Professional Ethics and Human Values Assignment

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Explain in detail about Responsibilities and rights of a professional? And explain how the Right to Information Act (RTI) can bring in transparency in governance.

Professional Responsibilities

The most comprehensive virtue of engineers is responsible professionalism. It can also be called Professional Responsibility. This consists of five types of virtues, as follows:

1. **Self-direction** (Self-governance) virtues are fundamental and necessary in exercising moral responsibility. On the basis of 'understanding and cognition', it includes self-understanding, humility (proper assessment of one's character), and good moral judgment (termed as 'practical wisdom' by Aristotle). On the basis of 'commitment and action', it covers courage, self discipline, perseverance, self-respect, and integrity. Honesty is a virtue common to both bases as it implies truthfulness in thoughts and words and trustworthiness in actions.
2. **Public-spirited virtues** focus on the good of the clients and the public. It includes the respect for rights (to make decisions and face the risk), non-malfeasance (not harming others intentionally). Engineering codes go a step further and prescribe beneficence that includes preventing or removing harm to others and also promoting the public safety, health, and welfare, generosity (helping the community by voluntarily giving their time, talent, and money-voluntary service to the professional society and community), and justice (unbiased) in all decisions and actions.
3. **Team-work virtues** enable the professionals to work successfully with others. They include collegiality, cooperativeness, communicative ability, and respect for

legitimate authority. Responsible exercise of authority and the ability to motivate others to achieve are also relevant to team-work virtues.

4. **Proficiency virtues**, which mean the mastery of technical skills (called as Intellectual Virtue by Aristotle). It includes competence (having qualified, licensed, and prepared to execute the job that is undertaken), diligence (alert to dangers, careful attention, and avoidance of laziness or workaholic nature), creativity (learning to respond to the changing technological society), excellence (perform at the highest level), and self-renewal through continuing education.
5. **Cardinal (chief) virtues**: *Wisdom* (prudence), *courage* (fortitude), *temperance* and *justice*. Some of these may overlap other virtues. They are called 'cardinal' (Latin: cardo, hinge) because they are hinges on which all virtues depend. These are also called moral (Latin: mores, fixed values) because they govern our actions, regulate our passions, and guide our conduct according to faith and reason. Wisdom is perception of truth and ability to distinguish between the right and wrong. Courage means a firm and elevated mind. Temperance represents order in words and actions. Justice is preserving humanity and observing the faith of contracts. Although these virtues ring religious tones, they are very relevant to the engineering practice.

Professional Rights

Employees are an asset to the company and any ethical organization would like its employees to be happy and prosperous by providing them a safe and happy working environment, steady work, reasonable modifications to work time, and a healthy work-life balance.

Many companies that top the chart when it comes to providing ideal environments to its employees credit their good employee management and retention programs as the key to their success.

An employee is, at the very least, entitled to the following rights at his workplace −

1. **No discrimination at work**, especially on the basis of gender, nationality, religion, medical condition, and political affiliation.
2. **Healthy work-life balance**, which means no long hours at work. Employees can also report if their employer makes unnecessary delays in delegating work.
3. **Protection of jobs** for people with disabilities and medical conditions.
4. Complete **protection against sexual harassment** of any kind and immunity from being forced to exchange favors for benefits.
5. **Freedom to discuss the terms and conditions** of the employment with other employees and negotiating wages to suit lifestyle as per changing times.

6. **Right to ask for safe working conditions** and reservation to answering questions on age, religion, nationality, and medical condition.
7. **Demanding certain changes and modifications** regarding the working conditions to accommodate situations that might crop up due to their prevailing medical conditions.
8. **Right to form or participate in a union** that aims to improve the wages, lifestyle, working environment, and emphasizes on employee rights at the workplaces.

Right To Information Act (RTI)

Right to Information (**RTI**) is an act of the Parliament of India which sets out the rules and procedures regarding citizens' right to information. It replaced the former Freedom of Information Act, 2002. Under the provisions of RTI Act, any citizen of India may request information from a "public authority" (a body of Government or "instrumentality of State") which is required to reply expeditiously or within thirty days. In cases involving a petitioner's life and liberty, the information has to be provided within 48 hours. The Act also requires every public authority to computerise their records for wide dissemination and to proactively restrict certain categories of information so that the citizens need minimum recourse to request for information formally.

This law was passed by Parliament on 15 June 2005 and came fully into force on 12 October 2005. Every day, over 4800 RTI applications are filed. In the first ten years of the commencement of the act over 17,500,000 applications had been filed.

RTI is a legal right for every citizen of India. The authorities under RTI Act 2005 are called quasi-judicial authorities. This act was enacted in order to consolidate the fundamental right in the Indian constitution 'freedom of speech'. Since RTI is implicit in the Right to Freedom of Speech and Expression under Article 19 of Indian Constitution, it is an implied fundamental right.

Information disclosure in India is restricted by the Official Secrets Act 1923 and various other special laws, which the new RTI Act relaxes. Right to Information codifies a fundamental right of the citizens of India. RTI has proven to be very useful, but is counteracted by the Whistle Blowers Protection Act, 2011.

The Right to Information (Amendment) Bill, 2019, seeks to amend Sections 13, 16, and 27 of the RTI Act. Section 13 of the original Act: It sets the term of the central Chief Information Commissioner and Information Commissioners at five years (or until the age of 65, whichever is earlier)

RTI as a Tool For Transparency in The Government

Participation, transparency, legitimacy and responsiveness form the pillars of good governance. The concept of good governance was applied in India through the passing of Right to Information (RTI) Act, 2005, 73rd and 74th constitutional amendment.

Right to Information Act, 2005 forms a basic requisite of good governance and the Act has played and is still playing a major role in bringing good governance by making our system transparent and accountable.

