

GLOBAL ISSUES

Unit-V

Characteristics of global issues

- Reach:
 - Extend beyond the borders of any particular country
- Legal framework:
 - Lie outside the laws of any particular country
 - Few constraints on business, little protection for individuals
- Ethical context:
 - Typically involve differing cultures and mores
 - Costs may be distributed quite differently from benefits
 - Very dependent on business & government ethics

Multinational corporations

- Significant activities in more than one country:
 - Usually large companies, often engineering-based
- Issues that arise if disparities of power or wealth:
 - Exploitation of one country's population, resources or environment on behalf of another
 - Bribery or extortion:
 - Appropriateness of activity or product

Benefits of Multi National corporations

Benefits to MNCs:

- Inexpensive labour
- Availability of natural resources
- Favourable tax conditions
- Fresh markets for products

Benefits to developing host countries:

- New jobs
- Greater pay and greater challenge
- Transfer of advanced technology
- Social benefits from sharing wealth

Three senses of 'Relative' values

Ethical Relativism

- Actions are morally right in a particular society if they are approved by law, custom, or other conventions of the society.

Descriptive Relativism

- Value beliefs and attitudes differ from culture to culture and this is a fact.

Moral Relationalism or Contextualism (Ethical pluralism)

- Moral judgments should be made in relation to factors that vary between issues. Hence it is not possible to formulate rules that are simple and applicably to all situations.

Which standards should guide engineers' conduct when working in foreign countries?

Alternate 1: 'When in Rome, do as the Romans do'

Alternate 2. Follow the identical practices which were followed in the home country.

Both are unacceptable. A via media should be found based on the context.

International Rights

Donaldson suggests the following international rights:

- *The right to freedom of physical movement*
- *The right to ownership of property*
- *The right to freedom from torture*
- *The right to a fair deal*
- *The right to non-discriminatory treatment*
- *The right to physical security*
- *The right to freedom of speech and association*
- *The right to minimal education*
- *The right to political participation*
- *The right to subsistence*

Promoting Morally Just Measures

- MNCs business should do *more overall good* than bad towards the economy of the *host country* than doing good to a *few corrupt leaders* in oppressive regimes.
- They must *respect laws and regulations* of the local country *as long as they do not violate basic moral rights*.
- They must *pay a living wage*, even when local companies fail to pay such a wage, but otherwise pay only enough to attract competent workers.
- *Good judgments exercised in good faith*, than abstract principles, is the only way to address practical problems.

Technology Transfer and Appropriate Technology

Technology Transfer:

‘ The process of moving technology to a novel setting and implementing there.’

- Novel setting is any situation containing at least one new variable relevant to success or failure of given technology
- Transfer of technology from a familiar to a new environment is a complex process

Technology Transfer and Appropriate Technology(Continued)

Appropriate Technology:

‘ Identification, transfer, and implementation of the most suitable technology for a new set of conditions’

- Conditions include social factors that go beyond routine economic and technical engineering constraints
- Identifying them requires attention to an array of human values and needs that may influence how a technology affects the novel situation

Business Ethics

Business Ethics means conducting all aspects of business and dealing with all stakeholders in an ethical manner...

Globalization, Business Ethics & Competitive Advantage

- Globalization has brought about greater involvement with ethical considerations and most importantly achieving competitive advantage through business ethics.
- Globalization and business ethics are linked as they affect a company's ability to commit to its shareholders, in particular to external investors, and preserve the trust needed for further investment and growth.

Stakeholders

Responsibilities to stakeholder groups:

- **Shareholders** – Generate profits and pay dividends
- **Customers** – provide good quality products at reasonable prices. Safety, honesty, decency and truthfulness
- **Employees** – health and safety at work, security, fair pay
- **Suppliers** – pay on time, pay fair rates for the work done, provide element of security

Stakeholders(Continued)

- **Local Community** – provide employment, safe working environment, minimise pollution and negative externalities – provide external benefits?
- **Government** – abide by the law, pay taxes, abide by regulations
- **Management** – their aims versus those of the organisation as a whole
- **Environment** – limit pollution, congestion, environmental degradation, development, etc.

