CHAPTER 3

Moral Frameworks

An ethical theory seeks to provide a comprehensive perspective on morality that clarifies, organizes, and guides moral reflection. If successful, it provides a framework for making reasonable moral choices and resolving moral dilemmas—not a simple formula, but rather a unifying way to identify and integrate moral reasons. As one of their applications, ethical theories ground the requirements in engineering codes of ethics by reference to broader moral principles. In doing so, they illuminate connections between engineering ethics and everyday morality, that is, the justified moral values that play a role in all areas of life.

We discuss five types of ethical theories (and traditions) that have been especially influential: rights ethics, duty ethics, utilitarianism, virtue ethics, and self-realization ethics. *Rights ethics* says we ought to respect human rights, and *duty ethics* says we ought to respect individuals' rational autonomy. *Utilitarianism* says that we ought to maximize the overall good, taking into equal account all those affected by our actions. *Virtue ethics* says that good character is central to morality. *Self-realization ethics* emphasizes the moral significance of self-fulfillment. None of these theories has won a consensus, although each has proven attractive to many people. At least in some of their versions, they widely agree in their practical implications.

3.1 Rights Ethics, Duty Ethics, Utilitarianism

Rights Ethics

Rights are moral entitlements and valid moral claims that impose duties on other people. All ethical theories leave some room for rights, but the ethical theory called *rights ethics* is distinctive in that it makes human rights the ultimate appeal—the moral bottom line. Human rights constitute a moral authority to make legitimate moral demands on others to respect our choices, recognizing that others can make similar claims on us. At its

core, rights ethics emphasizes respecting the inherent dignity and worth of individuals as they exercise their liberty.

Rights ethics is the most familiar ethical theory, for it provides the moral foundation of the political and legal system of the United States. Thus, in the *Declaration of Independence* Thomas Jefferson wrote: "We hold these truths to be self-evident; that all men are created equal; that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty, and the pursuit of Happiness." Unalienable—or inalienable, natural, human—rights cannot be taken away (alienated) from us, although of course they are sometimes violated. Human rights have been appealed to in all the major social movements of the twentieth century, including the women's movement, the civil rights movement, the farm workers' movement, the gay rights movement, and the patients' rights movement (in health care).

The idea of human rights is the single most powerful moral concept in making cross-cultural moral judgments about customs and laws.[1] As such, the notions of human rights and legal rights are distinct. Legal rights are simply those the law of a given society says one has, whereas human rights are those we have as humans, whether the law recognizes them or not.

Rights ethics applies to engineering in many ways. It provides a powerful foundation for the special ethical requirements in engineering and other professions.[2] Most engineering codes of ethics enjoin holding paramount the safety, health, and welfare of the public, a requirement that can be interpreted as having respect for the public's rights to life, rights not to be injured by dangerous products, rights to privacy, and rights to receive benefits through fair and honest exchanges in a free marketplace. In addition, the basic right to liberty implies a right to give informed consent to the risks accompanying technological products, an idea developed in Chapter 4.

In addition to human rights, there are *special moral rights*—rights held by particular individuals rather than by every human being. For example, engineers and their employers have special moral rights that arise from their respective roles and the contracts they make with each other. Special rights are grounded in human rights, however indirectly. Thus, contracts and other types of promises create special rights because people

[1] See, for example, Patrick Hayden, ed., *The Philosophy of Human Rights* (St. Paul, MN: Paragon House, 2001); and James W. Nickel, *Making Sense of Human Rights,* 2nd ed. (Malden, MA: Blackwell, 2007).

[2] Alan H. Goldman, *The Moral Foundations of Professional Ethics* (Totowa, NJ: Rowman and Littlefield, 1980); and Alan Gewirth, "Professional Ethics: The Separatist Thesis," *Ethics* 96 (1986), 287.

have human rights to liberty that are violated when the understandings and commitments specified in contracts and promises are violated. And when consumers purchase products, there is an implicit contract, based on an implicit understanding, that the products will be safe and useful.

Rights ethics gets more complex as we ask which kinds of rights exist—only liberty rights, or also welfare rights? *Liberty rights* are rights to exercise our liberty, and they place duties on other people not to interfere with our freedom. (The "not" explains why they are also called negative rights.) *Welfare rights* are rights to benefits needed for a decent human life, when we cannot earn those benefits, perhaps because we are severely handicapped, and when the community has them available. (As a contrast to negative rights, they are sometimes called positive rights.)

Most rights ethicists affirm that both liberty and welfare human rights exist.[3] Indeed, they contend that liberty rights imply at least some basic welfare rights. What, after all, is the point of saying that we have rights to liberty if we are utterly incapable of exercising liberty because, for example, we are unable to obtain the basic necessities, such as jobs, worker compensation for serious injuries, and health care? Shifting to legal rights, most Americans also support selective welfare rights, including a guaranteed public education of kindergarten through twelfth grade, Medicare and Medicaid, Social Security, and reasonable accommodations for persons with disabilities.

Another influential version of rights ethics, however, denies there are welfare human rights. *Libertarians* believe that only liberty rights exist; there are no welfare rights. John Locke (1632–1704), who was the first philosopher to carefully articulate a rights ethics, is often interpreted as a libertarian.[4] Locke's version of human rights ethics was highly individualistic. He viewed rights primarily as entitlements that prevent other people from meddling in our lives. The individualistic aspect of Locke's thought is reflected in the contemporary political scene in the Libertarian political party and outlook, with its emphases on protecting private property, dismantling welfare systems, and opposition to extensive government regulation of business and the professions. Libertarians take a harsh view of taxes and

[3] For example, Ronald Dworkin, *Taking Rights Seriously* (Cambridge, MA: Harvard University Press, 1978); Alan Gewirth, *Human Rights* (Chicago: University of Chicago Press, 1982).

[4] John Locke, *Two Treatises of Government* (Cambridge: Cambridge University Press, 1960). Milton Friedman, discussed in Chapter 1, was another influential libertarian thinker. For a critique of libertarian views of property see Liam Murphy and Thomas Nagel, *The Myth of Ownership: Taxes and Justice* (New York: Oxford University Press, 2002).

government involvement beyond the bare minimum necessary for national defense, a legal system, and the preservation of free enterprise.

Locke thought of property as whatever we gained by "mixing our labor" with things—for example, coming to own lumber by going into the wilderness and cutting down a tree. Today, however, our understanding of property is far more complex. Many believe that property is largely what the law and government specify as to how we can acquire and use material things. Even so, Locke's followers tended to insist that property was sacrosanct and that governments continually intruded on property rights, particularly in the form of excessive taxation and regulation.

Finally, both libertarians and other rights ethicists can agree that few rights are absolute, in the sense of being unlimited and having no justifiable exceptions. When rights conflict with rights in practical situations, thereby creating ethical dilemmas, good judgment is required in arriving at reasonable solutions about how to reasonably balance the rights.

