

## CHAPTER 8

# Global Issues

This chapter will discuss issues faced by global trade and increasing globalisation. This assumes importance since many Indian engineers are working outside India and many foreign engineers are working in India. The awareness about global issues is necessary to help deal with various aspects of professional interactions. Cross-cultural issues and complex environmental issues (which were discussed in the second chapter) are thrown up thanks to globalisation of business. The impact of weapons development is also covered. This Chapter presents some tools for solving international ethical problems. The Global Compact, which is an initiative taken by the United Nations is presented briefly.

Impediments to international trade in goods and services and investment continue to fall one by one every day. The free trade movement, the power of information age, technology, the shift of formerly communist and dictatorial states toward democracy and capitalism are all significant factors. Free markets, the means to supply them and the investments to support them have all gone global. As a result, the global trade has been increasing in double-digit percentages every year.

For most part of the world, this has resulted in more freedom, choice, income, economic growth, food production and longer life expectancy. But globalisation has also produced other major concerns. One is the shift in power from elected national governments to transnational corporations accountable to none and to such unelected global bodies as the World Trade Organisation, the International Monetary Fund and the World Bank. Another concern is the growing gap between the globalised 'haves' and non-globalised 'have-nots'. A third concern is the questionable performance of some transnational corporations and their suppliers, who have taken advantage of lower legal, environmental, corruption, labour and human rights standards in the less developed parts of the world. (*When a company operates in several countries, it is known as a multinational or transnational corporation. For example, Smith Kline Beecham, Unilever, Ford, Toyota etc. are MNCs.*)

There are other factors at work as well. Technology has made business practices around the world effectively transparent and fast. There is no place to hide any more because of Internet, CNN, BBC

**Values such as do not kill, lie or cheat are shared by most cultures around the world**

etc. Values such as do not kill, lie or cheat are shared by most cultures. Practices vary between cultures (e.g., gender discrimination) and can cause difficulties for international operations. There is a need for ethical leadership from all sectors of society to maintain a level playing field and development of more international guidelines and law that can be effectively enforced.

## ROLE OF PROFESSIONAL ENGINEERING

In continuation with the previous chapter wherein we looked at the roles performed by an engineer, here we focus on it in the context of the globalised world. The roles might be indirect, such as designing, manufacturing and marketing products for export. It could be direct such as working for an Indian company living in a foreign country. An engineer could be a part of an international engineering services consulting practice. Their success will be based on competence, fairness and high standards of practice and ethics. Indian engineers have made a name for themselves in software development. The direct roles are in design and project management functions like

- Technical advisor to a foreign government especially regarding standards
- Definer of contract terms of reference and contract negotiation.
- Trainer of local personnel for transfer technology to a foreign country, and
- Expert witness for contract interpretation.

These roles require the Clients to have trust in an engineer's technical competence as well as his integrity and professional ethics.

### International Ethics

In a global economy, many projects are often international. They bring together people from different traditions with different values and do business in different ways. Westerners sometimes have difficulty making the adjustment, because they are Universalists. They deeply hold the belief that all peoples should be basically the same (*i.e.*, similar to them), although some may be further along the path of development than others. Whatever they may believe, people are in fact very diverse. Cultures have developed fundamentally different and evolved equally legitimate solutions to life's problems. The key to working in a multicultural setting is to acknowledge the possibility of radically different approaches to life.

This is obviously a large topic, and attention here is restricted to a few behavior patterns that are considered unethical or unprofessional by Western standards. Engineers working abroad (or at home!) may encounter cronyism, nepotism, kickbacks, and bribes. Westerners view them as corrupting, and they are in fact corrupting in a Western context. They may or may not be corrupting in other systems, which can likewise be corrupted, but in different ways. Another cultural pattern that Westerners may find disturbing is the discrimination against women in business. The discussion here refers vaguely to non-Western cultures, but every culture has its own way of doing business and getting the job done. Before beginning an international assignment, the engineer should study the host culture and if possible the language. Some resources indexed by country may be found at <http://ba.gsia.cmu.edu/jnh/culture>.

### Kickbacks

A classic situation is that of a purchasing agent for a company or a government. A representative of a potential supplier offers the agent a side payment in exchange for a contract. In the West this is unethical, and perhaps illegal in the case of government agents. In many countries it is business as usual. Kickbacks are corrupting in the West because they imply a conflict of interest. The purchasing agent is supposed to represent the interests of his company. If the agent is taking payments, his or her own interests interfere. The procedure is to look at bids, investigate the companies, and choose the

best deal. This works because the system is based on rules and transparency. Bids, annual reports, accounting statements and the like are expected to reveal the facts about the supplier. If they do not, the supplier is guilty of fraud and could be taken to court. Business relationship is based primarily on a framework of rules that most people believe in and take seriously. (The government enforces the rules, but enforcement is impossible unless most people are already inclined to obey them.)

In a different kind of system, business relationships are personal. Rather than doing business with a company, one does business with a person, who happens to work for a certain company. The relationship is based on mutual trust, which may be built over a long period. When things go wrong, it is no use to call a lawyer. The agent must rely upon his personal relationship with another human being. Because a major part of the agent's task is to establish this relationship, there is no conflict of interest in doing so. One way for a supplier to demonstrate his commitment to the relationship is to put money on the line. If the supplier has paid for the relationship, he is less likely to vanish when there is a problem. The agent who receives a kickback is therefore doing his job.

Written contracts are traditionally not part of this process, because the concept of a contract presupposes an overarching framework of rules and law that enforce the contract. Many people around the world do not believe in the legitimacy of any such framework, because they are not universalists as Westerners are. They regard a piece of paper as just that. Any kind of enforceability must be based on flesh and blood, on a relationship of mutual trust and commitment between human beings. Because most business people have accepted the Western practice of writing contracts, some interesting anomalies result. For example, in some countries (e.g., Egypt), it is customary to write kickbacks into the contract.

### Cronyism

In much of the world, one routinely lets contracts to one's friends. The reason, again, is that business is based on trust relationships with individuals. They take different forms in different countries. In China one speaks of *guanxi* (the Putonghua word for "relationship"), which is a long-term association based on mutual obligation. In Mexico business relationships reflect bonds of friendship and affection. In Japan and Korea, they are based on an old-boy network formed during college days. The West refers to this as cronyism and complains of lack of transparency. To be sure, there is nothing transparent about it. A businessperson would be reluctant to ask a partner for too much.

Accounting information even if it were reliable, are not asked for because to do so would be to insult the partner's honour. This relationship-based system can work quite well, however. Such systems have sustained great civilizations for thousands of years; western capitalism has been around only for the last 500 years. A business commitment based on a proper relationship is as solid as anything in this life (although the parties often ask each other to renegotiate). With this background, it is not hard to trace the cause of the Asian financial crisis: investors poured in funds based on (insufficient) public information, rather than cultivating the sort of trust relationship that for millennia underscored investment in that part of the world. It still does in China and Taiwan, which largely escaped the crisis.

In much of the world, cronyism provides the social glue that makes business possible. Far from being immoral, it reflects a highly developed moral sensibility that is often missing in the West. It occurs in relationship-based cultures, in which people place high priority on solicitude for the welfare and feelings of their associates. Maintaining courtesy, respect, loyalty and honor is a fine art. It must be acknowledged, however, that many countries have evolved an uncomfortable blend of Western and indigenous practices. It may be hard to evaluate such cases, and one must look at each one individually.

Maintaining Courtesy, Respect, Loyalty and Honour is a fine art

### Nepotism

Nepotism is also standard practice in much of the world. A businessperson from the United States may be asked to hire relatives or the local boss. The proper response is to oblige if the relative will work in the host country, but not if he would work in the United States, which has different norms. Hiring relatives, or relatives of friends, has advantages in many cultures. Some may be incompetent, but in any case the boss knows their strengths and weaknesses better than those of other employees, and he can assign them duties accordingly. This is possible because employees are most likely to be managed directly by the boss than assigned to a fixed job description. Also in non-Western cultures, an older relative tends to carry great authority. This can enable the boss to obtain a level of effort and devotion that would not be forthcoming from more competent but unrelated employees.