Moral Behaviour

- Right or Wrong?
- Trade with corrupt regimes?
- Trade in weapons?
- Humanitarian issues?
- Advertising and Promotion?
- Regulations/Legislation?
- Safety of products and work place?
- R&D/ Testing new products?

Tensions

- Profits versus higher wages
- Expansion versus development
- Production versus pollution
- Supplier benefits versus consumer prices/lower costs
- Survival of the business versus needs of stakeholders

Environment

- **Urban blight** – excessive development, inappropriate development, use of greenbelt land
- **Waste** – land-fill? re-cycling? burning?
- **Energy use** – renewable energy, non-renewable resources
- **Global Warming** – fact or fiction?
- **Pollution:**
 - Noise
 - Air
 - Land
 - Sea
 - Water

Conclusion

- The purpose of ethics is to enhance our lives and our relationships both inside and outside of the organization.
- The metaphor of a game sees competition in business as an exciting game, in which each competitor strives to achieve excellence, satisfy customers, and succeed as a result. The motive in this type of game is not to drive out the competition, but to work hard, play by the rules of the game, and do one's best in order to succeed.

Environmental Ethics

- **Environmental ethics** is the study of ethical questions regarding human interactions with the environment.
- The following are the ethical questions to be answered by Engineers in their role as experimenters
 - *How does an industry affect the environment?*
 - *How far it can be controlled?*
 - *Whether protective measures are available and implemented?*
 - *Whether engineers can ensure safe & clean environment?*

Causes for Environmental Degradation

- High quantity of Exhaust gases
- Deforestation
- High number of industries such as mining
- Chemical effluents
- Unprecedented Construction
- Secondary Pollutants
- Ruinous agricultural policies
- The Population Explosion
- Unplanned Land-use policies

Acid rain

Acid rain:

- pH of normal rain is 5.6
- pH of rainfall in north eastern areas of North America is 3.9 to 4.3.
- It is 10 to 100 times more acidic than normal. This is 'acid rain'.
- Snowmelt into water releases huge amount of acid which got frozen during winter.

Effects of Acid rain

Effects:

- 'Acid shock' from snowmelt causes mass destruction of fish. On long term it also harms fish eggs and sources of food.
- Thousands of lakes were killed by acid rain in Scandinavia and North America.
- The causes are burning of fossil fuels leading to release of SO_2 in particular and Nitrogen oxides.
- Problems of Sweden caused by Industrial plants in England and North Europe.
- Problems of North America caused by utilities in Ohio valley, the largest polluter of SO_2 in USA.
- Some of the potential changes are still unknown
 - Micro organisms in soil are being affected
 - Groundwater is polluted but its ultimate effects are not known
 - The effects may be known only after another 100 years
- Effect on food sources are also unclear

Greenhouse effect

- 'Greenhouse Effect' is defined as 'The progressive warming up of earth's surface due to blanketing effect of man made CO₂ in the atmosphere.'
- A greenhouse is that body which allows the short wavelength incoming solar radiation to come in, but does not allow the long wave outgoing infrared radiation to escape. The earth's atmosphere bottles up the energy of the sun and it acts like a green house, where CO₂ acts like a glass windows.

Case Study :PCB & Kanemi's Oil

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- In Southern Japan, in 1968 a large number of people suffered by *disfigurement of skin, discolouration, fatigue, numbness, respiratory distress, vomiting and loss of hair*.
 - 10,000 people *got affected & some died*
 - Two groups of 121 people each were tested and results were as follows:
 - It was found that *fried food using rice oil* produced by Kanemi company was eaten which *caused the problem*

Case Study :PCB & Kanemi's Oil (Continued)

- After 7 months of investigation....
 - It was found that the *presence of Polychlorinated biphenyl-PCB* was the *cause for the effects* and it was present in the rice oil.
 - Rice Oil was heated at low pressure to remove the odour thro' a heat exchanger and a liquid known as KANECHLOR *which contained PCB was used* for heat transfer
 - Pipes of the heat exchanger was *corroded* and *led to leakage thro' those pinholes*.
 - In fact, Kanemi had been *replenishing 27 kgs of lost PCB per month for sometime* without realizing the seriousness.
- Indirect path – this rice was used as chicken-feed and half of one million chickens that were fed died.

