



IIT KHARAGPUR



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CERTIFICATION COURSES

# Ethics in Engineering Practice

Lecture No (6,7,8): Central Professional Responsibilities of Engineers

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# Outline of the module

- ❖ Professional responsibilities of an engineer
- ❖ Confidentiality and Proprietary Information - What types of information should be kept confidential? And why?
- ❖ Conflict of interest – Types and how to avoid the situations of conflict
- ❖ Competitive bidding
- ❖ Rights of an Engineer

# A case to see whether Rights and Responsibilities of engineers matter or not?

In the early 1970s, work was nearing completion on the Bay Area Rapid Transit (BART) system in the San Francisco Bay metropolitan area. The design for BART was very innovative, utilizing a highly automated train system with no direct human control of the trains. In the spring of 1972, three engineers working for BART were fired for insubordination. During the course of their work on the project, the three had become concerned about the safety of the automated control system and were not satisfied with the test procedures being used by Westinghouse, the contractor for the BART train controls.

Unable to get a satisfactory response from their immediate supervisors, the engineers resorted to an anonymous memo to upper management detailing their concerns and even met with a BART board member to discuss the situation. The information on the problems at BART was leaked to the press by the board member, leading to the firing of the engineers. They subsequently sued BART and were aided in their suit by the Institute of Electrical and Electronics Engineers (IEEE), which contended that they were performing their ethical duties as engineers in trying to protect the safety of the public that would use BART. Eventually, the engineers were forced to settle the case out of court for only a fraction of the damages that they were seeking.

There are many rights and responsibilities that engineers must exercise in the course of their professional careers. Often, these rights and responsibilities overlap. For example, the BART engineers had a responsibility to the public to see that the BART system was safe and the right to have their concerns taken seriously by management without risking their jobs.

In the case above, Do you think that rights and responsibilities of engineers were respected by BART?

# Introduction

Despite the fact that the codes of ethics of the professional engineering societies clearly point out the responsibilities of an engineer, the codes don't discuss any of the professional rights that engineers enjoy.

An engineer has a duty to protect the public, by blowing the whistle if necessary, when he perceives that something improper is being done in his organization. The engineer has a right to do this even if his employer feels that it is bad for the organization.

The same point has been highlighted in the case mentioned in the previous slide as well.

# Professional responsibilities of an Engineer

**(A) Confidentiality and Proprietary Information**

**(B) Conflict of Interest**

**(C) Competitive Bidding**

**And**

**(D) Is safety an emerging and much talked about new right of engineers?**

# Confidentiality and Proprietary Information

A unique characteristic of the majority of professions is the requirement that members of the profession 'shall or should' keep certain information of their client secret or confidential.

The clause of **Confidentiality** is also mentioned in most of the draft of the engineering codes of ethics. This is a well-established principle in other professions as well such as medicine, where the patient's medical information must be kept confidential, and in law, where attorney–client privilege is a well-established doctrine. This applies to engineering profession as well.

# Why must some engineering information be kept confidential?

The information is of great value if it relates to a unique formula about how a product is being manufactured or even if its is about how a business is being run or who are the core suppliers who are providing raw materials at very competitive rates

The information if leaked can help the competitors surpass us or even destroy our business to a major extent

So must be kept confidential.

# What types of information should be kept confidential?

- ✓ Confidential Data
- ✓ Results
- ✓ Information about upcoming unreleased products
- ✓ Information about designs or formulas for products.
- ✓ Business information concerning the number of employees working on a project, the identity of suppliers, marketing strategies, production costs, and production yields.
- ✓ Engineers today are required to sign a non disclosure agreement which binds them from sharing any information with outsiders.
- ✓ Government organizations like in Defense sector have more stringent rules because of the security issues.