The main reason for nepotism, however, is the primacy of the family, which is the foundation in many cultures. From this point of view, many people may consider Western family relationships with their broken and troubled histories, as dysfunctional and inefficient.

### Bribes

The definition of a bribe varies around the world. Many people regard a kickback as a "commission," not as bribe. A gift of a new BMW after the conclusion of a deal may be viewed as an expression of gratitude rather than a bribe, even if some degree of quid pro quo is implied. Bribes, however defined, may be legal or illegal. In China, the punishment for bribery can be death by firing squad. Illegal bribery may or may not be widely practiced. In Singapore, no one dares; in China, it is ubiquitous. The businessperson from abroad must know the local situation.

Bribes may or may not be corrupting for the culture in which they occur. In South Korea, payments in white envelopes are a regular feature of dealings with government officials. In many cases they help to cement a continuing relationship. These relationships are important, because government officials learn which companies are acting properly by cultivating personal ties with their executives. The bribe signals that the executive is serious and will behave himself to avoid upsetting a relationship in which he has invested. Bribes therefore need not be corrupting, although it should be noted that it is "loss of face" to be exposed for bribery. Koreans seem to realize that bribery could easily get out of hand and become corrupting (just as legalism can get out of hand in a rule-based culture, as it has in the United States).

Bribery is usually corrupting when it occurs in rule-based Western countries or does not contribute to relationships that are essential to making the system work. It is corrupting in Japan, for example, because it undermines loyalty to the group, the foundation of Japanese society. It is largely corrupting in China, because it incapacitates the central government. Petty bribery allows many governments to operate, because government salaries are too meager to live on; larger bribes and misappropriation of funds are dysfunctional. The moral status of bribery in Indonesia and Malaysia is less clear. It is widespread in Russia and parts of Eastern Europe, where it is an unmitigated evil. It is far from unknown in the United States. A few years ago, no less a figure than the Chief Justice of a state Supreme Court was impeached and removed from office for taking bribes.

Corruption tends to be most prevalent in cultures that have been disrupted by war or colonialism, as for example in some African countries, where bribes are often excessive and harmful to business. Bribery is similarly a legacy of past injustice and violence in Latin American countries, where people regard it as a serious social problem, even those who engage in it. U.S. Foreign Corrupt Practices Act makes it illegal for them to bribe officials of foreign governments. The law does not prohibit bribery of private business people, or payment of extortion money. It also permits "facilitating payments," such as small side payments to officials. The law is vague and unevenly enforced, and it is wise to consult lawyers when in doubt. In fact, when in a foreign country it is wise to avoid.

**The definition of Bribe varies across the countries**

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### Relativism

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businessperson from the United States, which has a more formal response to obligation if the transaction is to go through. In many cultures better than employees are seen as more competent but uncharitable.

### Gender Discrimination

Different cultures can have very different attitudes toward gender equality. A visitor from the United States or Europe tends to notice this right away, because it is a high profile issue back home. A case study called the "Foreign Assignment" (Dunfee and Robertson, 1997) describes a female bank employee in the United States who asked to be transferred to a branch in Mexico City. She encountered patronizing attitudes from male coworkers and, from clients, a lack of respect for her professional competence. Her dilemma was whether to acquiesce in this aspect of the local culture or fight it. She chose the latter with the result that her superiors gave her lukewarm evaluations and her career advance floundered.

Cultural patterns of this sort usually exist to serve a purpose in the larger system. The tradition of machismo in Mexico can be traced to Moorish Spain. It is centered on the concept of manly honor. Like so many cultural practices, it is a stress control mechanism. The underlying cause of stress is lack of control over one's fate. A young man growing up in Latin America once faced (and in some cases still faces) a life of danger and violence. To deal with this stress, he learned to take control of the situation. Rather than give in to fate, he took action, often violent. Rather than surrender his wife and children to danger, he protected them by whatever means was necessary. Machismo made a virtue of necessity: by facing up to danger "like a man," the Latino experienced life as an occasion to display manly honor rather than to cower with fear. Machismo was a way of making a hard life bearable for men and women alike. The patronizing attitude toward women therefore does not imply that women are inferior; only that they have a different role. They nurture the family while men shield it from danger. In fact, the flip side of machismo is Marianism (after Mary, mother of Jesus), which views women as morally superior to men. What U.S. women experience as demeaning, traditional Latina women accept as a sign of respect.

In recent times this system has evolved, at least among the upper classes, to an emphasis on devotion to family. A man of honor puts his family first. One way that Mexicans judge whether a business partner is trustworthy is to find out if he is a good family man. In particular he should never let business take precedence over the family. A Mexican businessman will cancel a meeting or miss an appointment to take care of family matters. He may spend a long lunch hour with the family or take several days off to assist an older relative or attend a funeral. This presents a stark contrast with business in the United States, where companies often expect total commitment, as though families did not exist. U.S. business people might well envy the Mexican way when it comes to family.

The Western habit of viewing different cultures as simply more or less advanced is therefore inadequate. Different peoples have made different tradeoffs and arrived at different solutions to life. Every solution favors certain human virtues and develops some aspects of human potential while suppressing others. A Westerner who simply resists a culture that seems retrograde misses an opportunity to develop a side of his or her humanity that is neglected back home.

### Ethical Relativism

From the discussion of above emerges the concept of ethical relativism. This refers to the differences in interpretations and evaluations of behavior in different cultures. It is said that when in Rome, one should do as the Romans do. This principle is inadequate to guide one's operations in foreign countries. The host countries policies and the local countries policies create conflict. There are many versions of relativism.

Ethical relativism means that actions are morally right within a particular society because law,

custom or other conventions of the society approve them. This is not always true. Descriptive relativism means that, as a matter of fact, the value beliefs and attitudes differ from culture to culture. It says that there are differences between the moral beliefs and attitudes of various cultures. However, just because certain cultures approves of rapes does not mean that they are ethical.

Moral relativism means that moral judgments are contextual. It believes in the situational theory. For example lying is immoral. Special circumstances can arise where people have to lie in order to save a life or protect their privacy from intruders.

Relativism is important in multinational contexts involving different cultures. This helps people to make adjustments.

### International Rights

The MNCs have to respect the International rights. They must understand the necessity and importance of these rights while operating their business in the host country. Donaldson\* suggests the following ten international rights:

1. The right to freedom of physical movement
2. The right to ownership of property
3. The right to freedom from torture
4. The right to a fair trial
5. The right to nondiscriminatory treatment ( freedom from discrimination on the basis of race and sex )
6. The right to physical security
7. The right to freedom of speech and association
8. The right to minimal education
9. The right to political participation
10. The right to subsistence.

MNCs must promote morally just measures even though the host countries standards might be lower. For example, DDT is harmful to health, even though in underdeveloped countries the laws are not stringent, company should not promote the product or educate the users about the product.

The transfer of technology across borders and appropriateness of such technology are applicable to MNCs. They transfer outdated technology to underdeveloped countries. Is this ethical? In the automobile industry, outdated models with safety features considered inadequate are introduced in less developed countries so that machineries and plant which are unacceptable in developed countries are used to in under developed regions. Is this to be accepted?

MNCs should look at the appropriate technology while selecting a technology for different countries. Nirma uses semi manual technology to produce detergents while Hindustan Lever uses automated technology. The costs are low for Nirma so also the price of the product. Water coolers work in dry climates in Hyderabad and Pune, but in Chennai they are not effective. Only air conditioners are effective. Appropriate technology refers to the most suitable technology. For example: a country with many poor farmers can make better use of small, single or two wheel tractors that can serve as motorized ploughs, to pull wagons or to drive pumps, than huge diesel tractors. On the other hand, the same country may benefit from the latest micro technology to spread a telephone network. Appropriateness should be examined from scale, technical and managerial skills, materials, environment, capital costs and above all human values.

\*Donaldson Thomas, *The Ethics of International Business*, New York : Oxford University Press, 1989, p.83.