Duty Ethics

Rights and duties are typically correlated with each other. For example, our right to life places duties on others not to kill us, and our right to liberty places duties on others not to interfere with our freedom. *Duty ethics* reverses the order of priority by beginning with duties and deriving rights from them. Although the similarities between duty ethics and rights ethics are pronounced, historically they developed as distinct moral traditions.

Duty ethics says that right actions are those required by duties to respect the liberty or autonomy (self-determination) of individuals. One duty ethicist suggests the following list of important duties: "(1) Do not kill. (2) Do not cause pain. (3) Do not disable. (4) Do not deprive of freedom. (5) Do not deprive of pleasure. (6) Do not deceive. (7) Keep your promises. (8) Do not cheat. (9) Obey the law. (10) Do your duty [referring to work, family, and other special responsibilities]."[5]

How do we know that these are our duties? Immanuel Kant (1724–1804), the most famous duty ethicist, argued that all such specific duties derive from one fundamental duty to respect persons.[6] Persons deserve respect because they are moral agents—capable of recognizing and voluntarily responding to moral

[5] Bernard Gert, *Common Morality* (New York: Oxford University Press, 2004), 20.

[6] Immanuel Kant, *Groundwork of the Metaphysics of Morals,* in Immanuel Kant, *Practical Philosophy*, trans. Mary J. Gregor (New York: Cambridge University Press, 1996), 80.

duty (or, like children, they potentially have such capacities). *Autonomy*—moral self-determination or self-governance—means having the capacity to govern one's life in accordance with moral duties. Hence, respect for persons amounts to respect for their moral autonomy.

We ought always to treat persons as having their own rational aims, and not merely use them for our ends. Immorality occurs when we reduce other people to mere means to our ends and needs. Violent acts such as murder, rape, and torture are obvious ways of treating people as mere objects serving our own purposes. We also fail to respect persons if we fail to provide support for them when they are in desperate need, and we can help them at little inconvenience to ourselves. Some duties, then, are to refrain from interfering with a person's liberty, and some express requirements to help them when they are in need, thereby paralleling the distinction between liberty and positive rights. Of course we need to use one another as means all the time: Business partners, managers and engineers, and faculty and students use each other to obtain their personal and professional ends. Immorality occurs when we *merely* use persons as means to our goals, rather than as autonomous agents who have their own goals.

We also have duties to ourselves, for we too are rational and autonomous beings. As examples, Kant said we have a duty not to commit suicide, which would bring an end to a valuable life; we have duties to develop our talents, as part of unfolding our rational natures; and we should avoid harmful drugs that undermine our ability to exercise our rationality. Obviously, Kant's repeated appeal to the idea of rationality makes a number of assumptions about morally worthy aims. After beginning with the minimal idea of rationality as the capacity to obey moral principles, he built in a host of specific goals as part of what it means to be rational.

Kant emphasized that duties are universal: They apply equally to all persons. Here again, the idea is that valid principles of duty apply to all rationally autonomous beings, and hence valid duties will be such that we can envision everyone acting on them. This idea of universal principles is often compared to the Golden Rule: Do unto others as you would have them do unto you; or, in its negative version, Do not do unto others what you would not want them to do to you.[7]

Finally, Kant insisted that moral duties are "categorical imperatives." As imperatives, they are injunctions or commands that we impose on ourselves as well as other rational beings.

[7] Jeffrey Wattles, *The Golden Rule* (New York: Oxford University Press, 1996).

As categorical, they require us to do what is right *because* it is right, unconditionally and without special incentives attached. For example, we should be honest because honesty is required by duty; it is required by our basic duty to respect the autonomy of others, rather than to deceive and exploit them for our own selfish purposes. "Be honest!" says morality—not because doing so benefits us, but because honesty is our duty. Morality is not an "iffy" matter that concerns hypothetical (conditional) imperatives, such as "If you want to prosper, be honest." A businessperson who is honest solely because honesty pays—in terms of profits from customers who return and recommend their services, as well as from avoiding jail for dishonesty—fails to fully meet the requirements of morality. In this way, morality involves attention to motives and intentions, an idea also important in virtue ethics.

Kant's ideas of respect for autonomy, duties to ourselves, universal duties, and categorical imperatives have been highly influential. However, he made one large mistake. He thought that everyday principles of duty, such as "Do not lie" and "Keep your promises," were *absolute* in the sense of never having justifiable exceptions. In doing so, he conflated three ideas: (1) universality—moral rules apply to all rational agents; (2) categorical imperatives—moral rules command what is right because it is right; and (3) absolutism—moral rules have no justified exceptions. Nearly all ethicists reject Kant's absolutism, even ethicists who embrace his ideas of universality and categorical imperatives.

The problem with absolutism should be obvious. As we emphasized in Chapter 2, moral reasons are many and varied, including those expressed by principles of duty. Given the complexity of human life, they invariably come into conflict with each other, thereby creating moral dilemmas. Contemporary duty ethicists recognize that many moral dilemmas are resolvable only by recognizing some valid exceptions to simple principles of duty. Thus, engineers have a duty to maintain confidentiality about information owned by their corporations, but that duty can be overridden by the paramount duty to protect the safety, health, and welfare of the public.

To emphasize that most duties have some justified exceptions, philosophers now use the expression *prima facie duties.*[8] In this technical sense, prima facie simply means "might have justified exceptions" (rather than "at first glance"). Most duties are prima facie—they sometimes have permissible or obligatory exceptions. Indeed, the same is true of most rights and other moral prin-

[8] W. D. Ross, *The Right and the Good* (Oxford: Oxford University Press, 1946).

ciples, and hence today the term *prima facie* is also applied to rights and moral rules of all kinds.

Utilitarianism

Rights ethics and duty ethics agree that some types of actions, for example being fair and truthful, are (prima facie) obligatory for reasons independent of their consequences. In contrast, utilitarianism says the sole standard of right action is good consequences. There is only one general moral requirement: Produce the most good for the most people, giving equal consideration to everyone affected. (The word *utility* is sometimes used to refer to good consequences and other times to the balance of good over bad consequences.)

At first glance, the utilitarian standard seems simple and plausible. Surely morality involves producing good consequences—especially in engineering. Indeed, utilitarian modes of thinking are reflected in cost-benefit analyses: Tally up the likely good consequences of various options or proposals; do likewise for the likely bad consequences; and then favor that proposal which maximizes the overall good. Utilitarianism also seems a straightforward way to interpret the central principle in most engineering codes: "Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties." After all, *welfare* is a rough synonym for *overall good* (utility), and safety and health might be viewed as especially important aspects of that good.

Yet, what exactly is the good to be maximized? And should we maximize the good with respect to each situation, or instead with regard to general rules (policies, laws, principles in codes of ethics)? Depending on how these questions are answered, utilitarianism takes different forms.