# Conflict of Interest

- It is important for any professional to avoid the conflict of interest and the same applies to engineer profession as well.
- A situation of conflict of interest arises “when an interest, if pursued, could keep a professional from meeting one of his obligations [ Martin and Schinzinger, 2000].
- For example, The chief engineer who is entrusted with the responsibility to select the best bid for construction project by the government has its own company bidding for the same project - **an obvious case of actual conflict of interest**

# Types of conflict of interests

- Actual conflicts of interest – as mentioned in the previous example
- Potential conflict of interest - An engineer becoming friends with cement supplier for a project could in future lead to a compromising situation
- Appearance of a conflict of interest – An engineering creating expensive designs because he is paid the fee as a certain percentage of the overall cost of design. He might end up making very expensive designs to earn a large fee.

# Avoiding conflict of interest

- Follow the guidance of the company policy
- Take opinion from manager or co-workers
- Use your own judgment to decide if it is ethical or not.

# Competitive Bidding

- In simplest of terms, competitive bidding is a process by which a contracting firm selects from amongst the competing vendors or contractors who have submitted **bids** for a project.
- Engineers are restricted from competitive bidding for a variety of reasons.
- This seems to undignified for a profession like engineering which has the potential to impact so many lives.
- This would make the “price” the most important and determining factor for contacts which would lead to engineers cutting corners on design work and could ultimately undermine engineers’ duty to protect the safety and welfare of the public.

# The Emerging Consensus on the Responsibility for Safety among Engineers

- Engineering students are often taught that safety is their responsibility.
- Do you agree? Please refer to the case below and provide your views on the same

## Unanticipated Factor, Auto Safety

You are a new engineer working as part of a design team for a large automobile manufacturer. The company is doing a major redesign of one of its product lines.

Your team is responsible for designing part of the frame of the new car. As part of the company's drive to make cars lighter and more efficient, your team is directed to make some of the structural members out of carbon fiber composites. The cross member that holds the rails of the frame apart was ideally suited for composite replacement.

You test several different composite materials and lay-ups, and finally choose one that you have reason to believe will work. Several prototypes of the car are built, which you checked carefully. Your design is then approved and is about to go into production.

Just today you found a problem with your cross member. A few inches of the cross member from a car that was winter tested showed extensive cracking. After looking at the design, you realize that the cracked portion is in proximity to the exhaust system. You conclude the hot pipe in cold weather created thermal stresses and caused cracking.

What can and should you do and how do you go about it?

*Source:* Adapted from a scenario by Dan Dunn, Chris Minekime, and John Van Houten (MIT '93)

Source (cf): Ethics in Engineering Research and practice, Whitbeck

# Rights of an engineer

- Engineers also have rights that go with their profession.
- There are basic fundamental rights as well like the right to privacy, the right to participate in activities of one's own choosing outside of work, the right to reasonably object to company policies without fear of retribution, and the right to due process.
- As per Martin and Schinzinger, 2000, the most fundamental right of an engineer is the right of professional conscience. The right to apply own professional judgment while discharging duties.

# The right to Whistle blowing

- Whistle-blowing occurs when an employee informs the public or higher management of unethical or illegal behavior being conducted by an employer or supervisor.
- Engineers undoubtedly have a duty to protect and health of the general public. In many cases engineers may be compelled to blow the whistle as it happened in the opening a case given in the beginning of the module.
- Whistle blowing could be acknowledged or anonymous whistle blowing.

## Continued

- Anonymous whistle blowing occurs when the employee who is blowing the whistle refuses to reveal his name when making allegations. This can be done by sending a mail or an anonymous memo to upper management.
- On the other hand, acknowledged whistle-blowing occurs when the employee points out the accusations openly and is willing to withstand the inquiry brought on by his accusations.
- Whistle-blowing can be very bad from a corporation's point of view because it can lead to distrust, disharmony, and an inability of employees to work together.



# When should whistle blowing should be attempted?

## Follow the four point rule:

- Need: Make sure whistle blowing is required to avoid the prospective harm.
- Proximity: First hand knowledge is essential before you blow the whistle. The things should be happening in proximity from they can be detected or evaluated.
- Capability : The whistle-blower must have a reasonable chance of success in stopping the harmful activity.
- Last resort : Make sure it is only option left with you

# Preventing Whistle-Blowing

- From an employer's perspective it is equally important to see if the whistle blowing can be prevented as it may substantially harm the image of the organization as a whole. Following measures can help a great deal in making sure that the need to blow the whistle never arises;
- There must be a strong corporate ethics culture. Clear commitment to ethics must be established in the organization.
- There should be clear lines of communication. Openness can help a lot in curbing the situations well in advance.
- All employees must have meaningful access to high-level managers in order to bring their concerns forward.
- There should be willingness on the part of management to admit mistakes, publicly if necessary.