Other Similar Effects Examples

- Plastic bakery *wrappers containing PCB* mixed with ground stale bread was *used as chicken-feed* and 140000 chickens had to be slaughtered in New York.
- *PCB leaked* into fishmeal from a heating system in North Carolina plant and 12000 tons of fishmeal were contaminated and 88000 chicken, fed with fishmeal had to be destroyed.
- High pressure *injection of water* near Baldwin Dam in Los Angeles *caused* the reservoir *crack* open along a fault line. The water released killed 5 and damaged property worth \$14 million.

Internalizing Costs of Environmental Degradation

- Time cost of a product – includes numerous factors like effect of pollution, the depletion of energy and raw materials, social costs, etc.
- If these costs are internalized (added to the price), then the cost can be charged directly to the beneficiary of the degradation of environment.
- It is better to make the user to pay for all its costs than to levy higher taxes.
- An acceptable mechanism for price fixing must be found by the engineer with the help of the economist, scientist, lawyer and politician which could protect the environment through self correcting procedures.
- Good design practices may give better environmental protection without added cost.

Technology Assessment

- Engineers are said to be finding the *right answers for the wrong questions*
- *Finding the right questions is much more difficult than finding the right answers to these questions*
- Engineers should
 - Try to assess the technology and its environmental impacts and focus on containing the major adverse effects.
 - During assessment even if engineers were strongly believe that the projects have no adverse effect, they should continue to monitor the outcome even after its implementation which only would give the complete picture of the consequences of the project.

Environmental Ethical Perspectives

- Anthropocentric
- Bio-centric
- Eco-centric

Commonalties

- All three value systems have are concerned with human stewardship of the natural world, however they differ sharply for whom they do it.

Ethical Perspectives: Definitions

- **Anthropocentrism** – considers the effects of environmental actions on humans only
- **Bio-centrism** – considers the effects of environmental actions on all living things
- **Eco-centrism** – considers the effects of environmental actions on all components of our environment, both living and nonliving

Anthropocentrism

- Emphasizes human domination over nature and views non-human environment as a bundle of natural resources to be managed and exploited for maximal human gain. The ecosystems have only **instrumental** value, not **intrinsic** worth.

“Not designed to address issues that go beyond the narrow circle of human life.”

Gudorf and Hutchison

Bio-centrism

1. Humans are members of the Earth's community
2. All species are integral elements in a system of interdependence
3. All organisms are centers of life, each pursuing its own good
4. Humans are not inherently superior to other living things

Eco-centrism

- Expansion of biocentrism by including abiotic components of the environment. It cares less about individual life forms but emphasizes interaction between them and fosters a system approach

COMPUTER ETHICS

- Power relationships
- Property
- Privacy
- Professional issues

POWER RELATIONSHIPS

- Job elimination
- Customer Relations
- Biased Software
- Stock Trading
- Unrealistic Expectations
- Political Power
- Military Weapons

PROPERTY

- Embezzlement
- Data and Software

EMBEZZLEMENT

- Disguising of voice by means of a computer
- Obtaining private phone numbers
- Factors that make computers vulnerable:
 1. Speed, geographic coverage
 2. Difficulty to trace the source

DATA AND SOFTWARE

- Computer hardware is protected by patent laws
- Software is protected by copyrights and trade secret laws
 1. Copyrighted material must be “intelligible”
 2. Source codes can be copyrighted
 3. Object codes cannot be copyrighted
- Software patents are difficult to obtain creating international disagreements