1. The RTI Act has lent voice to the aspirations of ordinary citizens in issues of governance. It gave the common people a defining power to shape the government schemes and policies. It empowered the people to question, audit, review, examine, and assess government acts and decisions to ensure that these are consistent with the principles of public interests, good governance and justice.
2. Right to Information is the most effective instrument to check corruption where the citizen has the right to take the initiative to seek information from the state and thereby promotes openness, transparency and accountability in administration by making the government more open to public scrutiny. It also empowered the people to seek definite and direct answers from the officials of their works or lack of it thus facilitating and encouraging the participation of common people in the process of good governance. The RTI Act democratized the information and decentralized the power. Power no more remains confined to select few, rather it was made available equally to all the citizens.
3. People have shown increased interest in the affairs of government and sought information regarding various issues affecting their lives and well-being. The RTI Act empowered the people to seek definite and direct answers from the officials of their works or lack of it. RTI applications have annually increased by 8 to 10 times. A 2009 study estimates that in the Act's first three years alone, close to two million RTI requests were filed in different parts of the country. Thus, there is massive use of the right to know. Of the millions of applications for information, less than 5 per cent have been denied information under various exemption categories. So, accountability has invariably led to efficiency and a sense of responsibility among government officials.
4. The Right to Information act is intended to promote accountability and transparency in government by making the process of government decision making more open. Though some departments of the Union government are exempted from this Act but the information can be sought if it is concerned with violation of human rights. Even the information from the private authority can be sought only through the controlling authority and controlling authority will send the notice to the institution concerned under section 11 of the Act.

5. The larger use of RTI has been seen in areas of women empowerment, youth development, democratic rights, rights and entitlements of the underprivileged, abuse of executive discretion and strengthening of participative and good governance.

Success Stories of RTI

1. In the model district of Mochha, Chhattisgarh, people are using RTI to secure employment, scholarships and pensions for the elderly. They also pressured government doctors and school teachers to show up at work regularly. Villagers in Madhubani district, Bihar used RTI to expose a solar-light scam, leading to charges against 200 corrupt officials.
2. In 2007, data obtained under RTI inspired citizens to question elected representatives to stop a scam worth over Rs. 6,000 crores in the Crawford Market redevelopment issues in Mumbai.

Explain briefly the concept of *Whistle Blowing* and *Intellectual Rights*. And give your comments on "Whistle Blowing will not be effective and may be dangerous to the life of a professional".

Whistle Blowing

Definition

Whistle Blowing is defined as conveying Information by an employee, on an important moral problem to somebody in a position to take action on that problem. Further this is done outside the approved organizational channels.

Aspects

There are four aspects of whistle blowing, namely:

1. **Basis of disclosure** The basis for disclosure may be intentional, or under pressure from superiors or others not to disclose.
2. **Relevance of topic** The whistle blower believes that the information is about a significant problem for the organization or its business ally. It can be a threat to the public or employees' health, safety and welfare or a criminal activity, or unethical policies or practices, or an injustice to the workers within the organization.
3. **Agent** The person disclosing the information may be a current or former employee or a person having a close link to the organization.
4. **Recipient** The person or organization, who receives the information, is in a position to remedy the problem or alert the affected parties. Usually, the recipients are not aware of the information fully or even partially.

Types

Based on the *destination (recipient)*, whistle blowing is classified into types, as:

a. **Internal:** In this case, the information is conveyed to a person within the organization, but beyond the approved channels.
b. **External:** This happens when the information is transmitted outside the organization. The recipient may be a municipal chairman or member of legislature or minister. It becomes severe if the information reaches the press and through them the public. The damage is maximum and sometimes poses difficulty in remedying the situation.

Based on the *origin* or *source (agent)*, this can be divided into three types, as follows:

a. **Open:** The originator reveals his identity as he conveys the information. This information is reliable and true, but sometimes partially true.
b. **Anonymous:** The identity is concealed. The information may or may not be true. But the agent anticipates perhaps some repression or threat, if identity is revealed.
c. **Partly anonymous (or partly open):** Such a situation exists when the individual reveals his identity to the journalist, but insists that the name be withheld from others.

When is Whistle Blowing Justified?

Under the following situations, the whistle blowing may be justified:

1. When the potential harm existing is identified as serious, or anticipated to occur with a high probability, in the near future.
2. When sufficient data on the harm had been gathered and adequately documented. This condition may not be required if revealing the information would jeopardize the national interests or help the competitors. A request to the appropriate authority for external investigation or permission by a court to release the information may be a solution.
3. The concerns have been reported earlier to the immediate superiors and no satisfactory response was forthcoming from them, within a reasonable time.
4. Regular channels within the organization have been used to transport the information to the highest level of management and the information has reached them. Situation 3 and 4 may not be appropriate, when one's supervisor is the main source of the problem or when urgency demands that regular channels are expected to only add the delay.
5. There is a reasonable hope that the whistle blowing can prevent or remedy the damage existing or anticipated.

Intellectual Property Rights

It is the information and original expression that derives its original value from creative ideas, and is with a commercial value. IP permits people to have fully independent ownership of their innovations and creativity, like that of their own physical property. This encourages the IP owners towards innovation and benefit to the society. It is an asset that can be bought or sold, licensed, and exchanged. It is intangible i.e., it cannot be identified by specific parameters.

The agreements with the World Trade Organisation (WTO) and Trade-Related aspects of Intellectual Property System (TRIPS) have been adopted effective from January 2005. Besides the minimum standards set for protection of IP rights, appropriate laws framed by the member countries are expected to reduce distortions and barriers for and promote international trade. The global IPR system strengthens protection, increases the incentives for innovation, and raises returns on international technology transfer. However, it could raise the costs of acquiring new technology and products, shifting the global terms of trade in favor of technology producers.