# Thank You!!



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# Ethics in Engineering Practice

## Lecture No (8,9): Workplace Rights and Responsibilities

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# Outline of the module

- ❖ Meaning of Rights and Responsibility
- ❖ Duty of confidentiality
- ❖ The criteria for deciding the confidential clause
- ❖ What types of information should be kept confidential?
- ❖ Changing Jobs, Confidentiality and Management Policies
- ❖ Justification for Confidentiality
- ❖ Conflict of Interest and sample situations for conflict of Interest
- ❖ An Ethical Corporate Climate and its defining feature
- ❖ Right of Professional Conscience, Conscientious Refusal and Employee Rights

Source: Introduction to Engineering Ethics, Second Edition, Martin and Schinzinger

# Rights and Responsibilities of an Engineer

Right: *a legal entitlement to have or do something*

Responsibility: *A duty or obligation to satisfactorily perform or complete a task (assigned by someone, or created by one's own promise or circumstances) that one must fulfill, and which has a consequent penalty for failure.*

# Duty of confidentiality

It is the duty to;

*keep secret all information deemed desirable to kept under covers*

Deemed by whom?

Basically, it is any information that the employer or client would like to have kept secret to compete effectively against business rivals. It could be any data concerning the company's business or technical processes that are not already public knowledge.

# The criteria for deciding the confidential clause

There is no fixed criteria.

It is what an employer considers to be confidential shall be kept confidential .



# What types of information should be kept confidential?

- ✓ Confidential Data
- ✓ Results
- ✓ Information about upcoming unreleased products
- ✓ Information about designs or formulas for products.
- ✓ Business information concerning the number of employees working on a project, the identity of suppliers, marketing strategies, production costs, and production yields.
- ✓ Engineers today are required to sign a non disclosure agreement which binds them from sharing any information with outsiders.
- ✓ Government organizations like in Defense sector have more stringent rules because of the security issues.

# Confidentiality and Changing Jobs

The responsibility to protect the information does not end when an employee leaves the job. If this was the case then there would be no way to protect the information. Previous employees would quickly give away it to their new employers or, perhaps for a price, sell it to competitors of their former employers.

Thus, the relationship of trust between employer and employee in regard to confidentiality continues beyond the formal period of employment.

Unless the employer gives consent, former employees are barred indefinitely from revealing trade secrets. This provides a clear illustration of the way in which the professional integrity of engineers involves much more than mere loyalty to one's present employer.

# Do you think?

**Do you think that the issue concerning the disclosure of secrets after leaving the job is a clear illustration of the way in which the professional integrity of engineers involves much more than mere loyalty to one's present employer?**

# A high profile case of trade secret violations

A high-profile case of trade secret violations was settled in January 1997 (without coming to trial) when Volkswagen AG (VW) agreed to pay General Motors Corporation (GM) and its German subsidiary Adam Opel \$100 million in cash and to buy \$1 billion in parts from GM over the next seven years.

Why?

Because in March 1993, Jose Ignacio Lopez, GM's highly effective manufacturing expert, left GM to join VW, a fierce competitor in Europe, and took with him not only three colleagues and knowhow, but also copies of confidential GM documents.

# Confidentiality and Management Policies

One approach is to use employment contracts that place special restrictions on future employment. Like restrictions related to the geographical location of future employers, the length of time after leaving the present employer before one can engage in certain kinds of work, and the type of work it is permissible to do for future employers.

But the issue is such contracts threaten the right of individuals to pursue their careers freely. Thus are not recognized as binding by the courts.