PRIVACY

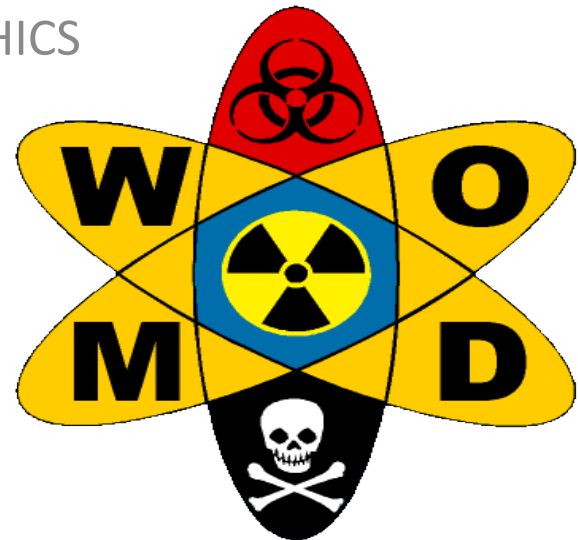
- Inappropriate Access: Eg- False accusation
- Data Bank Access:
 1. Taking impulsive measures on the basis of wrongly generated computer information.
- Hackers: compulsively challenge any computer security system
- Legal Responses:
 1. 1970 Fair Credit Reporting Act
 2. The Privacy Act of 1974

PROFESSIONAL ISSUES

- Computer Failures
- Computer Implementation
- Health Conditions

WEAPON DEVELOPMENT

IN ENGINEERING ETHICS



INTRODUCTION

- A **weapon, arm, or armament** is any device used in order to inflict damage or harm to living beings, structures, or systems.
- Engineers are the one who design the weapons.
- Engineers do their best on military because of their patriotism or prudential interests .
- But there is a great conflict between the Engineer's ethics and Weapon development .
- What is the duty of an Engineer ?!

- If an engineer designs or creates something that is used to take the lives of innocent lives , there rises an issue .

- Engineers also have various obligations ,

↳ He have to construct bridges that do not collapse .

↳ He has to build power plant that do not emit radiations and so on .

He has to carefully consider all the consequences and complexities before taking any step further .

DUTY OF AN ENGINEER

- Every engineer has to examine his or her own conscience regarding development of a particular form of weaponry .
- A weapon can be developed for a war if it satisfies some of the criteria's like ,
 - ↳ The war must be fought for a just cause .
 - ↳ The motive behind the war must be good .