Need for Protection of Intellectual Properties

IP plays an essential role to stabilize and develop the economy of a nation. This protection actually stimulates creativity, research, and innovation by ensuring freedom to individuals and organizations to benefit from their creative intellectual investments. The IP serves many purposes, namely

a. It prevents others using it,
b. prevent using it for financial gain,
c. prevent plagiarism
d. fulfill an obligation to the funding agency. ICICI Bank has advanced loan against IP as security to Shopper's Stop, New Delhi, and
e. provides a strategy to generate steady income.

Some of the challenges in the acquisition of IP are:

a. Shortage of manpower in the industry. Educational institutions can play a vital role in providing the same.
b. High cost of patenting and lengthy procedure. This was being considered by the Government and a simpler and faster procedure is expected, and
c. Lack of strong enforcement mechanism.

Whistle Blowing as a Danger to the Life of A Professional

In Hollywood, a nurse who was retaliated against after blowing the whistle on her employer would be protected under whistleblower laws, returning to the job unscathed, and be heralded by coworkers for reporting an employer who endangered others. Unfortunately, real life does not have a Hollywood ending.

Deciding to blow the whistle on an employer can be one of the most difficult decisions employees face during their careers because they may be viewed as a traitor, a tattler, or someone who cannot be trusted. Even coworkers who are loyal to their employer or employees involved in the violation may be angered by whistleblowing. Whistleblowing is especially difficult for nurses because nurses have a duty to protect and advocate for clients; therefore, nurses who witness violations that harm clients are in the difficult position of maintaining client safety while risking retaliation or ignoring client safety and maintaining employment.

Whistleblowing has both professional and personal consequences. Nurses who witness violations and report them risk losing their current position and any future employment. Additionally, nurses may endure physical and emotional strife from reporting the violation. Not reporting the violation can even cause distress in nurses' personal lives because nurses are responsible for protecting clients.

When nurses decide to report violations, they must evaluate how reporting will affect their lives. Jackson et al. (2010) studied nurses who had blown the whistle. The nurses told the researchers of their experiences whistleblowing and how colleagues treated them differently after reporting.

The nurses described their fear of physical violence from the subjects of the complaints secondary to blowing the whistle. Some nurses stated that they did not even feel safe at home and feared for the welfare of their children. Other nurses said that it was not worth blowing the whistle and that they would never speak out again because, as one stated, "I can't afford not to work" (Jackson et al., 2010, p. 2198).

The above examples and study by Jackson et al. clearly show us how dangerous it can be for professionals to blow the whistle and how it can damage their professional lives and also adversely affect their personal lives. A professional if she blows the whistle is at a risk of losing her job, losing out on any promotions and benefits as she might be viewed as a traitor by her colleagues and superiors and management might not consider her trustworthy enough to be given more power and position in the organization.

Even peers who are loyal to the organization might feel her whistle blowing as somehow an act of betrayal and this can then even affect interpersonal relationships one has at the organization. So, whistle blowing may be an ethically correct decision to make for a

professional. It is certainly not an easy one as the consequences for whistle blowing go far and wide and will affect her image in the industry even after she has switched roles.

What are Environmental and computer Ethics? State the major challenges and problems for Environmental Ethics and discuss the approaches to resolve the Environmental problems. Explain the categories of ethical problems related to computer Ethics and what steps can be taken up to overcome the ethical issues related to the use of computers.

Environmental Ethics

Definition

Environmental ethics is the study of (a) moral issues concerning the environment, and (b) moral perspectives, beliefs, or attitudes concerning those issues.

Engineers in the past are known for their negligence of the environment, in their activities. It has become important now that engineers design eco-friendly tools, machines,

sustainable products, processes, and projects. These are essential now to (a) ensure protection (safety) of the environment (b) prevent the degradation of the environment, and (c) slow down the exploitation of the natural resources, so that the future generation can survive.

The American Society of Civil Engineers (ASCE) code of ethics, has specifically requires that "engineers shall hold paramount the safety, health, and welfare of the public and shall strive to comply with the principles of sustainable development in the performance of professional duties" The term sustainable development emphasizes on the investment, orientation of technology, development and functioning of organizations to meet the present needs of people and at the same time ensuring the future generations to meet their needs.

Compaq Computer Corporation (now merged with HP) was the leader, who exhibited their commitment to environmental health, through implementation of the concept of 'Design for environment' on their products, unified standards all over the world units, and giving priority to vendors with a record of environmental concern. Engineers as experimenters have certain duties towards environmental ethics, namely:

1. Environmental impact assessment: One major but sure and unintended effect of technology is wastage and the resulting pollution of land, water, air and even space. Study how the industry and technology affects the environment.
2. Establish standards: Study and to fix the tolerable and actual pollution levels.
3. Counter measures: Study what the protective or eliminating measures are available for immediate implementation
4. Environmental awareness: Study on how to educate the people on environmental practices, issues, and possible remedies.

Human Centered Environmental Ethics

This approach assumes that only human beings have inherent moral worth duly to be taken care of. Other living beings and ecosystems are only instrumental in nature. Utilitarianism aims to maximize good consequences for human beings. Most of the goods are engineered products made out of natural resources. Human beings have also

a. **Recreational interests** (enjoy leisure through mountaineering, sports, and pastimes),
b. **Aesthetic interests** (enjoy nature as from seeing waterfalls and snow-clad mountains),
c. **Scientific interests** to explore into nature or processes, and (d) a basic interest to survive, by preservation as well as conservation of nature and natural resources.

Rights ethicists favor the basic rights to live and right to liberty, to realise the right to a live in a supportive environment. Further, virtue ethics stresses the importance of prudence,

humility, appreciation of natural beauty, and gratitude to the mother nature that provides everything. However, the nature-centered ethics, which ensures the worth of all living beings and organisms, seems to be more appropriate in the present-day context. Many Asian religions stress unity with nature, rather than domination and exploitation. The Zen Buddhism calls for a simple life with compassion towards humans and other animals. Hinduism enshrines the ideal of oneness (advaitha) in and principle of ahimsa to all living beings. It identifies all the human beings, animals, and plants as divine. The eco-balance is the need of the hour and the engineers are the right experimenters to achieve this.