## Bhopal disaster – A case study

Union Carbide is a US based MNC. It has branches all over the world. In 1970, it transformed its pesticide plant in Bhopal from just mixing chemicals to full-scale manufacturing. The company in its home country was fully aware of the dangers of the new technology while transferring the technology. In its main plant in USA they produced Methyl Iso-Cyanate, which was the main poison used in pesticides, particularly used in India. Methyl Iso-Cyanate is a concentrated gas, which burns any moist part in the body by affecting throats and nasal passages, blinding the eyes and even destroying lungs leading to death.

While installing the Bhopal plant, Union Carbide did not transfer all the available safety mechanisms. In the USA it used computerized instruments to control the safety systems to detect leaks. But in Bhopal, safety controls were manual.

The Indian Government had told the company that the Bhopal plant should be operated fully by Indian workers. So, Union Carbide USA took some care to give training to the Indian personnel in the USA. It also sent teams of US engineers to India to make regular safety inspections. But in the year 1982, due to financial pressures, the Company reduced its supervision of the Bhopal plant. On their last inspection, the US engineers had warned of many risks and dangers, which finally led to the disaster.

In the subsequent years, safety practices were reduced gradually due to high turnover of employees, failure in giving training to the new employees and lack of technical awareness among the Indian laborers. Due to this, the workers learned more about the dangers of pesticides from their personal experience than from the study of safety manuals. They also forgot the safety practices of US standards. They used only low-level Indian standards of safety practices within their reach.

### Reasons for the Disaster

1. As per the Company's safety manual, the tanks used to store Methyl Iso-Cyanate were not to be filled beyond 60% of their capacity. But in the Bhopal plant, the tanks were over loaded to a tune of 75%.
2. As per the policy of the home company, another empty tank had to be placed near the first tank for use as a stand-by in emergencies. But in the Bhopal plant that emergency tank was also filled with a large amount of chemicals.
3. The storage tanks were to be refrigerated to make the chemical less reactive. But in Bhopal, the entire refrigeration unit had been shutdown as a measure to reduce the cost and this led to increase of temperatures to a higher level.
4. Two months before the disaster, due to over supply production of methyl Iso-Cyanate was stopped and all the workers were diverted to plant maintenance. A new worker had been instructed to clean the pipes and filters connected to the storage tanks. He closed the valves to separate the tanks from the pipes and filters, but unfortunately he failed to insert the safety disks, which were meant to prevent leakages. This led to enormous pressure build-up and heat in the storage tanks.
5. According to Union Carbide, one of the disappointed workers unscrewed a pressure gauge on a tank and inserted a hosepipe into it, knowing that it would cause damage, but not to this extent.
6. As a result the Methyl Iso-cyanate gas started to leak. The workers tried to use the vent –gas-scrubber that was designed to reduce the exhaust gas. But that scrubber had also been shut down.
7. So the workers tried a second way. They wanted to use the flare tower, which was de-

As an international company, TI is global in its ethical and legal manner of relationships and its global vision. TI's global vision is competing in all ventures in every country.

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- U.S. companies Other countries
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"These types of people are under environmental pressure. Companies are either now expecting that the rapidly has exploded to the point that at different competitors. Yet, the tasks they present

The challenge Skooglund, "is to be fly, on the first taking action on our values, principles, appropriate choices."

To meet this level. The first level asks: interact with cultural environmental impacts that we should be adapted based in one country.

\* Jim Ridder, P.E.  
2002  
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signed to burn off the escaping gas missed by the scrubber. But unfortunately, it was also not in an operating condition.

Finally, the workers tried to minimize the damage by spraying water up to 100 feet into the air. But the gas was escaping from a stack of 120 feet high. Unfortunately there were no emergency drills or evacuation plans available.

As a result more of the gas escaped and formed a cloud in the air and gas spread over 40 Sq.m. This led to a death of more than 6000 people in and around the plant and injured more than 70000 people. Approximately 200,000 people had adverse health effects.

This tragedy happened only because of the total un-preparedness of both the US Company as well as branch in the host country. Bhopal holds out lessons for basic concerns of safety, for standards and above all for good sense.

Twenty years after the Bhopal tragedy, the two survivors Champa Devi Shukla and Rathida Bee were selected for the group of winners for the Goldman Environmental Prize. They recognize grassroots environmental activists. The two women will share 53 lakhs of Rupees as the award. They have decided to use it to establish an award in India to recognize individuals who fight corporate crime. To get the global attention, two of them organized a global hunger strike to help sustain international awareness of the lingering effects of the disaster, and for fighting to get Dow Chemicals to pay for the medical care of the survivors and their children, as well as the environmental cleanup. Union Carbide became the wholly owned subsidiary of Dow Chemicals in 1999, fifteen years after the gas leak. The survivors suffered multiple health problems including headaches, shortness of breath, burning sensation, insomnia and bone pain. They were coughing, there are cases of cancer and anaemia. Women showed high concentration of toxins in their breast milk. The efforts of the survivors helped to persuade the Indian Government to pursue criminal charges against the former Union Carbide Chairman, Warren Anderson, who was leading retirement life in New York State. More monetary damages were claimed from Dow, under the terms of an original settlement, the survivors received about \$ 500 (Rs. 21,500) and the relatives of those killed got about \$2,000. Dow Chemicals claimed that they had no involvement in the Bhopal tragedy, but were considering the original terms of the settlement between Union Carbide and the victims. Legal proceedings in the matter are continuing.

The other winners of the 2004 Goldman Environmental Prize was awarded to Margie Richard, who successfully led a campaign to get Royal Dutch/Shell to pay for the relocation of people living near a Shell Chemical Plant in Norco, Louisiana. In Africa, the prize was awarded to Rudolf Amenga Etego of Ghana, who worked to suspend a water privatization project that would have limited access to drinking water. In South America, social worker Libia Grueso Castelblanco, won for securing 2.4 million hectares in territorial rights for rural communities in Columbia, where armed conflict and aggressive development have displaced many. In Europe, Manana Kochladze won the prize for fighting a multi-corporation plan to build the world's largest oil pipeline through Georgia. His work won concessions to protect villagers and forced a larger examination of the project's environmental and health impact.

## ETHICS IN THE GLOBAL MARKET

For many companies, increased competition, stricter government controls and emerging global markets have raised ethical questions that they were unprepared to deal with.

"Ethical questions face business people every day, especially when a company is involved with worldwide markets," says Carl Skooglund, former vice president and director of ethics, Texas Instruments (TI). "Finding the right answer isn't often easy — one has to balance local customs and laws with laws of the home country."

MNC has to balance local customs and laws with laws of the home country

As an international company with more than 44,500 employees operating in more than 25 countries, TI is global in scope and culture with a time-honored tradition of conducting business in an ethical and legal manner. But, that is an increasingly difficult challenge thanks to the fast changing times, relationships and situations today.

TI's global vision is "World Leadership in Digital Solutions for the Networked Society." The company is competing to win at a global level — entering into strategic partnerships, alliances and joint ventures in every corner of the globe. The success of these relationships depends greatly upon the company's representatives understanding the ethical standards and expectations of others.

#### Consider these examples of cultural differences from their files:

- In the U.S., telephone help lines or "hotlines," as some companies refer to them, are considered a normal part of business. In some parts of the world, however, hotlines may be greatly mistrusted or even viewed as personally offensive and dangerous.
- U.S. companies and U.S. citizens are subject to certain U.S. laws wherever they are. Other countries also have a global reach.
- Workers in some parts of the world consider the concept of ethics to be very personal and they may not fully understand that it is also a global or company-wide issue to be discussed or even questioned. In many places, the contract negotiation process can be very long and drawn out — and somewhat informal. That's very frustrating for most U.S. companies unless they have a good understanding of what's going on. There may be very good intentions on all parts, but unless everyone clearly understands the process, it may seem that something unethical is happening.