THE WEAPONS SEESAW

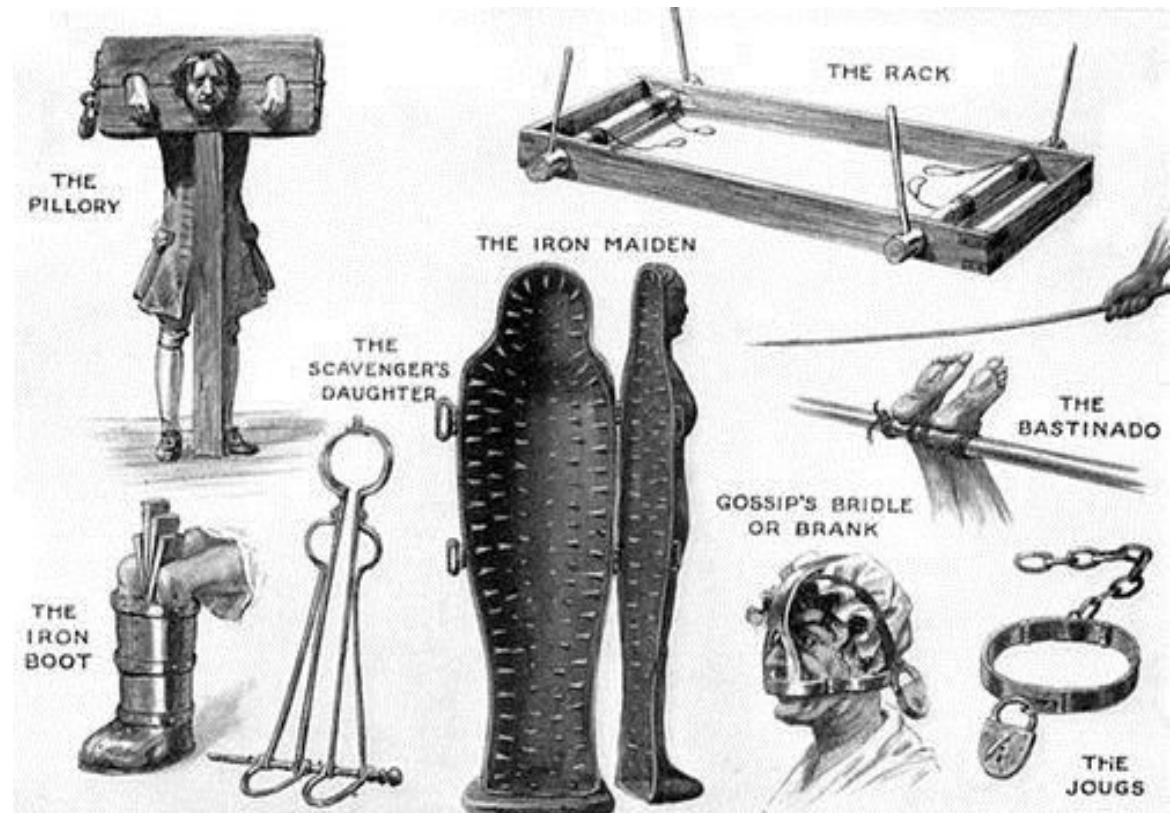
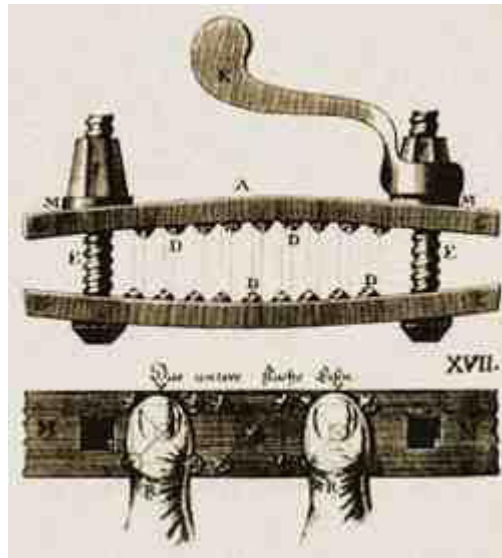
- Military expenditure throughout the world total hundreds of billion dollars annually , of this amount one-quarter is spent in purchase of weapons and related equipments , 17% of which is traded internationally .
- One of the world's most successful arm merchant and manufacturer is Krupp . Krupp is an expert in exploiting the defensive-offensive weapon seesaw .

- Having perfected his nickel armour . Armies and navies invested in it .
- Then he unveiled chrome steel shells that would pierce nickel armour . Armies and navies invested again .
- He appeared in the Chicago fair with a high-carbon armour that would resist both the newly invented shells . Orders poured in .
- In Far East the Krupp's firm was joined with Vickers(Britain) and Schneider(France) in supplying arms to Chinese , Japanese and Russians .

- Sir William White , chief designer and director of the warship construction pointed out to his Chinese clients about the growth of the Japanese navy .
- By this he was able to see profit by kindling the hearts of two Asiatic peoples . This was termed as the **Weapon Seesaw** !

THE ENGINEER'S INVOLVEMENT IN WEAPONS WORK

- Instruments of Torture – conveys an intense sense of pain and suffering : Engineer's Invention .



- Modern tickets to Hell : Engineer's Invention .





Why do people work/develop weapons for ?

- Money .
- Patriotism towards the country .
- Love towards the job – Physical Electronics .
- Consider it as a challenge to their country's prestige .

DECOMMISSIONING WEAPONS AND LASTING EFFECTS

- Till this day , the farmers in France plough up Shells (duds or live) which landed centuries ago during World War 1 .



- Special bomb disposal units are busy handling such hundreds of calls over a year and injuries occur as well .
- There are still hidden , unexploded bombs that fell all over the world during World War II
- Many farmers and their buffalos tread on mines planted by all sides in Vietnam and Cambodia in 1960 & 1970 .
- US State Department estimates that there are nearly 85 to 100 million land mines still remain scattered in various countries .