To begin with, what is the standard for measuring *good* consequences? Specifically, what is *intrinsic good*—that is, good considered just by itself? All other good things are *instrumental goods* in that they provide means (instruments) for gaining intrinsic goods. Some utilitarians consider pleasure to be the only intrinsic good. But that seems counterintuitive—there is nothing good about the pleasures of tyrants and sadists take in inflicting suffering.

John Stuart Mill believed that happiness was the only intrinsic good, and hence he understood utilitarianism as the requirement to produce the greatest amount of happiness.[9] What is happiness? Sometimes Mill confused it with pleasures and enjoyments,

[9] John Stuart Mill, *Utilitarianism, with Critical Essays,* ed. Samuel Gorovitz (Indianapolis, IN: Bobbs-Merrill, 1971).

which are short-term, feel-good states of consciousness. In the main, however, Mill thought of happiness as (a) a life rich in pleasures, especially the "higher" pleasures of friendship, love, and intellectual endeavors, mixed with some inevitable pains, plus (b) a pattern of activities and relationships that we can affirm as the way we want our lives to be.

There are alternative theories of intrinsic good. Some utilitarians understand intrinsic goods as those which a reasonable person would pursue, or those which satisfy rational desires—those that we can affirm after fully examining them in light of relevant information, for example, love, friendship, appreciation of beauty, in addition to happiness. In sharp contrast, most economists adopt a preference theory: What is good is what individuals prefer, as manifested in what they choose to purchase in the marketplace. Arguments over which, if any, of these theories of intrinsic good obviously complicate utilitarian ethical theories.

In addition to developing a plausible view of intrinsic good, we need to decide whether to focus on individual actions or general rules. Classical, nineteenth-century utilitarians such as Mill believed in *act-utilitarianism:* A particular action is right if it is likely to produce the most good for the most people in a given situation, compared with alternative options available. The standard can be applied at any moment. Right now, should you continue reading this chapter? You might instead take a break, go to sleep, see a movie, or pursue any number of other options. Each option would have both immediate and long-term consequences that can be estimated. The right action is the one that produces the most overall good, taking into account everyone affected.

Yet, act-utilitarianism seems vulnerable to objections. It apparently permits some actions that we know, on other grounds, are patently immoral. Suppose that stealing a computer from my employer, an old one scheduled for replacement anyway, benefits me significantly and causes only miniscule harm to the employer and others. We know that the theft is unethical, and hence act-utilitarianism seems to justify wrongdoing. Again, suppose that in a particular situation more good is promoted by keeping the public ignorant about serious dangers, for example, by not informing them about a hidden fault in a car or building. Or suppose that it will improve company morale if several disliked engineers are fired after being blamed for mistakes they did not make. Doing so is unfair, but the overall good is promoted.

Such difficulties lead many, perhaps most, utilitarians to shift to an alternative version of utilitarianism that says we should maximize the good through following rules that maximize good consequences, rather than through isolated actions. According to this view, called *rule-utilitarianism,* right actions are those required by rules that produce the most good for the most people.

Because rules interact with each other, we need to consider a set of rules. Thus, we should seek to discover and act on an *optimal moral code*—that set of rules which maximizes the public good more than alternative codes would (or at least as much as alternatives).[10]

Rule-utilitarians have in mind society-wide rules, but the same idea applies to rules stated in engineering codes of ethics. Thus, an engineering code of ethics is justified in terms of its overall good consequences (compared to alternative codes), and so engineers should abide by it even when an exception might happen to be beneficial. For example, if codified rules forbidding bribes and deception are justified, then even if a particular bribe or deception is beneficial in some situations, one should still refrain from them.

Discussion Questions

1. Americans are sometimes criticized for being too individualistic, and in particular for approaching moral issues with too great an emphasis on rights. Although we said that rights and duties are usually correlated with each other, what difference (if any) do you think would occur if Jefferson had written, "We hold these truths to be self-evident; that all people are created equal; that they owe duties of respect to all other persons, and are owed these duties in return"?
2. What does the Golden Rule imply concerning how engineers and corporations should behave toward customers in designing and marketing products? As a focus, discuss whether crash-test information should be made available to customers concerning the possibly harmful side effects of a particular automobile. Does it matter whether the negative or positive version of the Golden Rule is used?
3. Cost-benefit analyses typically *reflect* utilitarian thinking, but too often they are slanted toward what is good for corporations, rather than the good for everyone affected, as utilitarians require. A cost-benefit analysis identifies the good and bad consequences of some action or policy, usually in terms of dollars.[11] It weighs the total positives against the total negatives, and then compares the results to similar tallies of the consequences of alternative actions or rules. In the following case, was Ford justified in relying exclusively on a cost-benefit analysis, or were

[10] Richard B. Brandt, *A Theory of the Good and the Right* (Oxford: Clarendon Press, 1979).

[11] Matthew D. Adler and Eric A. Posner, eds., *Cost-Benefit Analysis: Legal, Economic, and Philosophical Perspectives* (Chicago: University of Chicago Press, 2001).

there additional moral considerations that they should have used in deciding whether to improve the safety of the Pinto? What might rights ethicists and duty ethicists, as well as rule-utilitarians, say about the case?

For years, the Pinto was the largest-selling subcompact car in America. During the early stages of its development, crashworthiness tests revealed that the Pinto could not sustain a front-end collision without the windshield breaking. A quick-fix solution was adopted: The drive train was moved backward. As a result, the differential was moved very close to the gas tank. Thus many gas tanks collapsed and exploded on rear-end collisions at low speeds. In 1977, Mark Dowie published an article in *Mother Jones* magazine that divulged the cost-benefit analysis developed by Ford Motor Company in 1971 to decide whether to add an $11 part per car that would greatly reduce injuries by protecting the vulnerable fuel tank—a tank that exploded in rear-end collisions under 5 miles per hour.[12] The $11 seems an insignificant expense, even adjusting to current dollars, but in fact it would make it far more difficult to market a car that was to be sold for no more than $2,000. Moreover, the costs of installing the part on 11 million cars and another 1.5 million light trucks added up. The cost of not installing the part and instead paying out costs for death and injuries from accidents was projected using a cost-benefit analysis. The analysis estimated the worth of a human life at about $200,000, a figure borrowed from the National Highway Traffic Safety Administration. The cost per non-death injury was $67,000. These figures were arrived at by adding together such costs as a typical worker's future earnings, hospital and mortuary costs, and legal fees. In addition, it was estimated that approximately 180 burn deaths and another 180 serious burn injuries would occur each year. Multiplying these numbers together, the annual costs for death and injury was $49.5 million, far less than the estimated $137 million for adding the part, let alone the lost revenue from trying to advertise a car for the uninviting figure of $2,011, or else reducing profit margins.

