Engineering Ethics

Rights and Responsibilities of Engineers:

Responsibilities: is often linked to the role that you have in a particular situation. **Passive responsibility** Typical for passive responsibility is that the person who is held responsible must be able to provide an account of why he followed a particular course of action and why he made certain decisions.

Professional Responsibilities: (1) Confidentiality and Proprietary Information: requirement that members of the profession keep certain information of their client secret or confidential (mentioned in codes of ethics) **(2)** Avoiding conflict of interest arises when an interest, actual conflicts of interest / potential conflict of interest / appearance of a conflict of interest. **(3)** Competitive bidding: was banned but not the case anymore. Issues with bidding: submitting unrealistic bids / cutting corners / importance of cost.

Professional Rights: right to privacy, the right to participate in activities of one's own choice outside of work.

Professional rights – Right of professional conscience (moral autonomy) – Right of conscientious refusal (can refuse to be unethical just because you view it to be that way) – Right to recognition, fair pay

, the right to reasonably object to company policies without fear of retribution,,

Whistleblowing: an act by an employee of informing the public or higher management of unethical or illegal behavior by an employer or supervisor. **when an employee exposes illegal behavior within their job.**1. Keep supervisors informed (discussions and memos) 2. Be accurate, document 3. Consult trusted colleagues 4. Before going outside, consult ethics committee of professional society 5. Consult a lawyer

Ethical issues in Engineering practice:

Environmental ethics: sought to control the introduction of toxic substances into the environment, to protect the integrity of the biosphere, and to ensure a healthy environment for humans. Engineers are partly to blame for the damage and need to fix it through sustainable designs. Approaches to fixing environmental issues:(2) cost-benefit analysis: achieve an economically beneficial balance of pollution with health or environmental considerations. (From utilitarianism).

Conflict of interest and loyalty: Situations that if pursued could keep employees from meeting obligations to employer: – Gifts, bribes, kickbacks? ther companies (suppliers?) – Insider information (impact on stocks).

All professional codes include the obligation to practice one's profession with integrity and honesty, and in a competent way. Ethics involves systematically reflecting on morality, which is the set of beliefs and actions defining what people consider right or good. **Morality** represents the actual norms and values that exist within a society. **Utilitarisme:** produces the most good for the most people giving aqual consideration to enyone effected

Virtue Ethics: we see the moral rather than the consequences

Katian ethics: is centered around the idea that certain moral rules or duties should always be followed, regardless of the consequences. **Example:** If you consider lying to get out of trouble, first think, "What if everyone lied to get out of trouble?" If lying were universal, trust would disappear, and the act of lying would lose its meaning.

Ethical cycle: (1) Moral problem statment **(2)** Problem analysis **(3)**Option for action **(4)**Ethical evaluation **(5)** Reflection **(6)** Moral acceptable action

Ethical issues during the design process: The design process is a central area where ethical considerations concerning technology arise. (1) Problem analysis and formulation (2) conceptual design (3) simulation (4) Decision

Trade-offs and value conflicts occur during the evaluation stage of the design process, where different designs must be assessed against various criteria that often align with distinct moral values. **Cost-Benefit Analysis:** This method converts all considerations into monetary units, allowing for a straightforward comparison. **Thresholds:**Setting thresholds involves defining acceptable levels for various criteria like safety or sustainability.

Introduction to Engineering Ethics

Technological mediation: Technological mediation describes how technologies shape human actions, perceptions, and experiences beyond their basic functions. **Mediation of Perception:** Technologies transform how we perceive reality. **For example**, glasses help us see the world more clearly but don't directly change what we see, while a thermometer requires us to interpret numbers to understand temperature changes. This results in an amplification of certain aspects of reality while reducing others. **Mediation of Action:** Technologies also influence our actions by suggesting certain behaviors while inhibiting others, much like a script guide actors. For instance, a speed bump prompts drivers to slow down, and a disposable coffee cup implies it should be thrown away after use.

Moralizing technology: The concept of "moralizing technology" refers to the idea that technologies not only facilitate certain actions and experiences but also shape our moral decisions. Technologies mediate our relationship with the world, influencing what we consider ethical actions.

Risk assement: is a systematic process used in engineering to evaluate the potential hazards associated with certain activities or technologies. It involves four main steps:**(1) Release Assessment:** Identifying potential harmful physical effects (like radiation, shock waves) originating from a technical installation.**(2) Exposure Assessment:** Analyzing how, and to what extent, vulnerable groups (humans, animals, the environment) are exposed to these hazards, including the intensity, frequency, and duration of exposure.**(3) Consequence Assessment:** Examining the relationship between exposure and potential harm, including immediate and long-term health or environmental impacts. This often involves dose-response studies using animal testing, epidemiology, and models.**(4) Risk Estimation:** Calculating the risk based on earlier findings, often expressed in terms of expected fatalities or affected lifespan near the installation.

problem of many hands: arises in situations where a group collectively contributes to an outcome, yet it's difficult to pinpoint individual responsibility. This often occurs in complex settings like large-scale engineering project

Responsibility and the law: Liability (Legal Responsibility): Defined by legal standards and procedures, liability involves formal judicial processes to establish if someone should be held accountable, . **Moral Responsibility:** Can be recognized informally, based on personal or societal ethical standards. It applies both before (proactively avoiding harm) and after (responding to) undesirable events. **Responsibility in organizations:** Most modern organizations are characterised by a division of tasks and roles. This has implications for who can be held responsible for what in organizations. **collective responsibility** model every member of a collective body is responsible for the actions of the other members of that same collective body. The collective responsibility model is not very attractive to large organisations, because it is not possible to allocate responsibility in differing degrees to individual members of the collective. **The individual responsibility** model holds that each person is accountable for their actions to the extent they meet specific criteria of responsibility. This model emphasizes moral fairness and promotes responsible behavior, as individuals know they may be held accountable for their actions. **Advantages:** Moral Fairness: Individuals are only held responsible if they meet established conditions for responsibility, such as having knowledge, causal connection, and freedom to act.