- One of the most ultimate horror was the intentional gassing(hydrogen cyanide) and human experimentation in Nazi concentration camps .





- Many treatments have been introduced to people affected by radiations during atomic bomb blasts , but one by one it has started showing its ill side effects .

CONCLUSION

The decision to enter or avoid weapons development as a career should involve a searching examination of both one's individual conscience and the social and political issues of weapons technology .

Engineers As Managers, Consultants And Leaders

Objectives of this Chapter

- Understand engineer's roles as manager
- Identify professional responsibilities as consultant
- Discuss the roles of engineer as advisor and expert witness
- Understand the social obligation of professional engineers as ethical leaders in the society

MANAGERS

- Primary function is to direct activities of the organization
- Are “custodians” /guardian or caretaker of the organization
- ***Concerned with present and future well-being of the organization***
 - economic terms
 - public image
 - employee morale

Engineers as Managers

- **Engineers often rise to management positions** – usually supervising other engineers as part of career advancement
- *Managerial positions offer higher incentives, responsibilities, accountabilities and power*
- *Managers are more highly regarded compared to engineers*

Engineers as Managers

(Continued)

- The change of job scope requires a lot of adjustment.
- Engineers **must equip themselves** with **managerial skills** such as *finance and leadership*.
- As engineers climb up the career ladder, *technical skills become less important* while **interpersonal skills become more important**

DECISIONS

- In engineering, as well as other activities, there is a distinction between the types of decisions to be made.
 - * Proper engineering decision (PED)
 - * Proper management decision (PMD)

PROPER ENGINEERING DECISION

- A decision that should be made by engineers or governed by engineering principles:
 - * involves **technical matters requiring engineering expertise**
 - * falls **within the ethical standards** embodied in the engineering codes

PROPER MANAGEMENT DECISION

- A decision that should be made by managers or governed by management considerations:
 - * involves **factors** relating to the **well-being of the organization**
 - * ***does not force engineers to make unacceptable compromises with **their** technical practices or ethical standards***

Engineers as Managers

(Continued)

- **Two major responsibilities of engineer-manager are as follows;**
 1. **Creating an ethical climate**
 2. **Managing conflict**

Creating an Ethical Environment

- To create an ethical environment, there are four criteria to be fulfilled;
 - **Ethical values** in their full complexity are **widely acknowledged and appreciated by managers and employees alike.**
 - The **sincere use of ethical language** has to be recognized as a legitimate part of **corporate dialogue.**
 - The top level management must **establish a moral tone in words, in policies, by personal example** etc.
 - The management has to **establish** some **procedures for resolving conflicts.**

Conflict Management

- Unresolved and unmanageable **conflict** in organization will *reduce productivity and effectiveness*.
- Manager **need to resolve and stop conflict** from affecting the organizational *performance*.

Conflict Management

- What are the important forms of Conflicts?
 - Conflicts based on *schedules*
 - Conflicts which arises in evolving the *importance of projects and the department.*
 - Conflicts based on the *availability of personal* for a project.
 - Conflicts over *technical matters.*
 - Conflicts arise due to *administrative procedure.*
 - Conflicts of *personality.*
 - Conflicts over *cost or expenditure or money*

Conflict Management

- The Principles of Conflicts Management
 - Separate people from the problem.
 - Focus on interest and not on positions.
 - Generate a variety of possibilities before deciding what to do.
 - Insist that the result be based on some objective standard.

Engineers as Consultant

- Consultant engineers **work in private practices**
- They are **compensated by fees for services they render/provide** not by salaries from employers
- Because of this, they tend to have *greater freedom to make decisions* about what projects they undertake.
- Nonetheless, their freedom is not absolute/total: They shared with salaried engineers the need to earn a living

Engineers as Consultant (Continued)

- There are three areas where engineers as consultants need to be aware of
 - *Advertising*
 - *Competitive bidding*
 - *Contingency fees*

Engineers as Consultants

(Continued)

- Consultant engineers are directly responsible for advertising of their services even when they hire consultant to help them. **Advertising becomes an issue become of these natures**
 - By outright *lies*.
 - By *half-truths*.
 - Through *exaggeration*.
 - By making *false innuendos/hints, suggestions or implications*.
 - Through confusion created by ambiguity, vagueness or incoherence.
 - Through subliminal/subconscious manipulation of the unconscious.