4. Present and defend your view concerning the relative strengths and weaknesses of the views of libertarian rights ethicists and those rights ethicists who believe in both liberty and welfare rights. In doing so, comment on why libertarianism is having considerable influence today, and yet why the Libertarian Party repeatedly cannot win widespread support for its goals to dis-

[12] Mark Dowie, "Pinto Madness," *Mother Jones* (September–October 1977). See also Douglas Birsch and John H. Fielder, eds., *The Ford Pinto Case* (Albany, NY: State University of New York Press, 1994).

mantle all welfare programs, such as guaranteed public education from kindergarten to twelfth grade and health care for the elderly and low-income families.

5. Apply act-utilitarianism and rule-utilitarianism in resolving the following moral problems. Do the two versions of utilitarianism lead to the same or different answers to the problems?

a. George had a bad reaction to an illegal drug he accepted from friends at a party. He calls in sick the day after, and when he returns to work the following day he looks ill. His supervisor asks him why he is not feeling well. Is it morally permissible for George to lie by telling his supervisor that he had a bad reaction to some medicine his doctor prescribed for him?

b. Jillian was aware of a recent company memo reminding employees that office supplies were for use at work only. Yet she knew that most of the other engineers in her division thought nothing about occasionally taking home notepads, pens, computer disks, and other office "incidentals." Her eight-year-old daughter had asked her for a company-inscribed ledger like the one she saw her carrying. The ledger costs less than $20, and Jillian recalls that she has probably used that much from her personal stationery supplies during the past year for work purposes. Is it all right for her to take home a ledger for her daughter without asking her supervisor for permission?

6. Can utilitarianism provide a moral justification for engineers who work for tobacco companies, for example, in designing cigarette-making machinery? In your answer take account of the following facts (and others you may be aware of).[13] Cigarettes kill more than 400,000 Americans each year, which is more than the combined deaths caused by alcohol and drug abuse, car accidents, homicide, suicide, and acquired immunodeficiency syndrome (AIDS). Cigarette companies do much good by providing jobs (Philip Morris employs more than 150,000 people worldwide), through taxes (more than $4 billion paid by Philip Morris in a typical year), and through philanthropy. Most new users of cigarettes in the United States are teenagers (younger than eighteen years of age). There is disagreement over just how addictive cigarettes are, but adults have some choice in deciding whether to continue using cigarettes, and they may choose to continue using for reasons beyond the addictive potential of nicotine.

[13] Roger Rosenblatt, "How Do Tobacco Executives Live with Themselves?" *New York Times Magazine*, March 20, 1994, 34–41, 55.

The preceding ethical theories placed the primary emphasis on right acts and moral rules. Other ethical theories shift the focus to the kinds of persons we should aspire to be and become. *Virtue ethics* focuses on good character, and *self-realization ethics* focuses on self-fulfillment.

3.2 Virtue Ethics, Self-Realization Ethics

Virtue Ethics

Character is the pattern of virtues (morally desirable features) and vices (morally undesirable features) in persons. *Virtues* are desirable habits or tendencies in action, commitment, motive, attitude, emotion, ways of reasoning, and ways of relating to others. *Vices* are morally undesirable habits or tendencies. The words *virtue* and *vice* sound a bit old-fashioned. Words for specific virtues, however, remain familiar, both in engineering and in everyday life—for example, competence, honesty, courage, fairness, loyalty, and humility. Words for specific vices are also familiar: incompetence, dishonesty, cowardice, unfairness, disloyalty, and arrogance.

Aristotle (384–322 BC) suggested that the moral virtues are habits of reaching a proper balance between extremes, whether in conduct, emotion, or desire.[14] Virtues are tendencies to find the reasonable (*golden*) mean between the extremes of too much (excess) and too little (deficiency) with regard to particular aspects of our lives. Thus, truthfulness is the appropriate middle ground (mean) between revealing all information, in violation of tact and confidentiality (excess), and being secretive or lacking in candor (deficiency) in dealing with truth. Again, courage is the mean between foolhardiness (the excess of rashness) and cowardice (the deficiency of self-control) in confronting dangers. The most important virtue is practical wisdom, that is, morally good judgment, which enables us to discern the mean for all the other virtues.

The Greek word *arete* translates as either "virtue" or "excellence," an etymological fact that reinforces our theme of ethics and excellence going together in engineering. The most comprehensive virtue of engineers is responsible professionalism. This umbrella virtue implies four (overlapping) categories of virtues: public well-being, professional competence, cooperative practices, and personal integrity.

Public-spirited virtues are focused on the good of clients and the wider public. The minimum virtue is nonmaleficence, that is, the tendency not to harm others intentionally. As Hippocrates

[14] Aristotle, *Ethics*, trans. J. A. K. Thomson and Hugh Tredennick (New York: Penguin, 1976).

reportedly said in connection with medicine, "Above all, do no harm." Engineering codes of professional conduct also call for beneficence, which is preventing or removing harm to others and, more positively, promoting the public safety, health, and welfare. Also important is a sense of community, manifested in faith and hope in the prospects for meaningful life within professional and public communities. Generosity, which means going beyond the minimum requirements in helping others, is shown by engineers who voluntarily give their time, talent, and money to their professional societies and local communities. Finally, justice within corporations, government, and economic practices is an essential virtue in the profession of engineering.

Proficiency virtues are the virtues of mastery of one's profession, in particular mastery of the technical skills that characterize good engineering practice. Following Aristotle, some thinkers regard these values as intellectual virtues rather than distinctly moral ones. As they contribute to sound engineering, however, they are morally desirable features. The most general proficiency virtue is competence: being well prepared for the jobs one undertakes. Another is diligence: alertness to dangers and careful attention to detail in performing tasks by, for example, avoiding the deficiency of laziness and the excess of the workaholic. Creativity is especially desirable within a rapidly changing technological society.

Teamwork virtues are those that are especially important in enabling professionals to work successfully with other people. They include collegiality, cooperativeness, loyalty, and respect for legitimate authority. Also important are leadership qualities that play key roles within authority-structured corporations, such as the responsible exercise of authority and the ability to motivate others to meet valuable goals.

Finally, *self-governance virtues* are those necessary in exercising moral responsibility.[15] Some of them center on moral understanding and perception: for example, self-understanding and good moral judgment—what Aristotle calls practical wisdom. Other self-governance virtues center on commitment and on putting understanding into action: for example, courage, self-discipline, perseverance, conscientiousness, fidelity to commitments, self-respect, and integrity. Honesty falls into both groups of self-governance virtues, for it implies both truthfulness in speech and belief and trustworthiness in commitments.

[15] John Kekes, *The Examined Life* (Lewisburg, PA: Bucknell University Press, 1988).

Virtue ethics takes contrasting forms, depending on which virtues are emphasized. To illustrate, we will contrast Samuel Florman's emphasis on conscientiousness and team-work virtues with Alasdair MacIntyre's emphasis on wider loyalties to community.