"These types of situations are trying in the best of times. But today, many organizations and people are under enormous pressure to succeed in a very competitive and challenging global economy. Companies are either reducing or eliminating layers of management that made decisions that they are now expecting those on the firing line to make. We are in a world where the ability to communicate rapidly has exploded. It has created enormous opportunities as well as risks. Legal complexities have increased to the point that people simply don't know. In fact, they can't know," says Skooglund. "Our relationships with other companies are changing through alliances, partnerships and joint ventures to the point that at different times we may be dealing with other companies as customers, suppliers or competitors. Yet, we still expect employees to recognize and respect those differences and the legal risks they present."

The challenge in this dynamic environment, with its close calls and uncertainties, according to Skooglund, "is to provide tools to our employees so that they can make the tough, quick decisions on the fly, on the firing line. And, make them correctly. There are two elements to making decisions and taking action on behalf of any organization: a) a clear understanding of the organization's guiding values, principles and ethical expectations and b) a sound personal judgment and ability to make appropriate choices."

To meet these challenges, TI has adopted a three-level approach to ethical integrity on a global level. The first level simply asks: 'are we complying with all legal requirements on a local level?' The second level asks: 'are there business practices or requirements at the local level which impact how we interact with co-workers in other parts of the world? A growing number of local regulations — rigid environmental regulations in some parts of Europe, for example — have a significant effect on products that we ship to and from those countries.' The third level is: 'do some of our practices need to be adapted based on the local laws and customs of a specific locale? What we think is perfectly proper in one country may not migrate well to another. On what basis do we define our universal standards

that apply to TI employees everywhere?"

"For example," Skooglund explained, "TI generally follows conservative rules covering the giving and receiving of gifts. However, what we consider to be an excessive gift in the U.S. may differ from what local customs dictate in other parts of the world. We used to define gift limits in terms of U.S. dollars, but this is impractical when dealing internationally. Instead, we emphasize following the directive that gift giving should not be used in a way that exerts undue pressure to win business or implies a quid-pro-quo."

"In today's environment, there is no way that a rulebook or a library of policies is going to guide those actions. A shared understanding of basic values and principles of integrity must guide them. And they must be supported by resources that will help them recognize when the caution lights should come on and to know where they can seek expert advice quickly. TI's reputation is completely in our hands, to be enhanced or damaged by the nature of our actions.", he concludes.

#### International ethics tools

Some of the issues faced in international practice are similar to those at home. They are made more serious and/or complex by the different and often less ethically demanding foreign work environment. In the area of labour, if you try to act ethically by paying local employees more than the low local pay rate, you can cause a social chaos.

The Indian engineer practicing abroad in USA or Canada could use some tools to help make the best ethical decisions. The International Federation of Consulting Engineers (FIDIC) provides templates for contract format, terms and definitions, as well as policies on practice specifics (e.g. copyright liability). It also has a code of ethics for engineers and their firms. The issue is the codes do not specify if the standards are more demanding than local codes or standards, engineer should follow which standards. This issue is especially critical in such areas as safety.

In addition to the engineering specific codes, there are international ethics initiatives that can also provide useful guidance. United Nations Global Compact, Organisation for Economic Cooperation and Development Anti-bribery Convention, World Bank and International Monetary Fund criteria. Both now screen proposals made to them using ethics criteria, emphasizing avoidance of countries and companies associated with corruption.

**Jim Ridler\*** offers some guidelines for international practice:

- Aim for doing no harm, realizing mutual benefit, having respect for local views and being consistent with your values.
- Find the best local people, prove your integrity, build trust and become part of the solution, by being a good corporate citizen and supporting the local community.
- Do not participate in corrupt practices and fire employees who do.
- Use common sense, good judgment and creative options.
- If a client is resisting an ethical solution to an issue, explain that your professional standards are as important to you as the client's standards are important to them.

To meet the challenges of globalisation, many companies may require a Chief Globalisation Officer (CGO). The CGO has to maintain a fine balance between global focus and local relevance. He has to globally expand operations, ownership and commitment. He has to champion his cause with the patience, experience, and thick skin, insight, foresight and intuition and communication skills to become a global leader.

#### Weapons development

There are special moral issues intrinsic to the defense industry, such as cost overruns, uncritical Use common sense, good judgement and creative options

proliferation of new weapons and secrecy in military work. Should countries invest in weapon development which is to be used in war? Should engineers get involved in the weapon development and take it up as a career? Engineers are under obligation to erect bridges that do not collapse, and build nuclear power plants that do not emit radiation, they need to carefully consider the consequences. A pacifist may argue that engineers have the right to refuse to get involved in the unethical design or manufacture of devices to kill human beings. Weapon development by itself is not unethical but the use for killing people is unethical and against the principle of human right to live, he may argue.

To us the atom bombs dropped on Hiroshima and Nagasaki are horrible because of deaths and destruction they caused. India had nuclear tests in Pokhran. If the use is for societal good then it is ethical. Those who are working in military missiles enjoy the challenging task and are proud and patriotic. Design, manufacture and deployment of weapons need to include not only their use but also eventual disposal. Engineers and scientists dealing with materials dangerous enough to be considered useful as weapons must consider not only their direct use but also their accidental diversion and ultimate safe disposal.

(A Case for Discussion: In October 1986, Mr. Vanunu, a former engineer at Israel's Dimona nuclear reactor, disclosed to The Sunday Times (London) that Israel had between 100 to 200 nuclear weapons, backing this with evidence and photographs. Following this, he was abducted by Mossad secret agents from Rome, smuggled by sea to Israel and tried behind closed doors. He was imprisoned for 'treason'. His trial and conviction came in for sharp protests from jurists, human rights and peace activists from the world over, including Noble Peace laureates and groups like the International Peace Bureau and the UK Campaign for Nuclear Disarmament. He defended his fundamental rights. Mr. Vanunu insists that he is not a 'spy' or a 'traitor': he merely 'let the world know what was happening' for reasons of conscience. He also said the Dimona reactor should be destroyed – just as Israel bombed Iraq's nuclear reactor in the early 1980's, then under construction. His past contribution to raising awareness about the nuclear danger, especially in West Asia, is both substantial and meritorious. He is a leader of conscience.

Comment on Mr. Vanunu may articulate the nuclear disarmament standpoint or work as an activist in the global peace movement.)

## ENGINEERS AND THE ENVIRONMENT

Engineering responsibility for the environment is necessarily closely related to the laws governing environmental matters, but environmental degradation was not the subject of serious government regulations until the late 1960's. Until that time, private litigation and the common law, at least in the USA, were the principal tools for controlling pollution. Usually, however, no single individual was sufficiently harmed by pollution to be motivated to bring suit against a polluter. Governments were ineffective in controlling pollution.

As a response to this state of affairs, the US Congress passed the National Environmental Policy Act (NEPA) in 1969. The Act inaugurated "a national policy which will encourage productive and enjoyable harmony between man and his environment...." One of the best-known provisions of the NEPA is the requirement for an environmental impact statement, which enumerates the effect of a project on the environment. Congress then created the Environmental Protection Agency (EPA) to enforce its mandates.

In the ensuing decades the U.S enacted legislation to control pollution in four major areas. In order to protect the air, they enacted the Clean Air Act of 1970 and amended it in 1977. The Act set a goal of a 90% reduction for auto emissions. It permitted the EPA to consider economic and technological feasibility in deciding when the goals were to be met, but not in adjusting the goals themselves.

After 1979, the EPA adopted a "bubble" concept as a method of enforcement. According to this policy, an imaginary "bubble" is placed around a plant or even an entire region. Under the bubble concept, industries may reduce those emissions that they can reduce most cheaply. One plant may be able to reduce pollutant A more cheaply, even reducing it below the level required by law. Another plant may be able to reduce pollutant B more cheaply, reducing it below the level required by law. Then the two plants can engage in trades, whereby the first plant trades some of the "credits" it has in pollutant A for some of the "credits" the second plant has in pollutant B. Since the first plant can reduce pollutant A most efficiently and the second plant can reduce pollutant B most efficiently, the total level of pollution under the bubble can be reduced to designated levels, but in the most economically efficient way.