# Continued

Another approach, is to offer certain benefits like portable plans, say pension plans to engineers for not working with competitors on certain kinds of projects after leaving the company. Or could relate to offering special post employment annual consulting fees on the condition that he or she not work for a direct competitor during that period.

The best way is to generate a sense of professional responsibility among their staff that reaches beyond merely obeying the directives of current employers.

# Justification for Confidentiality

The primary justification is to respect the autonomy (freedom, self-determination) of individuals and corporations and to recognize their legitimate control over some private information concerning themselves.

All the major ethical theories recognize the importance of autonomy, whether it is understood in terms of rights to autonomy, duties to respect autonomy, the utility (as in utilitarian ethics) of protecting autonomy, or the virtue of respect for others.

## Continued

Trustworthiness is also one of the justifications for maintaining confidentiality.

When clients go to attorneys or tax accountants or even doctors they expect them to maintain confidentiality, and the professional ethics indicate that confidentiality will be maintained.

Similarly, employees often make promises (in the form of signing contracts) not to divulge certain information considered sensitive by the employer. Revealing the relevant information would surely account for the breach of trust.



# Continued

There are public benefits in recognizing confidentiality relationships as well within professional contexts.

For example, if confidentiality is not maintained, patients may shy away from sharing all the important information with their doctors and as it requires trust that the physician will not divulge private information.

# Conflict of Interest

Professional conflicts of interest are situations where professionals have an interest that, if pursued, might keep them from meeting their obligations to their employers or clients.

Concern about conflicts of interest largely centers on their potential to distort good judgment in faithfully serving an employer or client.

Exercising good judgment means arriving at beliefs on the basis of expertise and experience, as opposed to merely following simple rules.

# Conflict of interest and Conflicting interests

“Conflicting interests” means a person has two or more desires that cannot all be satisfied given the circumstances. But there is no suggestion that it is morally wrong or problematic to try pursuing them all.

But, in professional conflicts of interest it is often physically or economically possible to pursue all of the conflicting interests but doing so would be morally problematic

# Sample situations for conflict of Interest

- (1) gifts, bribes, and kickbacks,
- (2) interests in other companies,
- (3) insider information.

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# Continued

(i) gifts, bribes, and kickbacks

A bribe is a substantial amount of money or goods offered beyond a stated business contract with the aim of winning an advantage in gaining or keeping the contract, and where the advantage is illegal or otherwise unethical.

Bribes are illegal or immoral because they are substantial enough to threaten fairness in competitive situations

Gifts are not bribes as long as they are small gratuities offered in the normal conduct of business.

## Continued

### *(i) interests in other companies*

Some conflicts of interest consist in having an interest in a competitor's or a subcontractor's business.

It could occur if an employee is actually working for the competitor or subcontractor as an employee or consultant

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Another example is partial ownership or substantial stockholdings in the competitor's business.

# Continued

## *(iii) sharing insider information*

An especially sensitive conflict of interest consists in using “inside” information to gain an advantage or set up a business opportunity for oneself, one’s family, or one’s friends.

The information might concern one’s own company or another company with which one does business. For example, engineers might tell their friends about the impending announcement of a revolutionary invention, which they have been perfecting, or of their corporation’s plans for a merger that will greatly improve the worth of another company’s stock.

# Moral Status of Conflicts of Interest

**Do you think that situations of conflict of interest are always unavoidable?**

**Or**

**Is it morally incorrect to pursue conflicting interest as an employee?**



## Continued

In fact, it is not always unethical to pursue conflicts of interest. In practice, some conflicts are thought to be unavoidable, or even acceptable. One illustration of this is that the government allows employees of aircraft manufacturers, such as Boeing or McDonnell Douglas, to serve as government inspectors for the Federal Aviation Agency (FAA). The FAA is charged with regulating airplane manufacturers and making objective safety and quality inspections of the airplanes they build. Naturally the dual roles—government inspector and employee of the manufacturer being inspected—could bias judgments. Yet with careful screening of inspectors, the likelihood of such bias is said to be outweighed by the practical necessities of airplane inspection

# Think Tank

Has Ken acted unethically?