Samuel Florman is famous for his celebration of the existential pleasures of engineering, that is, the deeply rooted and elemental satisfactions in engineering that contribute to happiness.[16] These pleasures have many sources. There is the desire to improve the world, which engages an individual's sense of personal involvement and power. There is the challenge of practical and creative effort, including planning, designing, testing, producing, selling, constructing, and maintaining, all of which bring pride in achieving excellence in the technical aspects of one's work. There is the desire to understand the world—an understanding that brings wonder, peace, and sense of being at home in the universe. There is the sheer magnitude of natural phenomena—oceans, rivers, mountains, and prairies—that both inspires and challenges the design of immense ships, bridges, tunnels, communication links, and other vast undertakings. There is the presence of machines that can generate a comforting and absorbing sense of a manageable, controlled, and ordered world. Finally, engineers live with a sense of helping, of contributing to the well-being of other human beings.

In elaborating on these pleasures, Florman implicitly sets forth a virtue ethics. In his view, the essence of engineering ethics is captured by the word *conscientiousness,* which combines competence and loyalty.[17] "Competence" does not mean minimally adequate, but instead performing with requisite skill and experience. It implies exercising due care, persistence and diligence, honesty, attention to detail, and sometimes creativity. Loyalty means serving the interests of organizations that employ us, within the bounds of the law. Unlike libertarians who favor minimum government regulation, Florman places great emphasis on laws as setting the basic rules governing engineering. Within a democratic setting in which laws express a public consensus, economic competition among corporations makes possible technological achievements that benefit the public. Competition depends on engineers who are loyal to their organizations, rather

[16] Samuel C. Florman, *The Existential Pleasures of Engineering*, 2nd ed. (New York: St. Martin's Griffin, 1994).

[17] Samuel C. Florman, *The Civilized Engineer* (New York: St. Martin's Press, 1987), 101.

than engineers "filtering their everyday work through a sieve of ethical sensitivity."[18]

Whereas Florman defends the priority of duties to employers, most professional codes that require engineers to hold paramount the safety, health, and welfare of the public, which does seem to imply "filtering their everyday work through a sieve of ethical sensitivity." Such an emphasis on the good of community is found in Alasdair MacIntyre's emphasis on public-spirited virtues in thinking about professions.[19] MacIntyre conceives of professions as valuable social activities, which he calls *social practices.*

A social practice is "any coherent and complex form of socially established cooperative human activity through which goods internal to that form of activity are realized in the course of trying to achieve those standards of excellence which are appropriate to, and partially definitive of, that form of activity."[20] To clarify, *internal goods* are good things (products, activities, experiences, etc.) that are so essential to a social practice that they partly define it. In engineering these goods are safe and useful technological products—products that can be further specified with regard to each area of engineering. Additional internal goods are *personal goods* connected with meaningful work, such as personal meaning in working *as an engineer* to create useful and safe public goods and services. In contrast, *external goods* can be earned in or outside specific professions, such as money, power, self-esteem, and prestige. Although both internal and external goods are important, excessive concern for external goods, whether by individuals or organizations, threatens internal goods and undermines social practices.

Whether in Florman's or MacIntyre's version, virtue ethics seems vulnerable to the criticisms that it is incomplete and too vague. The meaning and requirements of virtues need to be spelled out in terms of at least rough guidelines or rules, lest the virtues fail to provide adequate moral guidance.[21] For example, honesty requires certain kinds of actions, done from certain kinds of motives. It implies a disposition, among other things, not to tell lies (without special justification) because lying disrespects persons and otherwise causes harm.

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[18] Samuel C. Florman, *Blaming Technology* (New York: St. Martin's Press, 1981), 162–80.

[19] Some of the following material is from Mike W. Martin, "Personal Meaning and Ethics in Engineering," *Science and Engineering Ethics* 8 (2002): 545–60. It is used with permission of the publisher.

[20] Alasdair MacIntyre, *After Virtue*, 2nd ed. (South Bend, IN: University of Notre Dame Press, 1984), 187.

[21] James Rachels and Stuart Rachels, *The Elements of Moral Philosophy*, 5th ed. (Boston: McGraw-Hill, 2007), 173–90. In reply to the objection, see Rosalind Hursthouse, *On Virtue Ethics* (New York: Oxford University Press, 1999).

Self-Realization Ethics

Each of the preceding ethical theories leaves considerable room for self-interest, that is, for pursuing what is good for oneself. Thus, utilitarianism says that self-interest should enter into our calculations of the overall good; rights ethics says we have rights to pursue our legitimate interests; duty ethics says we have duties to ourselves; and virtue ethics links our personal good with participating in communities and social practices. *Self-realization ethics,* however, gives greater prominence to self-interest and to personal commitments that individuals develop in pursuing self-fulfillment. As with the other ethical theories, we will consider two versions, this time depending on how the self (the person) is conceived. In a community-oriented version, the self to be realized is understood in terms of caring relationships and communities. In a second version, called ethical egoism, the self is conceived in a highly individualistic manner.

The community-oriented version of self-realization ethics says that each individual ought to pursue self-realization, but it emphasizes the importance of caring relationships and communities in understanding self-realization. It emphasizes that we are social beings whose identities and meaning are linked to the communities in which we participate. This theme is expressed by F. H. Bradley (1826–1924): "The 'individual' apart from the community is an abstraction. It is not anything real, and hence not anything that we can realize. . . . I am myself by sharing with others."[22]

Individuals vary greatly in what they desire most strongly, and also in their talents and virtues.[23] Self-realization ethics points to the highly personal commitments that motivate, guide, and give meaning to the work of engineers and other professionals. These commitments enter into the core of an individual's character.[24] As such, they reflect what engineers care about deeply in ways that evoke their interest and energy, shape their identities, and generate pride or shame in their work. Personal commitments are commitments that are not incumbent on everyone—for example, specific humanitarian, environmental, religious, political, aesthetic, supererogatory, and family commitments. They also include, however, commitments to obligatory professional standards, especially when these are linked to an individual's broader value perspective.

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[22] F. H. Bradley, *Ethical Studies* (New York: Oxford University Press, 1962), 173.

[23] Alan Gewirth, *Self-Fulfillment* (Princeton, NJ: Princeton University Press, 1998).

[24] Bernard Williams, "Persons, Character and Morality," in *Moral Luck* (New York: Cambridge University Press, 1981), 5.