Challenges and Problems

The following are a few challenges that our country and the global community is facing at large:

Plastic Waste Disposal

In our country, several crores of plastic bottles are used as containers for water and oil, and plastic bags are used to pack different materials ranging from vegetables to gold ornaments. Hardly any of these are recycled. They end up in gutters, roadsides, and agricultural fields. In all these destinations, they created havoc. The worst still is the burning of plastic materials in streets and camphor along with plastic cover in temples, since they release toxic fumes and threaten seriously the air quality. Cities and local administration have to act on this, collect and arrange for recycling through industries.

e-Waste Disposal

The parts of computers and electronic devices which have served its useful life present a major environmental issue for all the developing countries including India. This scrap contains highly toxic elements such as lead, cadmium, and mercury.

Even the radioactive waste will lose 89% of its toxicity after 200 years, by which time it will be no more toxic than some natural minerals in the ground. It will lose 99% of its remaining toxicity over the next 30,000 years. The toxic chemical agents such as mercury, arsenic, and cadmium retain toxicity undiminished forever.

But these scraps are illegally imported by unscrupulous agencies to salvage some commercially valuable inputs. Instead of spending and managing on the scrap, unethical organizations sell them to countries such as India. This is strictly in violation of the Basel Convention of the United Nations Environment Program, which has banned the movement of hazardous waste. A recent report of the British Environment Agency,13 has revealed that the discarded computers, television sets, refrigerators, mobile phones, and electrical equipment have been dispatched to India and Pakistan in large quantities, for ultimate disposal in environmentally-unacceptable ways and at great risk to the health of the labour. Even in the West, the electronic junk has been posing problems. Strong regulation including

a. Pressure on industries to set up disassembling facilities,
b. Ban on disposal in landfill sites,
c. Legislation for recycling requirements for these junk and
d. Policy incentives for eco-friendly design are essential for our country. The European Union through the Waste Electrical and Electronic Equipment (WEEE) directive has curbed the e-waste dumping by member countries and requires manufacturers to implement methods to recover and recycle the components.

Indian Government expressed its concern through a technical guide on environmental management for IT Industry in December, 2004. It is yet to ratify the ban on movement of hazardous waste according to the Basel Convention. A foreign news agency exposed a few years back, the existence of a thriving e-waste disposal hub in a suburb of New Delhi, operating in appallingly dangerous conditions. Our country needs regulations to define waste, measures to stop illegal imports, and institutional structures to handle safe disposal of domestic industrial scrap.

Industrial Waste Disposal

There has been a lot of complaints through the media, on

a. Against the Sterlite Copper Smelting Plant in Thuthukkudi (1997) against its pollution, and
b. When Indian companies imported the discarded French Warship Clemenceau for disposal, the poisonous asbestos compounds were expected to pollute the atmosphere besides exposing the labor to a great risk, during the disposal. The government did not act immediately. Fortunately for Indians, the French Government intervened and withdrew the ship, and the serious threat was averted!

Depletion of Ozone Layer

The ozone layer protects the entire planet from the ill-effects of ultraviolet radiation and is vital for all living organisms in this world. But it is eaten away by the Chloro-fluoro-carbons (CFC) such as freon emanating from the refrigerators, air conditioners, and aerosol can spray. This has also caused skin cancer to sun-bathers in the Western countries. Further NO and NO_2 gases were also found to react with the ozone. Apart from engineers, the organizations, laws of the country and local administration and market mechanisms are required to take up concerted efforts to protect the environment.

Global Warming

Over the past 30 years, the Earth has warmed by 0.6°C. Over the last 100 years, it has warmed by 0.8°C. It is likely to push up temperature by 3°C by 2100, according to NASA's studies. The U.S. administration has accepted the reality of global climate change, which has been associated with stronger hurricanes, severe droughts, intense heat waves and the

melting of polar ice. Greenhouse gases, notably carbon dioxide emitted by motor vehicles and coal-fired power plants, trap heat like the glass walls of a greenhouse, cause the Earth to warm up. Delegates from the six countries — Australia, China, India, Japan, South Korea and US met in California in April 2006 for the first working session of the AsiaPacific Partnership on Clean Development and Climate. These six countries account for about half of the world's emissions of climate-heating greenhouse gases. Only one of the six, Japan, is committed to reducing greenhouse gas emissions by at least 5.2 per cent below 1990 levels by 2012 under the Kyoto Agreement.

About 190 nations met in Germany in the middle of May 2006 and tried to bridge vast policy gaps between the United States and its main allies over how to combat climate change amid growing evidence that the world is warming that could wreak havoc by stoking more droughts, heat waves, floods, more powerful storms and raise global sea levels by almost a meter by 2100.

Acid Rain

Large emissions of sulphur oxides and nitrous oxides (NO) are being released into the air from the thermal power stations using the fossil fuels, and several processing industries. These gases form compounds with water in the air and precipitates as rain or snow on to the earth. The acid rain in some parts of the world has caused sufficient damage to the fertility of the land and to the human beings.

Solutions to Environmental Challenges

The following are scientifically proven solutions to many of our world environmental challenges. Some of them are new and innovative and many time old adages that have tested the veracity for, but have failed to implement it at the required scale.

Sustainability

Sustainability, the long-term viability of a community, set of social institutions, or societal practice. In general, sustainability is understood as a form of intergenerational ethics in which the environmental and economic actions taken by present persons do not diminish the opportunities of future persons to enjoy similar levels of wealth, utility, or welfare.