Engineers as Consultants

(Continued)

- Competitive bidding for professional engineering services is defined as the formal or informal submission, or receipt, of verbal or written estimates of cost or *proposals in terms of dollars, man-days of work required, percentage of construction cost, or any other measure of compensation* whereby the prospective client may compare engineering services on a price basis prior to the time that one engineer, or one engineering organization, has been selected for negotiations

Engineers as Consultants

(Continued)

- An Engineer requested to submit a *fee proposal or bid prior to the selection of an engineer or firm subject to the negotiation of a satisfactory contract*, shall attempt to have the procedure changed to conform to ethical practices, but if not successful he shall withdraw from consideration for the proposed work. These principles shall be applied by the Engineer in obtaining the services of other professionals

Engineers as Consultants

(Continued)

- **Contingency fees** is a *fee paid based on the projects the engineers successfully market.*
- The greater amount of job freedom enjoyed by consultant engineers lead to wider areas of responsible decision making concerning safety
- “Design-Only” project where consultant engineers contract to **design something but not to have any role in its construction pose significant ethical issues especially if it concerns the safety of the public**

Engineers as Expert Witness

- Engineers increasingly are asked to serve as consultants who **provide expert testimony in courts**
- Usually engineers are hired by one adversary (opponent) in the dispute and that raises special ethical concern about their proper roles.
- Should they function as **impartial seekers and communicator of truth** or do they essentially become 'hired gun'?

Engineers as Expert Witness (Continued)

- Engineers as expert witness have these obligations
 - To represent their **qualification accurately**
 - To perform **thorough investigation**
 - To present a **professional demeanor/behavior**
 - To **protect confidentiality** – cannot indulge the contents of their investigations to the opposing side of controversy until required to do so by courts

Engineers as Expert Witness (Continued)

- Engineers as expert witness have these obligations
 - Engineers as expert witnesses are *not required to volunteer evidence favorable to the other side*
 - **Must answer truthfully** but it remains the responsibility of the attorney for the opposing side to ask.

Engineers as Expert Witness (Continued)

- While performing duties as expert witnesses, engineers are susceptible to the following biases
 - Money biases – high payment
 - Ego biases – past accomplishments
 - Sympathy biases – compelling drama
- Therefore, engineers must **maintain their integrity** when serving as expert witness

Engineers as Advisors

- In policy-making, public officials and the general public had objective studies about **costs and benefits of alternative systems** of transportation, housing, and energy use.
- In planning, they need expert **advise about the feasibility, risks and benefits of particular technological projects**

Engineers as Advisors in Policy-Making

- Therefore, engineers **should not influence by political factors or personal interests**
- The *responsibilities towards the public take precedence* over other type of responsibilities

Normative Models of Advisers

- Normative models to be used to avoid conflicts
 - **Hired Guns** – *emphasis on the obligation to client, obligation to the society is limited to the minimum requirement.*
 - **Value-neutral Analysts** – *assessing the situation objectively, without taking into account of both types of obligations. The main obligation is to assess all alternatives and their implications*
 - **Value-guided Advocates** – *emphasis on values.* These values are honesty, competence, diligence and loyalty

Engineers as Moral Leaders

- It is the responsibilities of all professional to become moral leaders
- The aim is for the professional to *lead a group based on an accepted moral and ethical values*
- Moral leaders need to *identify important values and apply them when the need arises* and **built up the followers commitment to the values.**

Engineers as Moral Leaders (Continued)

- **Joining a professional body** is also part of manifestation of moral leadership especially when there is **active involvement**.
- Engineers can also become the **community leader – part of social obligation**