In 1972 the U.S. Congress enacted the Clean Water Act and amended it in 1972, 1977, and 1986. The Act, designed to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters," makes it unlawful for any person, business, or governmental body to discharge any pollutant into navigable waters without a permit. The Act mandated pollution control measures in two stages. By 1977 all plants were to have installed water pollution control devices that represented the best practicable pollution control technology. By 1989 all plants were to have installed equipment that met more stringent standards. Plants discharging conventional pollutants are to apply the best conventional pollutant control technology. Plants discharging toxic or unconventional pollutants are to apply the best available technology economically achievable.

In 1976 they enacted the Resource Conservation and Recovery Act (RCRA), designed to control the transportation, storage, treatment, and disposal of hazardous wastes. The Act requires the generator of a hazardous waste to complete a "manifest," a form that describes the nature of the hazardous waste and its method of disposal. The transporter must sign the manifest and the operator of the disposal site must do so as well, returning the manifest to the generator of the waste. This procedure is supposed to provide a complete record of the disposal of the waste. The EPA is also required to regulate the disposal sites themselves.

In order to facilitate the cleanup of inactive dump sites, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act in 1980. The Act empowers the President to clean up abandoned hazardous sites and to provide necessary remedial actions in the case of spills. Finally, Congress has enacted a number of other laws that require businesses to alter products and processes that can have an adverse effect on the environment. The Noise Pollution Control Act of 1972 gives the federal government broad powers to protect the public from excessive noise. The Federal Insecticide, Fungicide, and Rodenticide Act of 1947 and the Federal Environmental Pesticide Control Act that amended it requires manufacturers to register insecticides with the EPA before they can be sold to consumers. The EPA will register a pesticide only if it is properly labeled, does what it claims to do, and will not produce "any unreasonable risk to man or the environment, taking into account the economic, social and environmental costs and benefits of the use of any pesticide." The Toxic Substances Control Act (TSCA) of 1976 establishes a regulatory mechanism for protecting the public against dangerous chemical materials contained in consumer and industrial products.

These are the principal U.S. laws that provide the legal context in which decisions regarding the effect of technology on the environment must be made. Similar legislations have also been made or are being made in India and other countries. The laws, however, do not cover many situations, however, so there is the need for individual judgment. Business managers usually make these judgments. Business Managers and Environmental Laws

#### A recent survey gives us insight into the attitudes of managers towards environmental laws.

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from 1982 until 1985 Joseph M. Petulla, Director of the Graduate Program in Environmental Management at the University of San Francisco, surveyed a number of industries with respect to hazardous waste disposal. He found that he could classify the companies he investigated into three categories.

The first type of company, consisting of 29% of the firms surveyed, engaged in what Petulla called "crisis-oriented environmental management." Industries in this group tended to have no full-time personnel assigned to environmental concerns, devoted as few resources as possible to such matters, and fought environmental regulations. As one representative of this group put it, "Why should we cooperate with government or anyone else who takes us away from our primary goal of making money?"<sup>1</sup> He went on to say that it is cheaper to pay the fines and lobby than to devote resources to environmental matters.

A second group, consisting of 58% of the firms surveyed, adopted what Petulla called "cost-oriented environmental management." Firms in this group accepted governmental regulation as a part of doing business, but often without enthusiasm or commitment. They usually had established company policies regulating the environmental matters and separate units devoted to them.

A third group, consisting of 9% of Petulla's sample, adopted what he called "enlightened environmental management." In these companies, responsiveness to environmental concerns had the complete support of the CEO. The companies had well-staffed environmental divisions, used state-of-the-art equipment, and generally had good relationships with governmental regulators. One manager said that people in his company saw themselves as good neighbors in the community. "Anyhow," he concluded, "in the long run it's in our own interest, to keep us from lawsuits and generate some good will."

Petulla's findings must be viewed in the light of the fact that many of the attitudes expressed concerned environmental laws and their enforcement and may not have reflected fundamental attitudes towards environmental matters accurately. Many of the managers in the second group may have had a commitment to environmental preservation, but they may have believed that governmental regulations are an inefficient way to protect the environment. Nevertheless the survey suggests that relatively few managers have a firm commitment to preserving the environment.

### Engineering Codes and the Environment

In the light of widespread skepticism on the part of managers, what are the responsibilities of professional engineers with regard to the environment? The first canon of the NSPE code requires engineers to "hold paramount the safety, health and welfare of the public in the performance of their professional duties." Insofar as environmental issues have a clear relation to human safety and health, therefore, the engineering profession has already committed itself to a concern for environmental protection and perhaps even improvement. For example, engineers already have an obligation to concern themselves with pollution, when it affects human health.

The codes give little direction, however, as to how this concern should be implemented. What kinds of policies with respect to the environment should engineers advocate? If engineers have an obligation to promote a clean environment in order to protect human health, how do they determine what is "clean"?

A still wider issue is raised by the fact that some environmental problems do not raise issues of human health. Suppose an engineer is asked to participate in the design of a dam that will destroy a section of a "wild river" and flood thousands of acres of farmland. He may believe that this is an unwarranted destruction of a natural state and even bad social policy. If an engineer objects to such, should she do so as an engineer or as a concerned citizen? In other words, should the objection to environmental degradation not involving dangers to human health be a matter of professional ethics

**Engineer managers must have firm commitment to preserve environment**

or personal ethics?

Consider another example. An engineer may be asked to design a condominium project that will be built in a wetlands area. She may be concerned about the resource depletion that will be accelerated by a chemical process, or the destruction of plant species that will result from an engineering project. Can an engineer object to such projects on the basis of her role as an engineer, or should she make clear that she is objecting as a citizen? Again, should such objections be made on the basis of professional ethics or personal ethics?

One of the most explicit statements on environmental matters to be found in an engineering code is in the code of the Institute of Electrical and Electronics Engineers (IEEE). The first canon of the code commits IEEE members ".....to accept responsibility in making engineering decisions consistent with the safety, health, and welfare of the public, and to disclose promptly factors that might endanger the public or the environment."

The fact that there is an explicit reference to endangering the environment in addition to endangering "the public" might be taken to indicate that environmental concerns go beyond a concern for human health. This inference might, however, be unwarranted. The concern for the environment might be intended to refer only to matters affecting human health. Furthermore, IEEE members are obligated only to "disclose" possible dangers to the public and the environment. Should such dangers be disclosed only to one's immediate superior? What if one's superior is part of the problem? And does an engineer have any right as a professional to refuse to participate in projects to which she has strong objections from an environmental standpoint? Again, the codes are silent.

#### Environmental Matters Involving Human Health: How Clean Is Clean?

If we can assume that the engineering profession has already committed itself to a concern for the environment insofar as it is related to human health, how can we ascertain the proper implementation of that commitment? Since this question usually involves environmental pollution, one way to formulate this question is to ask how we can determine an acceptable level of pollution. The question is often asked, "How clean is clean?"

One way of responding to this question is to adopt an approach that is oblivious to costs and keeps the environment as free as possible of pollution. We have seen that the Clean Air Act places safety ahead of the balancing of costs and benefits when dealing with hazardous pollutants. It permitted the EPA to consider economic and technological feasibility in deciding when the goals were to be met, but not in adjusting the goals themselves. The Clean Water Act requires polluters to do the best they possibly can to stop polluting, without reference to cost. The Resource Conservation and Recovery Act requires that standards regulating hazardous waste be based solely on the protection of public health and the environment. The Endangered Species Act is essentially oblivious to cost considerations. Finally, in the famous decision regarding Tellico dam, the U.S. Supreme Court forced the dismantling of a dam costing \$100 million in order to prevent the extinction of an economically worthless species of perch.

There are several problems with this cost-oblivious approach to environmental pollution, even where human health is concerned.

First, it tends to produce disrespect for the law. Manufacturers know that the law is unrealistic and that the regulators determine its practical significance. There is a strong incentive, therefore, to engage in as much deception and hard negotiation as possible, knowing that it may pay off in rich dividends.