The idea of sustainability rose to prominence with the modern environmental movement, which rebuked the unsustainable character of contemporary societies where patterns of resource use, growth, and consumption threatened the integrity of ecosystems and the well-being of future generations. Sustainability is presented as an alternative to short-term, myopic, and wasteful behaviours. It can serve as a standard against which existing institutions are to be judged and as an objective toward which society should move. Sustainability also implies an interrogation of existing modes of social organization to determine the extent to which they encourage destructive practices as well as a conscious

effort to transform the status quo so as to promote the development of more-sustainable activities.

Natural Resource Management

Natural resource management, ways in which societies manage the supply of or access to the natural resources upon which they rely for their survival and development. Insofar as humans are fundamentally dependent on natural resources, ensuring the ongoing access to or a steady provision of natural resources has always been central to the organization of civilizations and, historically, has been organized through a range of schemes varying in degrees of formality and involvement from the central authorities.

A “natural” resource is one that is afforded by nature without human intervention; hence, the fertile lands or the minerals within them, rather than the crop that grows on them, are examples of a country’s natural resources. Although what is considered a “resource” (or, for that matter, “natural”) has varied over time and from one society to another, resources are, ultimately, riches provided by nature from which can be derived some form of benefit, whether material or immaterial. Under some definitions, only those natural resources that can renew themselves and whose exploitation relies on their regenerative capacities properly necessitate management. For example, oil is not usually considered a subject of natural resource management, whereas forests are. The use of nonrenewable resources is subject to regulation rather than management. The management of renewable natural resources seeks to balance the demands of exploitation with a respect for regenerative capacities.

Environmental Policy

Environmental policy, any measure by a government or corporation or other public or private organization regarding the effects of human activities on the environment, particularly those measures that are designed to prevent or reduce harmful effects of human activities on ecosystems.

Environmental policies are needed because environmental values are usually not considered in organizational decision making. There are two main reasons for that omission. First, environmental effects are economic externalities. Polluters do not usually bear the consequences of their actions; the negative effects most often occur elsewhere or in the future. Second, natural resources are almost always underpriced because they are often assumed to have infinite availability. Together, those factors result in what American ecologist Garrett Hardin in 1968 called “the tragedy of the commons.” The pool of natural resources can be considered as a commons that everyone can use to their own benefit. For an individual, it is rational to use a common resource without considering its limitations, but that self-interested behaviour will lead to the depletion of the shared limited resource—and that is not in anyone’s interest. Individuals do so nevertheless because they reap the benefits in the short term, but the community pays the costs of depletion in the

long term. Since incentives for individuals to use the commons sustainably are weak, the government has a role in the protection of the commons.

Circular Economy

Economic systems are moving from the current linear models to circular economy. Circular economy calls for prioritizing regenerative resources (use of renewable, reusable, non-toxic), maximizing the lifetime of products, using waste as 5 resources, rethinking business models, designing for the future; all of which call for innovative solutions.

Sharing Economy

An example of an innovative solution is the current move towards sharing economy or collaborative consumption. Today's society is changing from the belief that owning things is commensurate to one's status in society, more and more people are becoming inclined to agree that there are sometimes real advantages to renting over owning – access is the new ownership. For instance, a company offering integrated pest management services to farmers using organic material and products, instead of the standard way of selling the pesticides, the company offers the service to their clients.

Policy Harmonization

Harmonization of policies across multiple sectors creates an enabling environment to drive Innovative solutions. For example, the agriculture ministry will need to work with environment and forestry ministries to ensure EBA techniques like agroforestry are integrated into mainstream agriculture policies (SDGs 2, 13, 15). To catalyze investment in clean energy powered value addition, agriculture policies will need to reconcile with industry policies, energy policies, lands policies and private investors to ensure relevant-cross cutting policies that incentivize investment by both state and non-state actors in plants and clean processing industries.

Innovative Financing Schemes

The Addis Ababa Action Agenda calls upon all businesses to apply their creativity and innovation to solving sustainable development challenges. It also seeks to promote social innovation (including innovative practices of indigenous peoples) to support social well-being and sustainable livelihoods.

New financial streams (mobile banking; renewable energy systems; retro-fittings in buildings, green bonds, green mortgages) are needed.

Computer Ethics

Definition

Computer ethics is defined as

1. study and analysis of nature and social impact of computer technology,
2. formulation and justification of policies, for ethical use of computers.

This subject has become relevant to the professionals such as designers of computers, programmers, system analysts, system managers, and operators. The use of computers have raised a host of moral concerns such as free speech, privacy, intellectual property rights, and physical as well as mental harm. There appears to be no conceptual framework available on ethics, to study and understand and resolve the problems in computer technology.

Categories of Ethical Problems

Different types of problems are found in computer ethics:

Computer as the Instrument of Unethical Acts

a. The usage of computers replaces the job positions. This has been overcome to a large extent by readjusting work assignments, and training everyone on computer applications such as word processing, editing, and graphics.
b. Breaking privacy. Information or data of the individuals accessed or erased or the ownership changed.
c. Defraud a bank or a client, by accessing and withdrawing money from another bank account.

Computers as the Object of Unethical Act

Their data are accessed, modified or deleted.

a. **Hacking:** The software is stolen or information is accessed from other computers. This may cause financial loss to the business or violation of privacy rights of the individuals or business. In case of defense information being hacked, this may endanger the security of the nation.
b. **Spreading virus:** Through mail or otherwise, other computers are accessed and the files are erased or contents changed altogether. 'Trojan horses' are implanted to distort the messages and files beyond recovery. This again causes financial loss or mental torture to the individuals. Some hackers feel that they have justified their

right of free information or they do it for fun. However, these acts are certainly unethical.

c. **Health hazard:** The computers pose threat during their use as well as during disposal.