Personal commitments are relevant in many ways to professional life, including one's choice of career and choice of jobs. Most important, they create meaning; thereby they motivate professionalism throughout long careers. Professions offer special opportunities for meaningful work, which explains much of their attraction to talented individuals. The relevant idea of meaning has subjective aspects—a "sense of meaning" that enlivens one's daily work and life. It also has objective aspects—the justified values that make work worthwhile and help make life worth living. In the following passage Joanne B. Ciulla has in mind both subjective and objective meaning:

> "Meaningful work, like a meaningful life, is morally worthy work undertaken in a morally worthy organization. Work has meaning *because* there is some good in it. The most meaningful jobs are those in which people directly help others or create products that make life better for people. Work makes life better if it helps others; alleviates suffering; eliminates difficult, dangerous, or tedious toil; makes someone healthier and happier; or aesthetically or intellectually enriches people and improves the environment in which we live."[25]

As just one illustration of personal commitments, and of the motivation and guidance they generate, consider the commitment to be creative, as illustrated by Jack Kilby who coinvented the microchip. The invention has had momentous importance in making possible the development of today's powerful computers, so much so that in 2000 Kilby was awarded a Nobel Prize—a rare event for an engineer, as Nobel Prizes are usually given for fundamental contributions to science, not engineering. In retrospect, the idea behind the microchip seems simple, as do many creative breakthroughs. During the 1950s the miniaturization of transistors was being pursued at a relentless pace, but it was clear there would soon be a limit to the vast number of minute components that could be wired together. Kilby was well aware of the problem, sensed the need for a fundamentally new approach, and was driven by personal commitments to be creative in finding a solution. In July 1958, only a few weeks after starting a new job at Texas Instruments, he discovered the solution: Make all parts of the circuit out of one material integrated on a piece of silicon, thereby removing the need to wire together miniature components.

In making his discovery, Kilby was not pursuing a grand intention to provide humanity with the remarkable goods the

[25] Joanne B. Ciulla, *The Working Life: The Promise and Betrayal of Modern Work* (New York: Times Books, 2000), 225–26. See also Arnold Pacey, *Meaning in Technology* (Cambridge, MA: MIT Press, 1999).

microchip would make possible, although it is true he was known for his everyday kindness to colleagues. When he was about to give his Nobel lecture, he was introduced as having made the invention that "launched the global digital revolution, making possible calculators, computers, digital cameras, pacemakers, the Internet, etc."[26] In response, he told a story borrowed from another Nobel laureate: "When I hear that kind of thing, it reminds me of what the beaver told the rabbit as they stood at the base of Hoover Dam: 'No, I didn't build it myself, but it's based on an idea of mine.'"

Was Kilby merely seeking money, power, fame, and other rewards just for himself? No, although these things mattered to him. As one biographer suggests, "we see nothing extraordinary in Jack Kilby's private ambition or in his aim to find personal fulfillment through professional achievement. In that regard he was the same as the rest of us: We all pick professions with a mind to fulfilling ourselves."[27] Primarily, Kilby was pursuing interests he had developed years earlier in how to solve technical problems in engineering. In this regard he was exceptional only in his passion for engineering work. Like many creative individuals, he was persistent to the point of being driven, and he found great joy in making discoveries. But even saying this by itself would be misleading. The accurate observation is that he had multiple motives, including motives to advance technology, to be compensated for his work, and to do some good for others.

Building on this observation, we might sort the motives of professionals into three categories: proficiency, compensation, and moral.

Proficiency motives, and their associated values, center on excellence in meeting the technical standards of a profession, together with related aesthetic values of beauty. The undergraduate curriculum for engineering is generally acknowledged to be more rigorous and difficult than the majority of academic disciplines. We might guess that students are attracted to engineering in part because of the challenge it offers to intelligent people. Do empirical studies back up this somewhat flattering portrayal? To a significant extent, yes. Typically, students are motivated to enter engineering primarily by a desire for interesting and challenging work. They have an "activist orientation" in the sense of wanting to create concrete objects and systems—to

[26] T. R. Reid, *The Chip* (New York: Random House, 2001), 265. Robert Noyce would no doubt have shared the prize had he not died 10 years earlier (the award is not given posthumously). See Leslie Berlin, *The Man Behind the Microchip: Robert Noyce and the Invention of Silicon Valley* (New York: Oxford University Press, 2005).

[27] Jeffrey Zygmont, *Microchip* (Cambridge, MA: Perseus Publishing, 2003), 3.

build them and to make them work. They are more skilled in math than average college students, although they tend to have a low tolerance for ambiguities and uncertainties that cannot be measured and translated into figures.[28]

Compensation motives are for social rewards such as income, power, recognition, and job or career stability. We tend to think of these motives and values as self-interested, and in a large degree they are. Yet most people seek money for additional reasons, such as to benefit family members or even to be able to help others in need. In addition, financial independence prevents one from becoming a burden on others. In general, due regard for one's self-interest is a moral virtue—the virtue of prudence—assuming it does not crowd out other virtues.

Moral motives include desires to meet one's responsibilities, respect the rights of others, and contribute to the well-being of others. Such motives of moral respect and caring involve affirming that other people have inherent moral worth. In addition, moral concern involves maintaining self-respect and integrity—valuing oneself as having equal moral worth and seeking to develop one's talents.

For the most part, these motives are interwoven and mutually supportive. All of them, not only moral motives, contribute to providing valuable services to the community, as well as professional relationships among engineers, other involved workers, and clients. Engineering is demanding, and it requires engineers to summon and to integrate a wide range of motivations. Indeed, life itself is demanding, and it can be argued that our survival requires constant interweaving and cross-fertilization of motives.[29]

For many engineers, we should add, moral motivation and commitments are interwoven with spiritual and religious ones. Here are two examples. Egbert Schuurman is a Dutch Calvinist engineer who has written extensively on technology. Highlighting the dangers of technology, he calls for redirecting technology to serve morally worthy aims, both human liberation and respect for the environment. He and his coauthors of *Responsible Technology* articulate normative principles for design. They include: cultural appropriateness (preserving valuable institutions and practices within a particular society); openness (divulging to the public the value judgments expressed in products and also their known effects); stewardship (frugality in the use of natural resources and energy); harmony (effectiveness of products together with

[28] Robert Perrucci and Joel E. Gerstl, *Profession without Community: Engineers in American Society* (New York: Random House, 1969), 27–52.

[29] Mary Midgley, *Beast and Man: The Roots of Human Nature*, rev. ed. (New York: New American Library, 1994), 331.

promoting social unity); justice (respect for persons); caring (for colleagues and workers); and trustworthiness (deserving consumers' trust).[30]

The second example is Mark Pesce, who invented dial-up networking. In 1994, Pesce and a colleague developed the Virtual Reality Modeling Language (VRML), which allowed three-dimensional models to be placed on the World Wide Web. Emphasizing the importance of spiritual attitudes in his work, he makes it clear that his beliefs are neither orthodox nor associated solely with any one world religion. He characterizes his beliefs as "a mélange of a lot of different religious traditions, including Christian, pre-Christian, Buddhist, Taoist and so on," integrated into a type of "paganism," which is "a practice of harmony, a religion of harmony with yourself and the environment."[31] He is aware that his contributions to technology can be used as tools of communication or weapons of domination. Spiritual attitudes seek ways to allow aspects of the sacred into technology, to find ways for technology to make human life more interconnected through global communication, as well as attuned to nature, and to allow individuals to express themselves in more broadly creative ways through the Web.

These examples barely hint at the myriad ways in which personal commitments, ideals, and meaning enter into professional ethics, including how individuals construe codified responsibilities.[32] Later we offer additional illustrations; for example, in Chapter 7 we comment on personal commitments in connection with whistle-blowing, and in Chapter 8 we comment on environmental commitments.