Second, in spite of the rigor of the law, the enforcement of the law may be too lax. The disparity between the law and the way it is enforced may be too great. This is because enforcement involves consent decrees with industry. These decrees often allow pollution that is far greater than what the

shows. Thus the net result may be more pollution than an even less stringent law would have allowed.

Third, this approach takes no account of the cost of eliminating the pollution, or the fact that in some cases the threat to human health is unknown or is in dispute. Some pollutants pose far more danger to human health than others, and there are other values that should perhaps be considered as well, such as jobs and the standard of living.

In the light of these objections, some have proposed an approach to the regulation of environmental pollution based on cost/benefit analysis (CBA). CBA is a type of utilitarianism, in that its aim is to maximize human well-being. One aspect of well-being is health, and pollution is a threat to health. Unfortunately, reducing threats to health involves a cost. We cannot improve the environment with respect to human health without devoting resources to the effort, and thus requires diverting those resources from other areas. As economist William F. Baxter comments, even though low levels of pollution contribute to human well-being, "so do food and shelter and education and work."

CBA provides an appealing way of resolving conflict problems between the good of reducing pollution and other competing goods which make demands on social resources: we must divert resources to environmental causes only up to that point at which the resources can produce more overall human well-being if used elsewhere. It would be irrational, by the standards of CBA, to devote resources to environmental causes when the resources could produce more overall human well-being if they were devoted to other uses. Thus the goal of CBA is not a totally "clean" environment, but rather an environment such that making it any cleaner would divert financial resources from other areas, where they could promote more human well-being.

The CBA method for determining optimal pollution involves three steps. First, one must assess the problem in terms that are amenable to a CBA. Second, one must calculate the costs and benefits. Third, one must compare the costs and benefits and determine the proper course of action.

We can illustrate this method by means of an example of pollution from a chemical plant.

Suppose there is a large chemical plant near a residential area. The plant emits a number of noxious odors, some of them posing mild risks to health. How do we determine the optimal level of pollution that the plant should be allowed to contribute to the environment?

First, we must analyze the problem. The plant is emitting pollutants into the air, which is a part of the "commons." The commons are those areas, such as the air, rivers, and oceans, which are not owned by anyone in particular. Economists say that the plant is "externalizing" the cost of the pollution by forcing others, such as the surrounding residents, to pay the cost of the pollution. The costs of the pollution must be "internalized," or charged to the plant that produces the pollution. The other costs and benefits of regulating the pollution must be determined in order to arrive at an optimal pollution level.

Second, we must calculate the costs and benefits. If a manufacturer can dump pollutants into a river or into the air and not be liable for any further costs for their disposal, then we do not know the true costs of eliminating the pollutant. In order to internalize the cost, we must first determine the cost of the pollution. One way to get a measure of the cost for the obnoxious smells is to compare the costs of homes near the plant with costs of homes in locations which are equivalent, except that the odors are not present. Then some measure of the cost to health would have to be obtained. We would have to estimate the lost earnings from days missed at work, the cost in suffering, and any other costs attributed to poorer health.

There are also costs associated with forcing the plant to eliminate the pollution, because the plant also confers benefits on the community. If the cost of eliminating the pollution produced by a

given process is greater than the profits produced by the process, the plant may be forced to terminate the process. This would increase unemployment, and the cost of this increased unemployment would have to be entered into the CBA equation.

Third, we must compare the costs and benefits of regulating the pollution. The plant should eliminate the pollution up to that point at which the advantages to the community of eliminating the pollution are outweighed by the disadvantages to the community of eliminating it. Then the optimum level of pollution will have been reached.

This analysis omits many of the considerations that should be a part of a complete CBA, but it illustrates the method. This same method can, of course, be applied to any other type of pollution. Implementation of policies based on CBA does not guarantee that all pollution will be eliminated, but rather that resources will be used in the most economically efficient way.

There are several objections to the CBA answer to the question, "How clean is clean?" First, the CBA assumes that economic measures of cost and benefit must override all other considerations. CBA encourages only the elimination of pollution that can be eliminated in an economically efficient manner, and this may not be the pollution that is most harmful from an environmental standpoint. Suppose the chemical plant we have been considering is near a wilderness area that is damaged by one of the plant's emissions. It might not be economically efficient to eliminate the pollutant, from the CBA standpoint. Of course the damage to the wilderness area must be included in the cost of the pollution in a CBA, but this cost might still not justify the elimination of the pollution from the CBA standpoint, or even its reduction. In this event, CBA would allow the plant to continue damaging the wilderness area.

Second, it is often very difficult to ascertain the costs and benefits of the many factors that enter into a CBA. If the threats posed by many substances to human health are not known, it is impossible to execute a competent CBA. This problem becomes especially acute if we consider long-term costs and benefits, most of which are impossible to calculate.

Third, CBA often does not take into account the distribution of costs and benefits. Often those who bear the costs of pollution do not share in the benefits. Suppose a plant pays a pollution tax to dump pollutants into a river. By CBA, the costs of eliminating the pollution might not justify its elimination, yet these costs may fall in a disproportionate way to the poor people who often fish in the river and eat the contaminated fish.

Fourth, CBA often leads to conclusions contrary to the moral beliefs of many people. Many manufacturers oppose child-labor laws, arguing that the laws would lead to economic inefficiencies. For example, tunnels and shafts in some mines were too small to accommodate adults. We shall see in the next section, in fact, that most environmental legislation is based on values that transcend CBA.

This observation does not, of course, mean that CBA is wrong. It may be that our moral beliefs that cannot be justified by CBA are wrong. Nevertheless, the counter-intuitive implications of CBA do at the very least raise doubts about its validity as a complete basis for answering the question, "How clean is clean?" Combined with the other problems, this objection becomes even more relevant. In spite of these problems, CBA is a useful method in determining the proper policies for pollution control. The criticisms show that, taken alone, it is not adequate.

If defining "clean" in terms of either a cost-oblivious approach or CBA are both unsatisfactory, philosopher Mark Sagoff suggests a middle ground between them. Sagoff suggests that what is needed is a policy that might permit the agencies to take technological and economic factors into account, on a case-by-case basis, as long as they act in good faith to make progress toward reducing and, it is hoped, eventually eliminating damage to the environment and risks to human safety and health.

It is not always clear how Sagoff's suggested policy should be applied, but it may be a useful

general guideline in determining engineering responsibilities with respect to environmental pollution. As such, it can be a supplement to the almost total lack of specificity in the codes. It shows a kind of RP and utilitarian considerations that is characteristic of many good moral guidelines. That is, it takes into account both the need to protect human health and the need to balance costs and benefits, within certain limits. It also has the benefit of a background in the law. New set in turn briefly to a consideration of environmental concerns that go beyond considerations of human health.

### Engineering Responsibilities to the Non-Human Environment

Contemporary technologically advanced civilization has made massive changes in the environment. Western society has tended to conceive of nature as passive, as the fit object of human manipulation and control. This view of nature as passive is amply reflected in our language about the natural world. Land is to be developed. "Raw" land is to be "improved." Natural resources are to be "exploited" and "consumed." Trees are to be "harvested." The rivers are to be "harnessed" to produce electrical power. The wilderness must be "managed." Nature, like the rest of the non-human world, is to be subservient to human purposes.

The environmental movement, so influential during the last twenty-five years, is a reaction against this attitude toward nature, but there is still a question as to whether the concern for non-human nature should be a part of professional engineering ethics rather than an engineer's personal ethics. What are some of the arguments for and against including a concern for non-human nature in the professional codes of engineers? Those who believe that professional engineering obligations to the environment should not be extended beyond a concern for factors that endanger human health could make the following arguments.

First, the judgments that would have to be made in this area fall outside the area of professional engineering expertise and as such might be considered a violation of professional responsibility. Suppose an engineer is asked to participate in the design of a condominium that will be built on a wetland area. The engineer objects because she believes that the wetland area is especially important for the ecology of the area. This judgment is not a professional engineering judgment, but rather one more appropriately made by a biologist.