Problems Related to Autonomous Nature of The Computer

a. **Security risk:** Recently the Tokyo Stock Exchange faced a major embarrassment. A seemingly casual mistake by a junior trader of a large security house led to huge losses including that of reputation. The order through the exchange's trading system was to sell one share for 600,000 Yen. Instead the trader keyed in a sale order for 600,000 shares at the rate of one Yen each. Naturally the shares on offer at the ridiculously low price were lapped up. And only a few buyers agreed to reverse the deal! The loss to the securities firm was said to be huge, running into several hundred thousands. More important to note, such an obvious mistake could not be corrected by some of the advanced technology available. For advanced countries like Japan who have imbibed the latest technology, this would be a new kind of learning experience.
b. **Loss of human lives:** Risk and loss of human lives lost by computer, in the operational control of military weapons. There is a dangerous instability in automated defense systems. An unexpected error in the software or hardware or a conflict during interfacing between the two, may trigger a serious attack and cause irreparable human loss before the error is traced. The Chinese embassy was bombed by the U.S. military in Iraq a few years back, but enquiries revealed that the building was shown in a previous map as the building where insurgents stayed.
c. In flexible manufacturing systems, the autonomous computer is beneficial in obtaining continuous monitoring and automatic control.

Workplace Issues

The ethical problems initiated by computers in the workplace are:

a. Elimination of routine and manual jobs. This leads to unemployment, but the creation of skilled and IT-enabled service jobs are more advantageous for the people. Initially this may require some upgradation of their skills and knowledge, but a formal training will set this problem right. For example, in place of a typist, we have a programmer or an accountant.
b. Health and safety: The ill-effects due to electromagnetic radiation, especially on women and pregnant employees, mental stress, wrist problem known as Carpal Tunnel Syndrome, and back pain due to poor ergonomic seating designs, and eye strain due to poor lighting and flickers in the display and long exposure, have been reported worldwide. Over a period of long exposure, these are expected to affect the health and safety of the people. The computer designers should take care of

these aspects and management should monitor the health and safety of the computer personnel.

c. Computer failure: Failure in computers may be due to errors in the hardware or software. Hardware errors are rare and they can be solved easily and quickly. But software errors are very serious as they can stop the entire network. Testing and quality systems for software have gained relevance and importance in the recent past, to avoid or minimize these errors.

Property Issues

The property issues concerned with the computers are:

a. Computers have been used to extort money through anonymous telephone calls.
b. Computers are used to cheat and steal by current as well as previous employees.
c. Cheating of and stealing from the customers and clients
d. Violation of contracts on computer sales and services.
e. Conspiracy as a group, especially with the internet, to defraud the gullible, stealing the identity and to forge documents.
f. Violation of property rights: Is the software a property? The software could be either a Program (an algorithm, indicating the steps in solving a problem) or a Source code (the algorithm in a general computer language such as FORTRAN, C and COBOL or an Object code (to translate the source code into the machine language). How do we apply the concept of property here? This demands a framework for ethical judgments.

Property is what the laws permits and defines as can be owned, exchanged, and used. The computer hardware (product) is protected by patents. The software (idea, expression) is protected by copyrights and trade secrets. But algorithms can not be copyrighted, because the mathematical formulas can be discovered but not owned. The object codes which are not intelligible to human beings can not be copyrighted.

Thus, we see that reproducing multiple copies from one copy of (licensed) software and distribution or sales are crimes. The open source concepts have, to a great extent, liberalized and promoted the use of computer programs for the betterment of society.

Cyber Crime

Physical Security

The computers are to be protected against theft, fire, and physical damage. This can be achieved by proper insurance on the assets.

Logical Security

The aspects related are

a. The privacy of the individuals or organizations,

b. Confidentiality,
c. Integrity, to ensure that the modification of data or program are done only by the authorized persons,
d. Uninterrupted service. This is achieved by installing appropriate uninterrupted power supply or back-up provisions, and
e. Protection against hacking that causes dislocation or distortion. Licensed anti-virus packages and firewalls are used by all computer users to ensure this protection. Passwords and data encryption have been incorporated in the computer software as security measures. But these have also been attacked and bye-passed. But this problem has not been solved completely.

Major weaknesses in this direction are:

a. The difficulty in tracing the evidence involved and
b. Absence of stringent punishment against the crime. The origin of a threat to the Central Government posted from an obscure browsing center, remained unsolved for quite a long time. Many times, such crimes have been traced, but there are no clear cyber laws to punish and deter the criminals.

Privacy and Anonymity

The data transmission and accessibility have improved tremendously by using the computers, but the right to privacy has been threatened to a great extent. Some issues concerned with the privacy are listed hereunder:

Records of Evidence

Service records or criminal records and the details of people can be stored and accessed to prove the innocence or guilty. Records on psychiatric treatment by medical practitioners or hospitals, or records of membership of organizations may sometimes embarrass the persons in later years.

Hacking

There are computer enthusiasts who willfully or for fun, plant viruses or “Trojan horses” that may fill the disc space, falsify information, erase files, and even harm the hardware. They break down the functioning of computers and can be treated as violation of property rights. Some hackers opine that the information should be freely available for everybody. It is prudent that the right to individual privacy in limiting the access to the information on oneself, should not be violated.

Legal Response

In the Indian scene, the Right to Information Act 2005 provides the right to the citizens to secure access to information under the control of public authorities, including the departments of the central government, state governments, government bodies, public

sector companies and public sector banks, to promote transparency and accountability of public authorities.

Solutions to Overcome Computer Related Ethical Challenges

Some solutions to overcome the various types of Ethical conundrums that we face are as follows for the different types of Conundrums:

Computer as the Instrument of Unethical Acts

Computers are very powerful machines and irrespective of the amount of fraud that is committed on them they are here to stay as they have become an integral and irreplaceable part of our lives now.