Who owns your knowledge?

Ken is a process engineer for Stardust Chemical Corp., and he has signed a secrecy agreement with the firm that prohibits his divulging information that the company considers proprietary. Stardust has developed an adaptation of a standard piece of equipment that makes it highly efficient for cooling a viscous plastics slurry. (Stardust decides not to patent the idea but to keep it as a trade secret.) Eventually, Ken leaves Stardust and goes to work for a candy-processing company that is not in any way in competition. He soon realizes that a modification similar to Stardust's trade secret could be applied to a different machine used for cooling fudge and, at once, has the change made.

## In the following case, are the actions of Client A morally permissible?

Client A solicits competitive quotations on the design and construction of a chemical plant facility. All the bidders are required to furnish as a part of their proposals the processing scheme planned to produce the specified final products. The process generally is one which has been in common use for several years. All of the quotations are generally similar in most respects from the standpoint of technology.

Contractor X submits the highest-price quotation. He includes in his proposals, however, a unique approach to a portion of the processing scheme. Yields are indicated to be better than current practice, and quality improvement is apparent. A quick laboratory check indicates that the innovation is practicable.

Client A then calls on Contractor Z, the low bidder, and asks him to evaluate and bid on an alternate scheme conceived by Contractor X. Contractor Z is not told the source of alternative design. Client A makes no representation in his quotation request that replies will be held in confidence

# An Ethical Corporate Climate

An ethical climate is a working environment that is conducive to morally responsible conduct.

Within corporations it is a combination of formal organization and policies, informal traditions and practices, and personal attitudes and commitments.

Engineers can make a vital contribution to such a climate, especially as they move into technical management and then more general management positions.

# Defining features of an ethical corporate climate

- Ethical values in their full complexity are widely acknowledged and appreciated by managers and employees alike.
- The use of ethical language is honestly applied and recognized as a legitimate part of corporate dialogue.
- Setting of moral tone by the top management
- Conflict resolution policies

# Rights of Engineers

Engineers have several types of moral rights, which fall into the sometimes overlapping categories of human, employee, contractual, and professional rights.

*As humans, engineers have* fundamental rights to live and freely pursue their legitimate interests, which implies, for example, rights not to be unfairly discriminated against in employment on the basis of sex, race, or age.

# Right of Professional Conscience.

The right of professional conscience is the moral right to exercise professional judgment in pursuing professional responsibilities. Pursuing those responsibilities involves exercising both technical judgment and reasoned moral convictions.

As with most moral rights, the basic professional right is an entitlement giving one the moral authority to act without interference from others. It is a “liberty right” that places an obligation on others not to interfere with its proper exercise.

# Right of Conscientious Refusal

The right of conscientious refusal is the right to refuse to engage in unethical behavior and to refuse to do so solely because one views it as unethical. This is a kind of second-order right. It arises because other rights to honor moral obligations within the authority-based relationships of employment sometimes come into conflict.

There are two situations to be considered: (1) where there is widely shared agreement in the profession as to whether an act is unethical and (2) where there is room for disagreement among reasonable people over whether an act is unethical.



# Continued

The troublesome cases concern situations where there is no shared agreement about whether a project or procedure is unethical.

The challenge for the engineer lies in tackling these situations.

# Right of Recognition

Engineers have a right of professional recognition for their work and accomplishments. Part of this involves fair monetary remuneration, and part nonmonetary forms of recognition.

If in any job employees are not paid well. Most of their time will be taken up by money worries, or even by moonlighting to maintain a decent standard of living

# Employee Rights

Employee rights are any rights, moral or legal, that involve the status of being an employee. They overlap with some professional rights, of the sort just discussed, and they also include institutional rights created by organizational policies or employment agreements, such as the right to be paid the salary specified in one's contract.

It includes;

***Privacy Right***

***Right to Equal Opportunity: Preventing Sexual Harassment***

***Right to Equal Opportunity: Nondiscrimination***

# Privacy Right

The right to pursue outside activities can be thought of as a right to personal privacy in the sense that it means the right to have a private life off the job.