The same problem exists in many other areas related to the environment. An engineer may object to a dam that will destroy a wild river or flood hundreds of acres of farmland. Or he may object to designing a sawmill that is to be built in the midst of an ancient forest. In all of these cases the judgments involve considerations outside the engineer's professional expertise. An engineer may well object to these projects, but he or she should not object as an engineer. To do so is to invite public disrespect for the engineering profession.

Such objections might even be considered violations of engineering codes. The National Society of Professional Engineers (NSPE) code contains the following statement: 'Engineers may express publicly a professional opinion on technical subjects only when that opinion is founded upon adequate knowledge of the facts and competence in the subject matter.' (Section II 3.b) Many objections to environmental matters are not based on professional engineering competence.

Suppose the NSPE code also contained a provision such as this: Engineers must not participate in projects that are unnecessarily destructive to the environment, even if they do not endanger human life or health. The judgments necessary to comply with such a provision would often not be professional engineering judgments, so that implementing such a provision might well involve violating the above section.

Second, an extension of professional responsibility for the environment into areas not clearly related to public health or safety might cause considerable problems for engineering societies. Along with other members of society, engineers disagree over environmental issues, especially where hu-

man health is not directly involved. Forcing members of professional societies to take policy stands on such issues will introduce a new source of divisiveness into professional societies. Another aspect of this same objection is that such issues will be especially troublesome for engineering managers who are members of the societies.

Management cannot be expected to be sympathetic to policies that will inevitably result in greater expense for industry. The effect of introducing these issues into the societies may serve to weaken industry support for the societies themselves. There are, however, reasons for believing that engineers should assume a professional responsibility for the effects of engineering work on the non-human environment.

First, a good argument can be made that the very concept of responsibility shows that engineers have a responsibility for environmental problems, even when they do not directly affect human welfare. Philosopher Kenneth E. Goodpaster finds several senses of the term "responsibility," two of which are relevant here. In the causal sense of responsibility, we say of a person that he or she is responsible for something when an action or event is brought about at least in part by that individual. By this definition, engineers should share in the responsibility for environmental concerns, because technology has brought about many environmental problems, and it has the capacity to remedy many of them.

Another conception of responsibility is a role-following sense, referring to socially expected behavior associated with certain roles. Thus parents have responsibility for children. In this sense also engineers have responsibility for the environment, for many members of the public expect engineers to assume this responsibility.

Second, the engineering profession could make a substantial contribution to the protection of the environment. Engineers are, after all, major participants in virtually all of the projects that affect the environment for good or ill. If even a substantial number of concerned engineers refused to contribute their professional skills to some of the most environmentally destructive projects, the result might well be the cancellation of the projects or at least a modification of them so they will produce less environmental devastation.

We shall leave it to the reader to decide whether engineers should have an obligation as professionals to protect non-human nature. There is, however, another approach to the question. There is a precedent in other professions for allowing professionals to refuse to lend their professional expertise to activities to which they have personal objections.

The morality of abortion is an issue outside the professional expertise of physicians. It is a matter for moral philosophy or theology rather than medicine. Nevertheless, physicians are not usually required to perform abortions if they have moral objections to it. Similarly, perhaps engineers should not be required to participate in environmental projects to which they object. Many engineers already have serious reservations about some projects that damage the environment. Without support from the codes, they may find it difficult to register their objections to the projects or to refuse to participate in them.

Perhaps a provision in the code could be worded like this: "Engineers should not be required to participate in projects that, in their personal judgment, are unnecessarily harmful to the environment. They also have the right to make their objections known to the proper authorities." Such a provision allows a professional engineer to refuse to participate in (and even to object to) projects which offend her personal values regarding the environment.

(A Case for Discussion: The Chennai-based Orchid Chemicals received an award for environmental and community service. The Rotary Club of Madras gave the award. The company is driven by a corporate philosophy that places people before products and profits. It is 100 per cent export

Engineers should share the responsibility of environment

presented company producing antibiotics. The company has invested 14 million on capital expenditure in environmental friendly systems. The company has pioneered the concept of Zero discharge in the pharmaceutical sector. The company adopted a technology to break down the effluents it produces by separating heating and cooling and converts them into useful or harmless waste. Water can be extracted from liquid waste but solid waste poses the real challenge for the industry. Orchid recycles almost 100% of the water used in its production process. To minimize solid waste, the company has undertaken bio composting to produce manure, which has been tested and proved to be safe and effective. Normally we hear about kitchen waste but not industrial waste. Industrial waste from a pharmaceutical company is mainly made up of inorganic salts and solvent residues, it doesn't have heavy metals, which makes it possible to convert it to manure.)

## COMPUTER ETHICS

Computer ethics is the branch of engineering ethics dealing with moral issues in computer technology. It is becoming increasingly important as computers become the technological backbone of contemporary society.

Computers have become integral part of our life. We are in a knowledge economy, but our managerial and governance system are stuck in the industrial era. What we need is the culture of citizenship with interplay of structures, values and practices, encourage every person to pursue individual excellence and at the same time create, through shared processes of self-governance, an emotional commitment to efforts for the common good. It seeks to break the conflict between self-interest and corporate interest. The practice of citizenship cannot be imposed from above. It must grow out of the actions and beliefs of the citizens themselves.

The era of computers have advantages and disadvantages. Communication has become fast and the reach has increased. New issues of safety and privacy have emerged. Some of the problems are given below:

**Technostress :** This is stress induced by computer use. Its symptom includes aggravation, hostility towards other humans, impatience and fatigue.

**Computers viruses, abuse and crime :** Computer abuse is the commission of acts involving a computer that may not be illegal but are considered unethical.

**Ethical dilemma of Employee monitoring :** Should you monitor a worker who spends more time on internet?

**Rage due to Computer failures:** The failure can occur due to hardware or software. Hardware problem do not occur frequently and can be solved, but software errors are very serious as they destroy the entire network. Who is to be blamed?

### Cyber crimes\* :

The Internet is fast becoming a way of life and also a way of living because of growing dependence and reliance on it. The advent of computers has been a boon to engineers. There have been various kinds of computer and Internet related crimes that are classified as cyber crimes. Unauthorized access to systems, damage to property, theft, fraud, mischief and publication of obscene and indecent material are the types of crimes the Internet revolution has spawned.

### Hacking

Hacking is a crime in which a person(s) cracks a system and gains unauthorized access to the data stored in them. The hacker hacks into the site and changes the material. The real tangible threat

\*Technical note, Journal of Intellectual Property Rights, Vol. 9, January, 2004, pp. 51-54.

of hacking comes in when an unauthorized access to a system is done with an intention of committing further crimes like fraud, misrepresentation, downloading data in order to commit infringement of copyright, accessing sensitive and confidential data from the sites etc. One of the common types of fraud on the net is circulation of bogus online investment newsletters, which give biased and untrue advice on stocks and securities.

Hacking is criminal trespass covered under Section 441 of the Indian Penal Code that defines it as "unauthorized entry into or upon property against the will of the person in possession or lawfully obtaining entry but wrongfully remaining thereon". Herein a website is considered as a property. Could website be regarded as property is an issue? The world of Internet includes terms like site, home page, visiting a site and traveling on the super highway etc.. Hacking is made a crime punishable under Section 66(2) of the Information Technology (IT) Act, 2000 providing for an imprisonment upto 3 years or with fine up to Rs. 2 lakhs or with both. If a person gains unauthorised access to the property (web site) of another, breaching confidentiality of electronic documents, it is punishable under Section 72 of the IT Act with an imprisonment upto 2 years or fines up to 1 lakh or with both.

### Cyber Scams and Frauds

Section 25 of the IPC defines "fraudulently as an action or deed done with an intention of deceit. One needs to satisfy the deceit or an intention to deceit or to cause possible injury. Internet is being used to defraud people and organization. This is done through on line investment newsletters, bulletin boards, e-mail spams. Spam is junk e-mail that is cheap and easy to create. These offenses are treated as fraud and cheating.