Ethical Egoism

Ethical egoism is a more individualistic version of self-realization ethics that says each of us ought always and only to promote our self-interest. The theory is *ethical* in that it is a theory about morality, and it is *egoistic* because it says the sole duty of each of us is to maximize our well-being. Self-interest is understood as our long-term and enlightened well-being (good, happiness), rather than a narrow, short-sighted pursuit of immediate plea-

[30] Stephen V. Monsma et al., *Responsible Technology* (Grand Rapids, MI: William B. Eerdmans Publishing, 1986), 171–77. See also Egbert Schuurman, "The Modern Babylon Culture," in *Technology and Responsibility,* ed. Paul Durbin (Dordrecht, Holland: D. Reidel, 1987).

[31] "Virtually Sacred," an interview in W. Mark Richardson and Gordy Slack, *Faith in Science* (London: Routledge, 2001), 104.

[32] For additional examples, see: Caroline Whitbeck, *Ethics in Engineering Practice and Research* (New York: Cambridge University Press, 1998), 306–12; and Mary Tiles and Hans Oberdiek, *Living in a Technological Culture: Human Tools and Human Values* (New York: Routledge, 1995), 172–75.

sures that leaves us frustrated or damaged in the long run. Thus, Thomas Hobbes (1588–1679) and Ayn Rand (1905–1982) recommended a "rational" concern for one's long-term interests. Nevertheless, ethical egoism sounds like an endorsement of selfishness. It implies that engineers should think first and last about what is beneficial to themselves, an implication at odds with the injunction to keep paramount the public health, safety, and welfare. As such, ethical egoism is an alarming view.

Are there any arguments to support ethical egoism? Rand offered three arguments. First, she emphasized the importance of self-respect, and then portrayed altruism toward others as incompatible with valuing oneself. She contended that acts of altruism are degrading, both to others and to oneself: "altruism permits no concept of a self-respecting, self-supporting man—a man who supports his life by his own effort and neither sacrifices himself nor others."[33] This argument contains one true premise: Independence is a value of great importance, especially in democratic and capitalistic economies. Yet, independence is not the only important value. In infancy, advanced age, and various junctures in between, each of us is vulnerable. We are also interdependent, as much as independent. Self-respect includes recognition of our vulnerabilities and interdependencies, and certainly it is compatible with caring about other persons as well as about ourselves.

Rand's second argument was that the world would be a better place if all or most people embraced ethical egoism. Especially in her novels, Rand portrayed heroic individuals who by pursuing their self-interest indirectly contribute to the good of others. She dramatized Adam Smith's "invisible hand" argument, set forth in 1776 in *The Wealth of Nations*. According to Smith, in the marketplace individuals do and should seek their own economic interests, but in doing so it is as if each businessperson were "led by an invisible hand to promote an end which was no part of his intention."[34] To be sure, Smith had in mind the invisible hand of God, whereas Rand was an atheist, but both appeal to the general good for society of self-seeking in the professions and business. This argument, too, contains an enormously important truth (although unrestrained capitalism does not always maximizes the general good). Nevertheless, contrary to Rand, this argument does not support ethical egoism. For notice that it assumes we ought to care about the well-being of others, for their sake—something denied by ethical egoism itself! And once

[33] Ayn Rand, *The Virtue of Selfishness* (New York: New American Library, 1964), ix, italics removed.

[34] Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, vol. 1 (New York: Oxford University Press, 1976), 456.

the general good becomes the moral touchstone, we are actually dealing with a version of utilitarianism.

Rand's third and most important argument was more complex, and it leads to a discussion of human nature and motivation. It asserted that ethical egoism was the only psychologically realistic ethical theory. By nature, human beings are exclusively self-seeking; our sole motives are to benefit ourselves. More fully, *psychological egoism* is true: All people are always and only motivated by what they believe is good for them in some respect. Psychological egoism is a theory about psychology, about what actually motivates human beings, whereas ethical egoism is a statement about how they ought to act. But if psychological egoism is true, ethical egoism becomes the only plausible ethical theory. If by nature we can only care about ourselves, we should at least adopt an enlightened view about how to promote our well-being.

Is psychological egoism true? Is the only thing an engineer or anyone else cares about, ultimately, their own well-being? Psychological egoism flies in the face of common sense, which discerns motives of human decency, compassion, and justice, as well as the proficiency motives mentioned earlier. It is difficult to refute psychological egoism directly, because it radically reinterprets both common sense and experimental data. But we can show that most arguments for psychological egoism are based on simple although seductive confusions. Here are four such arguments for psychological egoism.[35]

Argument 1. We always act on our own desires; therefore, we always and only seek something for ourselves, namely the satisfaction of our desires.

—In reply, the premise is true: We always act on our own desires. By definition, *my* actions are motivated by *my* desires together with *my* beliefs about how to satisfy those desires. But the conclusion does not follow. There are many different kinds of desires, depending on what the desire is for—the object of the desire. When we desire goods for ourselves, we are self-seeking; but when we desire goods for other people (for their sake), we are altruistic. The mere fact that in both instances we act on our own desires does nothing to support psychological egoism.

Argument 2. People always seek pleasures; therefore they always and only seek something for themselves, namely their pleasures.

[35] See James Rachels and Stuart Rachels, *The Elements of Moral Philosophy,* 68–88.

—In reply, there are different sources of pleasures. Taking pleasure in seeking and getting a good solely for oneself is different from taking pleasure in helping others.

Argument 3. We can always imagine there is an ulterior, exclusively self-seeking motive present whenever a person helps someone else; therefore people always and only seek goods for themselves.

—In reply, there is a difference between imagination and reality. We can imagine that people who help others are only seeking fame, but it does not follow that they actually are motivated in this way.

Argument 4. When we look closely, we invariably discover an element of self-interest in any given action; therefore people are solely motivated by self-interest.

—In reply, there is an enormous difference between the presence of an element of self-interest (asserted in the premise) and inferring the element is the only motive (asserted in the conclusion). Many actions have multiple motives, with an element of self-interest mixed in with concern for others.

We conclude that there are no sound reasons for believing psychological egoism, nor for believing ethical egoism. Nevertheless, having emphasized that self-seeking is not the only human motive, we certainly acknowledge that it is a very strong motive. Indeed, quite possibly *predominant egoism* is true: The strongest desire for most people most of the time is self-seeking.[36] It is also plausible to believe that most acts of helping and service to others involve mixed motives, that is, a combination of self-concern and concern for others.

Unlike psychological egoism, predominant egoism acknowledges human capacities for love, friendship, and community involvement. It also acknowledges engineers' capacities for genuinely caring about the public safety, health, and welfare. Engineers are strongly motivated by self-interest, but they are also capable of responding to moral reasons in their own right, as well as additional motives concerned with the particular nature of their work.

Which Ethical Theory Is Best?