To prevent unethical acts to be committed on computers we must make our infrastructures more robust and further expand our existing cyber crime laws. This requires both computer professionals and Governments and organizations to come together and work in harmony.

Computers as the Object of Unethical Acts

Computers just like any other modern invention like the internet, or Optical fibre, or even the telephone or Mobile are used by terrorists and other persons for unscrupulous actions and that just means that we need to adapt and create better laws to properly identify illegal actions and to be able to prosecute against it in court.

Problems Related To Autonomous Nature of Computers

More and more computers have been slowly replacing jobs and tasks that were initially performed by humans and they have also become more intelligent and are performing tasks that are very complex and would've been deemed impossible to be solved by a computer a few years ago.

Also, computers have also taken over functions that were previously done by mechanical processes. Eg. The brakes in the car were at a point in time operated and controlled by mechanical process which has now been replaced by a computer chip controlling the brakes depending on the position of a brake pedal.

Similarly computers are also placed on the rocket that goes to space and the International Space Station (ISS) and self driving cars and many many other appliances such as mixers, grinders and even toaster ovens.

If a computer fails on any of these devices, the results can be burnt bead to dead astronauts and anywhere in between and hence computer scientists and software engineers/developers need to follow proper ethical principles of development so that the machines which were used to automate do not lead to disasters.

This can be achieved if all developers and engineers follow proper domain driven design patterns and properly test their code base using well written tests that are exhaustive and comprehensive.

Using this design technique and by modern agile methodologies engineers can weed out any design flaws during production and by further taking advantage of the test team and quality assurance team they can make sure that the product that they are shipping is ready for mass production use.

Workplace Issues

Working many hours in the office in a fixed position can cause many health problems like Carpal Tunnel Syndrome, Myopia, Eye Vision Defects, Back Pain, Sore wrists and neck problems.

To avoid these issues from forming and to maintain a healthy lifestyle whilst working in an office environment engineers can focus on the following habits:

a. Eating a healthy wholesome food before coming to the office.
b. Regularly taking short breaks from the desk to move around and flex your muscles and also stretch your arms and legs.
c. To alternate between a sitting and a standing posture so as to remove stress and tension from your abdomen and back
d. Drink tea or coffee sparingly as high amounts of caffeine and other drugs can increase stress.
e. Reduce the amount of blue light being emitted from the screen as that can cause sleep disorders (like insomnia etc.) and also eye disorders.

Management can also work towards promoting a healthy lifestyle by putting up posters or pamphlets that can help spread these important points so that people can follow them to lead a healthy work-life balance and remain fit.

Another ethical conundrum that automation and the general computer revolution has brought about is the loss of jobs and a massive shift in what people do and interract with society. Management and organizations who are invested in their workforce and do not wish them to lose jobs because of changing demands and growing technologies can constantly work on reskilling their workforce and re-training them. This will make them resilient to any strong change in the market for new skills.

Property Issues

Property issues can be solved by creating different types of Licences like MIT, APACHE, APACHE-II etc. and then training engineers on using the correct type of licence for their product so that they can protect their work and distribute it safely.

Identifying and respecting the developer-consumer licence is a different issue entirely and must also be taught to engineers so that they understand the consequences of using somebody else's work and also the ethically correct decisions an dp[ermission taking protocols to properly use somebody else's work.

Cyber Crime

Cyber Crime is a very intricate topic and has many different facets. Cyber crime can be and is committed in the cyberspace world and as very real world consequences just like a normal crime. Organizations that have a technical knowledge base need to work with governments to create proper cyber laws and so that the governments are fully equipped to battle cyber crime.

Furthermore we can work on educating the children at a young age with the help of schools, teachers and proper workshops so that they understand the definitions of cyber crimes and cyber bullying and also the consequences that these actions can have, to other people as well as legal.

Privacy and Autonomy

With the advent of computers data transmission has increased manifold and we store more and more of our intimate and private moments and information on our mobile phones and computers. This has led to more personalized attacks on our mobile phones and computers which has led to many a time data being breached and stolen.

We need to understand the risk of storing important data on vulnerable devices and also understand how to keep it safe and secure. We need to teach ourselves and others the various types of protections we have in the cyber world and how to use them.

We also need to follow and obey a few cyber ethics like

1. Not sharing our passwords with anyone.
2. Not writing down passwords on a slip of paper or temporary storage and leaving it near or around the actual protected device.
3. We must not use the same password for every device.
4. We should use random password generators to create passwords for all the different services we have and store these random passwords in a password decryptor software that is further guarded by a common password which is known only to us.

Explain in Detail About the Assessment of Safety and Risk Regarding Engineering Products. What is the Use of Risk-Benefit Analysis.

Safety

Safety has different connotations. A product or a project is safe, with respect to a person or group, at a given time, if its risks were fully known, and if the risks are judged to be acceptable, in the light of settled perspectives. When based on judgment safety, can be taken as objective. If the perspective on values is taken then safety can be taken as objective. If the perspective on values are taken the safety can be subjective as well.

Awareness and maintenance of the situation is called *safety*. This safety can be incorporated during design, pre-testing, operation, field applications, analog tests, and learning from the past or from others.

The perception varies from person to person based on one's physical condition, age, experience, expertise and wisdom. A second hand electric heater when purchased was alright. But when used it might give electric shock and harm the human.

Safety and Risk

Safety was defined as the risk that is known and judged as acceptable. But, risk is a potential that something unwanted and harmful may occur. It is the result of an unsafe situation, sometimes unanticipated, during its use.

$$\text{Probability of safety} = 1 - \text{Probability of risk}$$

$$\text{Risk} = \text{Probability of occurrence} \times \text{Consequence in magnitude}$$

Different methods are available to determine the risk (testing for safety)

1. Testing on the functions of the safety-system components.
2. Destructive testing: In this approach, testing is done till the component fails. It is too expensive, but very realistic and useful.
3. Prototype testing: In this approach, the testing is done on a proportional scale model with all vital components fixed in the system. Dimensional analysis could be used to project the results at the actual conditions.
4. Simulation testing: With the help of a computer, the simulations are done. The safe boundary may be obtained. The effects of some controlled input variables on the outcomes can be predicted in a better way.