### Computer Virus

Viruses are introduced deliberately and with mala fide destroying or altering the operating systems and database of computer. It is described as mischief as per Section 425 to 440 of the IPC. Loss or damage to the public or person needs to be proved. Chapter XI of the Information Technology Act, 2000 deals with computer crimes and provides for punishments for these offences.

### Internet Defamation

If X publishes something, which is an attack on the good name of Y on the internet. Can it be a case of defamation? Similarly, if wrong information is provided on the net. The jurisdiction is a problem in the net. The issue is what should constitute as publication on net. Suppose you get some bad remarks on e-mail. Can e-mail be regarded as publication? It is a personal correspondence. Just because internet has jurisdiction problem, is it ethical to publish wrong information or defame somebody.

### Software Piracy

Just as in publishing and music, software piracy is a reality. In India computer software falls under copyright laws and therefore, the software is protected under the Copyright Act. The problem is philosophy behind Internet is freedom of information and freedom to information. Some 'die hards' like the proponents of open source software maintain that software copyright protection violates this philosophy.

### Cyber Squatting

Cyber squatting is an offence that relates to the registration of a domain name by an entity that does not have an inherent right to similar or identical trademark registration. In the Sify case, the Supreme Court on a complaint by Sify, the software and ISP major, has restrained another company from using the domain name Sify.

The Internet crimes are increasing at an alarming rate. There is a need for international cyber law due to the problem of jurisdiction since in the Internet geographical boundaries are difficult to define and enforce.

### Ten Commandments Of Computer Ethics

Computer professionals find themselves in various relationships of employer-employee, client-professional, professional - professional and society - professional. These relationships involve a diversity of interests and sometimes these interests come into conflict with each other. To respond to the various problems of computer ethics, the Computer Society of India has evolved their own code of conduct and a set of Ten Commandments has been drawn up. The code of ethics specifies that IT professionals should act with integrity, respect confidentiality of information and be human in their approach. The responsibilities of IT professional towards clients and community have also been specified.

### Ten Commandments Of Computer Ethics

*Created by the Computer Ethics Institute*

1. Thou shall not use a computer to harm other people.
2. Thou shall not interfere with other people's computer work.
3. Thou shall not snoop around in other people's computer files.
4. Thou shall not use a computer to steal.
5. Thou shall not use a computer to bear false witness.
6. Thou shall not copy or use proprietary software for which you have not paid.
7. Thou shall not use other people's computer resources without authorization or proper compensation.
8. Thou shall not appropriate other people's intellectual output.
9. Thou shall think about the social consequences of the program you are writing or the system you are designing.
10. Thou shall always use a computer in ways that insure consideration and respect for your fellow humans.

### Global compact

The Global Compact of UN Secretary-General was launched officially in July 2000. It exhorts individual corporations to advance basic values within their sphere of influence. These basic values are based on nine internationally agreed principles from the fields of human rights, labour and environment. Consultations are underway about the possibility of adding "corruption" as a tenth principle.

The Global Compact's nine principles enjoy universal consensus, having been derived from the following:

- The Universal Declaration of Human Rights
- The International Labour Organisation's Declaration on Fundamental Principles and Rights at Work
- The Rio Declaration on Environment and Development

### Human Rights

1. Businesses should support and respect the protection of internationally proclaimed human rights within their sphere of influence; and

2. Make sure that they are not complicit in human rights abuses

## Labour Standards

3. Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining.
4. Eliminate of all forms of forced and compulsory labour.
5. Effectively abolish of child labour.
6. Eliminate discrimination in respect of employment and occupation.

## Environment

7. Support a precautionary approach to environmental challenges.
8. Undertake initiatives to promote greater environmental responsibility; and
9. Encourage the development and diffusion of environmentally friendly technologies.

Six case studies wherein the Global Compact is violated are presented below:

### 1. Aventis

Since Aventis signed on to the Global Compact in July 2000, its genetically engineered StarLink™ corn has illegally contaminated the food supply and seed stock in the U.S. The contamination of other corn varieties significantly impacts links throughout the food chain, from farmers, grain elevators, and food processors to retail grocers and consumers. Without a system of segregation or the ability to control pollen drift, StarLink contaminated much of the U.S. corn supply. The full costs of this contamination continue to emerge; however, current estimates run in the hundreds of billions of dollars.

A look at the company's behavior regarding StarLink shows that before and after signing the Compact, Aventis violated Global Compact's Principle 7, which is drawn from the Rio Declaration and supports "a precautionary approach to environmental challenges."

Source: Institute for Trade and Agriculture Policy

### 2. Nike

Since 1997, Nike has continually failed to uphold "freedom of association and the effective recognition of the right to collective bargaining," which is Principle 3 of the Global Compact. Nike made a commitment to respect this right in 1997 when it signed the Fair Labor Association voluntary workplace code of conduct along with other giant shoe and garment manufacturers like Reebok, Adidas, Liz Claiborne and Patagonia. Violations of Principle 3 and related accounts of repression, firings, violence and threats are found in Nike production factories in China, Indonesia, Thailand, Cambodia and Mexico. In addition, Nike has been actively involved in lobbying Washington against using trade policy to pressure China to respect workers' rights.

Source: Global Exchange

### 3. Rio Tinto

In 2000, the Indonesian government's National Human Rights Commission investigated allegations of abuses at the Rio Tinto's Kelian gold mine and found egregious violations. Since the mine opened in 1992, the Commission revealed, the Indonesian military and company security forcibly evicted traditional miners, burned down villages, and arrested and detained protestors. Local people have systematically lost homes, lands, gardens, fruit trees, forest resources, family graves and the right to mine for gold in the river, according to the Human Rights Commission. Kelian employees

have also been named in a number of incidents of sexual harassment, rape and violence against local women between 1987 and 1997. These included abuse and rape committed by senior company staff against local Dayak women.

Rio Tinto, which has headquarters in the UK and Australia, also is accused of environmental abuses affecting the health of the surrounding community. The Kelian mine produces over 14 tons of gold per year using the cyanide heap-leaching process, which produces contaminated tailings. The tailings are held in a dam and treated in a polishing pond near the Kelian River. Water from the polishing pond pours into the river through an outlet. The company claims that the water is clean; meanwhile the community says that people cannot drink or bathe in the water because it causes skin lesions and stomach aches.

Two articles on the CorpWatch website ([www.corpwatch.org](http://www.corpwatch.org)) document that Rio Tinto has violated Principle 1 of the Global Compact, which requests companies to "support and respect the protection of international human rights within their sphere of influence," and Principle 8, which asks business to "undertake initiatives to promote greater environmental responsibility."

Source: Project Underground and Asia-Pacific Human Rights Network

#### 4. International Chamber of Commerce

The International Chamber of Commerce (ICC), a lobby group with over 7,000 corporate members, is a prominent partner in UN Secretary-General Kofi Annan's Global Compact and has played a key role in shaping it from the start. While the ICC has provided momentum to the Global Compact, it also seriously undermines its credibility.

The ICC has a long history of vigorous lobbying to weaken international environmental treaties and these efforts have continued even after the group has pledged support for the Global Compact principles. Examples include the Kyoto Protocol, the Convention on Biodiversity, and the Basel Convention against trade in toxic waste. In all of these UN negotiations, the International Chamber's obstructive lobbying runs counter to the Global Compact principles to which it subscribes.

For instance, rather than "supporting a precautionary approach to environmental challenges," (Principle 7), and rather than undertaking "initiatives to promote greater environmental responsibility" (Principle 8), the ICC promotes a narrow commercial agenda, dominated some of the world's most environmentally irresponsible corporations.

Source: Corporate Europe Observatory

#### 5. Unilever

In March 2001, residents of Kodaikanal, a pretty hill retreat in Southern India, caught the Anglo-Dutch multinational Unilever red-handed when they uncovered a dump site with toxic mercury-laced waste from a thermometer factory run by Unilever's Indian subsidiary Hindustan Lever. The 7.4-ton stockpile of crushed mercury-containing glass was found in torn sacks, spilling onto the ground in a busy scrap yard located near a school. Company officials denied and downplayed the dump site, eventually refusing even to engage researchers in dialogue about the issue.