Just as ethical theories are used to evaluate actions, rules, and character, ethical theories can themselves be evaluated. In this chapter, our concern has been to introduce some influential ethical theories rather than to try to determine which is preferable. Nevertheless, we argued against particular versions of each type

[36] Gregory S. Kavka, *Hobbesian Moral and Political Theory* (Princeton, NJ: Princeton University Press, 1986).

of theory. For example, we argued against act-utilitarianism, as compared with rule-utilitarianism, and we argued against ethical egoism. We hinted at our preference, as authors, for nonlibertarian versions of rights ethics. And we suggested that few duties are absolute, contrary to Kant.

Which criteria can be used in assessing ethical theories, and which criteria did we use? The criteria follow from the very definition of what ethical theories are. Ethical theories are attempts to provide clarity and consistency, systematic and comprehensive understanding, and helpful practical guidance in moral matters. Sound ethical theories succeed in meeting these aims.

First, sound ethical theories are clear and coherent. They rely on concepts (ideas) that are sufficiently clear to be applicable, and their various claims and principles are internally consistent.

Second, sound ethical theories organize basic moral values in a systematic and comprehensive way. They highlight important values and distinguish them from what is secondary. And they apply to all circumstances that interest us, not merely to a limited range of examples.

Third, and most important, sound ethical theories provide helpful guidance that is compatible with our most carefully considered moral convictions (judgments, intuitions) about concrete situations. Who does "our" refer to? It refers to each of us, in moral dialogue with others. To take an extreme case, if an ethical theory said it was all right for engineers to create extremely dangerous products without the public's informed consent, then that would show the theory is inadequate.

Of course, even our most carefully considered convictions can be mistaken, sometimes flagrantly so as with racists and other bigots. An important role of a sound ethical theory is to improve our moral insight into particular problems. Hence, there is an ongoing checking of an ethical theory (or general principles and rules) against the judgments about specific situations (cases, dilemmas, issues) that we are most confident are correct, and, in reverse, a checking of our judgments about specific situations by reference to the ethical theory. Theories and specific judgments are continually adjusted to each other in a back-and-forth process until we reach what John Rawls calls a *reflective equilibrium.*[37]

Which of the ethical theories most fully satisfies these criteria? In our view, some versions of rule-utilitarianism, rights ethics, duty ethics, virtue ethics, and self-realization ethics all satisfy the criteria in high degrees. We find ourselves more impressed

[37] John Rawls, *A Theory of Justice*, rev. ed. (Cambridge, MA: Harvard University Press, 1999), 18.

by the similarities and connections, rather than the differences, among the general types of theories.

Discussion Questions

1. Review the National Society of Professional Engineers (NSPE) Code of Ethics (in the Appendix). To what extent do its Preamble and Fundamental Canons rely on the language of the virtues? Try rewriting the Fundamental Canons entirely in terms of the virtues, and comment on what is lost or gained in doing so.
2. Discuss similarities and differences in the views of Samuel Florman and Alasdair MacIntyre, and what you find insightful and problematic in their views.
3. The following widely discussed case study was written by Bernard Williams (1929–2003). The case is about a chemist, but the issues it raises are equally relevant to engineering. What should George do to best preserve his integrity? Is it permissible for him to take the job and "compartmentalize" so as to separate his work and his personal commitments? In your answer, discuss whether in taking the job George would be compromising in either of the two senses of "compromise": (1) undermine integrity by violating one's fundamental moral principles; (2) settle moral dilemmas and differences by mutual concessions or to reconcile conflicts through adjustments in attitude and conduct.[38] What might rights ethicists and utilitarians say?

   > George, who has just taken his doctorate in chemistry, finds it extremely difficult to get a job. He is not very robust in health, which cuts down the number of jobs he might be able to do satisfactorily. His wife has to go out to work to keep [i.e., to support] them, which itself causes a great deal of strain, since they have small children and there are severe problems about looking after them. The results of all this, especially on the children, are damaging. An older chemist, who knows about this situation, says that he can get George a decently paid job in a certain laboratory, which pursues research into chemical and biological warfare.[39]

4. With regard to each of the following cases, first discuss what morality requires and then what self-interest requires. Is the answer the same or different?
   a. Bill, a process engineer, learns from a former classmate who is now a regional compliance officer with the Occupational Safety and Health Administration (OSHA) that there will be

[38] Martin Benjamin, *Splitting the Difference: Compromise and Integrity in Ethics and Politics* (Lawrence, KS: University Press of Kansas, 1990).

[39] Bernard Williams, *Utilitarianism: For and Against* (New York: Cambridge University Press, 1973), 97–98.

an unannounced inspection of Bill's plant. Bill believes that unsafe practices are often tolerated in the plant, especially in the handling of toxic chemicals. Although there have been small spills, no serious accidents have occurred in the plant during the past few years. What should Bill do?[40]

b. On a midnight shift, a botched solution of sodium cyanide, a reactant in an organic synthesis, is temporarily stored in drums for reprocessing. Two weeks later, the day shift foreperson cannot find the drums. Roy, the plant manager, finds out that the batch has been illegally dumped into the sanitary sewer. He severely disciplines the night shift foreperson. Upon making discreet inquiries, he finds out that no apparent harm has resulted from the dumping.[41] Should Roy inform government authorities as is required by law in this kind of situation?

5. Wrongdoing by professionals is often caused in part by pressures within their organizations, but character remains important in understanding why only some professionals succumb to those pressures and engage in wrongdoing. Return to LeMessurier in the Citicorp case in Chapter 1 and discuss what kinds of character faults might tempt other engineers in his situation to simply ignore the problem. The faults might be general ones in an individual or those limited to the situation. Consider each of the following categories: (a) moral indifference and negligence, (b) intentional (knowing) wrongdoing, (c) professional incompetence, (d) bias or lack of objectivity, (e) fear, (f) lack of effort, (g) lack of imagination or perspective.

6. Discuss the following claim: "It is irrelevant what the motives of professionals are; what matters is that they do what is right." In your answer, distinguish questions about the motives for a specific right action and questions about habits or patterns of motivation throughout a career.

7. Long before H. G. Wells wrote *The Invisible Man,* Plato (428–348 BC), in *The Republic,* described a shepherd named Gyges who, according to a Greek legend, discovers a ring that enables him to become invisible when he turns its bezel. Gyges uses his magical powers to seduce the queen, kill the king, and take over an empire. If we have similar powers, why should we feel bound by moral constraints? In particular, if professionals are sufficiently powerful to pursue their desires without being caught for malfeasance, why should they care about the good of the wider public?

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[40] Jay Matley, Richard Greene, and Celeste McCauley, "Health, Safety and Environment," *Chemical Engineering* 28 (September 1987), 115.

[41] Ibid., 117.

In your answer, reflect on the question “Why be moral?” Is the question asking for self-interested reasons for being moral, and if so does it already presuppose that only self-interest, not morality, provides valid reasons for conduct?