Assessment of Safety and Risk

Uncertainties in Assessment

There are any positive uncertainties in determining the risk of a product/service.

1. Restricted access to knowledge on risk: Some organizations do not disclose the data, citing legal restrictions.
2. Uncertain behaviour of materials: Test data supplied by the suppliers are only statistical. The individual parts may have considerably ($!3\sigma$) different from the statistical mean obtained from tests on random samples.
3. Uncertain and varying behaviour of user environments such as physical shock, thermal shock, fatigue, creep, impulse and self-excited vibrations in components or structures due to winds, snow fall, and rains cause sudden failure of the whole structure. An error or wrong procedure during assembly or joining the components may cause additional stress leading to early failure.
4. The use or misuse of materials/products, remaining untracked e.g. exposure to rain or snow or damp weather is likely to change the properties.
5. Newer applications of obsolete technologies, remaining unpublished.
6. Substitution of newer materials whose behaviour are not disclosed, and
7. The unexpected and unintended outcomes of the product/project.

All these aspects make the estimation of risk complex and unreliable. Hence, the data is to be monitored continuously and risk estimation updated periodically.

Safe Exit

In the study of safety, the 'safe exit' principles are recommended. The conditions referred to as 'safe exit' are:

1. The product, when it fails, should fail safely.

2. The product, when it fails, can be abandoned safely (it does not harm others by explosion or radiation)
3. The user can safely escape the product (e.g., ships need sufficient number of lifeboats for all passengers and crew; multi-storeyed buildings need usable fire escapes)

Risk-Benefit Analysis

The major reasons for the analysis of the risk benefit are:

1. To know risks and benefits and weigh them each.
2. To decide on designs, advisability of product/project.
3. To suggest and modify the design so that the risks are eliminated or reduced.

There are some limitations that exist in the risk-benefit analysis. The economic and ethical limitations are presented as follows:

1. Primarily the benefits may go to one group and risks may go to another group. Is it ethically correct?
2. Is an individual or government empowered to impose a risk on someone else on behalf of supposed benefit to somebody else? Sometimes, people who are exposed to maximum risks may get only the minimum benefits. In such cases, there is even violation of rights.
3. The units for comparison are not the same, e.g., commissioning the express highways may add a few highway deaths versus faster and comfortable travel for several commuters. The benefits may be in terms of fuel, money and time saved, but lives of human beings are sacrificed. How do we then compare properly?
4. Both risks and benefits lie in the future. The quantitative estimation of the future benefits, using the discounted present value (which may fluctuate), may not be correct and sometimes misleading.
5. Both risks and benefits may have uncertainties. The estimated probability may differ from time to time, and region to region.

Use of Risk-Benefit Analysis

Risk benefit analysis can be used for the following purposes.

Analyzing and Assessing Risk

Risk benefit analysis provides mathematicians, scientists and statisticians with a concrete quantifiable tool to measure the risk associated with any model, construction, technology

etc. They can create statistical models to try and quantify something that is much more abstract and on the basis of that be able to

1. Calculate the amount of risk associated with it.
2. Calculate the amount of insurance or other monetary funds that should be leased/loaned over the particular *item*.
3. Calculate the protection or different safety measures that should be employed to mitigate the amount of risk.
4. Create different strategies and protocols in case something that is undesirable happens.
5. Preparing beforehand for disasters and also equipping and stocking up on items that could be required.

Creating a Mathematical Model to Calculate Monetary Requirements

Statisticians and Actuaries are employed and paid to successfully calculate the amount of risk associated with inanimate objects, people and even events or other items. They are tasked with mathematically calculating the amount of risk associated with anything and the probabilistic likelihoods of any event taking place.

They use their calculations to predict the likelihood of any event happening based on qualitative, measurements and also past data as a reference and for extrapolation. These calculations are then used to advise the respective authorities on how much should any particular item/event/entity be valued at and insured at.

This also guides the respective authorities on how much an item should be monetarily valued at. These techniques are also used to insure items at auctions, or museums etc.

Creating Disaster Protocols

If we use the risk-benefit analysis metric we can determine the amount of risk associated with every part and can also to some degree calculate the different types of disasters and problems that can be faced in any operation, machinery, event etc. as we have calculated beforehand the different types anomalies that can occur.

As we are aware of the various problems that we can or very likely will encounter during said operation, we can also individually prepare for any such disaster and plan a mitigation and prevention strategy individually for all likely disasters.

We can also create different protocols for every disaster on how to deal with them individually and these protocols can then further have their own highly detailed plans and also their own associated risks which can then further be covered by their own disaster mitigation protocols.

Minimize Risks

By calculating the various types of risks that are associated with any activity we can understand how our actions and activities can be prone to different risks which can lead to disasters. By properly analyzing these risks we can take the following steps and measures to ensure that we minimize these risks by:

1. Choice of least vulnerable population to achieve results.
2. Appropriate screening of potential subjects.
3. Reasonable number of visits to monitor expected benefit.
4. Minimal number of subjects in non-treatment/ placebo arms.
5. Minimising predictable risks.
6. Using tests and procedures to avoid risk to subjects (collecting extra samples).
7. Avoid subject deception (Debriefing and counseling)
8. Follow up care.
9. Define stopping/withdrawal criteria.
10. Allow rescue medications and procedures
11. Define the safety committee role to perform interim assessments.
12. Provide serious adverse events management.
13. Address potential for exploitation (commercial/ other)