Situations in which the functions of employers conflict with the right employees have to privacy

*A supervisor unlocks and searches the desk of an engineer who is away on vacation without the permission of that engineer. The supervisor suspects the engineer of having leaked information about company plans to a competitor and is searching for evidence to prove those suspicions.*

*A supervisor unlocks and searches the desk of an engineer who is away on vacation without the permission of that engineer. The supervisor suspects the engineer of having leaked information about company plans to a competitor and is searching for evidence to prove those suspicions.*

# Right to Equal Opportunity: Preventing Sexual Harassment

Sexual harassment is defined as : “the unwanted imposition of sexual requirements in the context of a relationship of unequal power.”

It takes two main forms:

quid pro quo and hostile work environment;

## Continued

*Quid pro quo* includes cases where supervisors require sexual favors as a condition for some employment benefit (a job, promotion, or raise). It can take the form of a sexual threat (of harm) or sexual offer (of a benefit in return for a benefit).

*Hostile work environment*, by contrast, is any sexually oriented aspect of the workplace that threatens employees' rights to equal opportunity. It includes unwanted sexual proposals, lewd remarks, sexual leering, posting nude photos, and inappropriate physical contact.

Both these forms are completely unacceptable at work.

# Right to Equal Opportunity: Nondiscrimination

One's sex, race, skin color, age, or political or religious outlook should not at all affect how they are perceived at work.

Human rights to fair and decent treatment at the workplace and in job training are vitally important.

# Thank You!!





# Ethics in Engineering Practice

## Lecture No 10 :Ethics as Design – Doing Justices to Moral Problems

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# Outline of the module

- ❖ Engineering and ethical situations
- ❖ Ethical Dilemmas
- ❖ Ethical theories : As a solution for resolving ethical issues
- ❖ What is a moral theory?
- ❖ Utilitarian, Tenets of utilitarian and criticism
- ❖ Cost benefit analysis in engineering
- ❖ Duty ethics, Right ethics and Virtue ethics
- ❖ Which theory to use
- ❖ Issues and Techniques while solving ethical issues
- ❖ Steps for solving ethical dilemmas
- ❖ Code of ethics as a solution

Source: Introduction to Engineering Ethics, Second Edition, Martin and Schinzinger

# Engineering and Ethical situations

Caroline Whitbeck suggests that engineering design is in many respects a model for “designing” courses of action in many moral situations, in engineering and elsewhere.

Understanding the crossings between engineering and moral situations through the assignment she gave in class (see next slide)

## continued

The assignment was to design a child seat that fits on top of standard suitcases with wheels. She specified several constraints. Some pertained to size: The child seat must be easily removable and storable under airplane seats and in overhead storage bins. Others pertained to use: The seat must have multiple uses, including the possibility of strapping it into a seat on an airplane.

Still others set safety limits: conformity to applicable safety laws plus avoiding unnecessary dangers. Yet there were many areas of uncertainty and ambiguity surrounding how to maximize safety (for example, when carrying the infant in the seat) and how many convenience features to include, such as storage spaces for baby bottles and diapers.

*The students arrived at strikingly different designs, varying in size and shape as well as in the basic structure of the crossbar that held the infant in place. Several were reasonable solutions to the design problem. Yet no design was ideal in every regard, and each had strengths and weaknesses. For example, one was larger and would accommodate older infants, but the added size increased the cost of manufacturing. Again, the bar securing the infant was more convenient in some directions of motion and less convenient in other directions.*

## Five aspects of engineering decisions that highlight important aspects of many moral decisions in general

First, usually there are alternative solutions to design problems, more than one of which is satisfactory or “satisfices.”

Second, multiple moral factors are involved, and among the satisfactory solutions for design problems, one solution is typically better in some respects and less satisfactory in other respects when compared with alternative solutions.

Third, some design solutions are clearly unacceptable. Like while designing a chair for an old person, the issue may be to make a chair at low cost which might in long term lead to back ache problems.

## continued

Fourth, engineering design often involves uncertainties and ambiguities, not only about what is possible and how to achieve it, but also about the specific problems that will arise as solutions are developed.

Finally, design problems are dynamic.

# Ethical or Moral dilemmas

Ethical (or moral) dilemmas are situations in which moral reasons come into conflict, or in which the applications of moral values are unclear, and it is not immediately obvious what should be done.

Ethical dilemmas arise in engineering, as elsewhere, because moral values are many and varied and can make competing claims.

Yet, although moral dilemmas comprise the most difficult occasions for moral reasoning, they constitute a relatively small percentage of *moral choices, that is, decisions* involving moral values.

# Ethical theories- As a solution for resolving moral problems

Ethical problem solving is as simple solving problems in engineering.

In engineering, there is generally one theory that is considered when tackling a problem. In studying engineering ethics, there are several theories that will be considered in solving just one problem.

The relatively large number of theories doesn't indicate a weakness in theoretical understanding of ethics or a "fuzziness" of ethical thinking. Rather, it reflects the complexity of ethical problems and the diversity of approaches to ethical problem solving that have been developed over the centuries.



# What Is a Moral Theory?

A moral theory defines terms in uniform ways and links ideas and problems together in consistent ways [Harris, Pritchard, and Rabins, 2000 ].

This is exactly how the scientific theories used in other engineering classes function. Scientific theories also organize ideas, define terms, and facilitate problem solving.

There are four ethical theories that will be considered here, each differing according to what is held to be the most important moral concept.

- *Utilitarianism*

- *Duty ethics*

- *virtue ethics*

- *Rights ethics*

# Utilitarianism

**Utilitarianism** – Utilitarianism holds that those actions are good that serve to maximize human well-being. emphasis in utilitarianism is not on maximizing the well-being of the individual, but rather on maximizing the well-being of society as a whole, and as such it is somewhat of a collectivist approach.

An example of this theory that has been played out in this country many times over the past century is the building of dams.

Dams often lead to great benefit t to society by providing stable supplies of drinking water, flood control, and recreational opportunities. However, these benefits often come at the expense of people who live in areas that will be flooded by the dam and are required to find new homes, or lose the use of their land. Utilitarianism tries to balance the needs of society with the needs of the individual.

# Tenets of utilitarianism

Act utilitarianism focuses on individual actions rather than on rules. The best known proponent of act utilitarianism was John Stuart Mill (1806–1873), who felt that most of the common rules of morality (e.g., don't steal, be honest, don't harm others) are good guidelines derived from centuries of human experience.

Rule utilitarianism differs from act utilitarianism in holding that moral rules are most important. As mentioned previously, these rules include “do not harm others” and “do not steal.” Rule utilitarians hold that although adhering to these rules might not always maximize good in a particular situation, overall, adhering to moral rules will ultimately lead to the most good.

# Criticism of Utilitarian approach

Sometimes what is best for everyone may be bad for a particular individual or a group of individuals.

Another objection to utilitarianism is that its implementation depends greatly on knowing what will lead to the most good. Frequently, it is impossible to know exactly what the consequences of an action are.

# Cost–Benefit Analysis in engineering

In cost–benefit analysis, the costs of a project are assessed, as are the benefits. Only those projects with the highest ratio of benefits to costs will be implemented. This principle is similar to the utilitarian goal of maximizing the overall good.

## The Pitfalls of Cost-benefit analysis

*For eg. from a pure cost–benefit discussion, it might seem that the building of a dam is an excellent idea. But this analysis won't include other issues such as whether the benefits outweigh the loss of a scenic wilderness area or the loss of an endangered species with no current economic value. Finally, it is also important to determine whether those who stand to reap the benefits are also those who will pay the costs. It is unfair to place all of the costs on one group while another reaps the benefits.*

# Code of Ethics – A solution for ethical decision making

Codes of ethics state the moral responsibilities of engineers as seen by the profession and as represented by a professional society.

Because they express the profession's collective commitment to ethics, codes are enormously important, not only in stressing engineers' responsibilities but also in supporting the freedom needed to meet them

# Thank You!!