Disadvantages: Problem of Many Hands: In complex organizational settings, undesirable outcomes may result from collective action, making it difficult to pinpoint individual responsibility.

Engineering as Social Experimentation:

Engineering as experimentation: Engineering can be viewed as a form of social experimentation due to several similarities with scientific experiments: both are undertaken with partial knowledge, outcomes are uncertain, and both aim to acquire new knowledge through ongoing monitoring and adaptation. **Conscientiousness:** People act responsibly to the extent that they conscientiously commit themselves to live according to moral values, instead of a consuming preoccupation with a narrowly conceived self-interest. **Comprehensive Perspective:** Conscientiousness is blind without relevant information. For example, in designing a heat exchanger, if I ignore the fact that it will be used in the manufacture of an illegal hallucinogen, I am showing a lack of moral concern. **Moral Autonomy:** People are morally autonomous when their moral conduct and principles of action are their own. **Accountability:** responsible people accept moral responsibility for their actions. Submission to an employer's authority, or any authority for that matter, creates in many people a narrowed sense of accountability for the consequences of their actions. **Balanced outlook on law:** The legal regulations that apply to engineering and other professions are becoming more numerous and more specific, but they can be counterproductive. However, specificity is welcomed in industrial standards.

Workplace Responsibilities and Rights:

Confidentiality and conflicts of interest: Confidentiality: duty to keep secret all information deemed by the employer or client desirable to keep secret. Privileged information means available based on privilege. Proprietary information means that it is owned. Patents protect products from being manufactured by competitors. **Changing jobs:** conf. does not cease when changing jobs but leads to ethical issues when it comes to individual Knowledge. **Management policies:** this issue can be fixed by employment contracts that place special restrictions on future employment (not recognized as binding by law). Another option is to offer positive benefits in exchange for future employment restrictions. **Justification:** respect the autonomy of companies on information, trustworthiness, public benefits (competitiveness).

Conflicts of interest: conditions: (1) The professional is in a role that requires exercising good judgment on behalf of the interests of an employer (2) the professional has some additional or side interest that could threaten good judgment. **Gifts, bribes, and kickbacks:** bribe: big amount of money given with the aim to get an advantage. Gifts: small gratuities offered in normal conduct of business. Kickbacks: contractors giving money in exchange for contracts. **Teamwork and Rights: Ethical Corporate Climate:** An ethical climate is a working environment that is conducive to morally responsible conduct. (1) ethical values are acknowledged by managers and employees (2) use of ethical language (3) top management sets a moral tone in words, policies and actions (4) conflict resolution procedures. **Loyalty and Collegiality:** Loyalty to an employer can mean two things: Agency-loyalty is acting to fulfill one's contractual duties to an employer (obligation). Attitude-loyalty has as much to do with attitudes, emotions, and a sense of personal identity (virtue). **Employee Rights:** privacy right, right to equal opportunity through preventing sexual harassment (quid pro quo: requiring sexual favors

for benefits and hostile work environment), non-discrimination, affirmative action.

Truth and Truthfulness:

Whistleblowing: **Definition:** 4 components (1) Disclosure: info is shared outside conventional channels (2) Topic: info includes a moral problem for the organization (3) Agent: person sharing info is an or former employee (4) Recipient: should be in position to act. **Moral Guidelines:** it is permissible to whistle blow under these conditions (1) The actual or potential harm reported is serious (2) The harm has been adequately documented. (3) The concerns have been reported to immediate superiors (4) also tried regular networks to reach upper management (5) to prevent the harm. **Protecting whistle-blowers:** common sense procedures before whistle blowing (1) work through normal channels (2) be prompt in expressing objections (3) proceed in a low-key manner (4) keep supervisors informed (5) be accurate and consult your colleagues. **Honesty and research Honesty:**

Truthfulness: centers on meeting responsibilities about trust (so that the public, clients, etc. can trust in the expertise of the engineer)

It imposes what many consider an absolute prohibition on deception, and in addition it establishes a high ideal of seeking and speaking the truth. **truthfulness responsibility:** Engineers must be objective and truthful and must not engage in deception. Honesty has fundamentally 2 meanings (1) truthfulness (2) trustworthiness: meeting responsibilities about trust. **Academic integrity: students:** cheating: Intentionally violating the rules of fair play in any academic exercise, for example, by using crib notes or copying from another student during a test. fabrication: r inventing information, for example by faking the results of an experiment. Plagiarism: negligently submitting others' work as one's own, Facilitating academic dishonesty: intentionally helping other students to engage in academic dishonesty, for example, by loaning them your work.

Integrity: Integrity in research is about promoting excellence in pursuing the truth. Bias and self-deception can affect integrity: sabotage: preventing others from doing their work, misrepresentation : giving false information to an instructor, for example, by lying about why one missed a test. are forms of academic dishonesty.

Research Integrity: Truthfulness takes on heightened importance in research because research aims at discovering and promulgating truth. Truthfulness in research: – Honesty in conducting/reporting experiments – No theft of others' results – No misuse of research funds.

Misrepresenting credentials: saying you have a degree that you do not have.

Reporting misconduct: It is your responsibility to report misconduct you see

-the primary duty of an engineer serving as an expert witness is to remain objective and truthfully interpret technical evidence, not just to support the side that hired them.

Studying only part of the problem can create a biased solution

- Engineers serving as expert witnesses should adopt a stance of value-neutral analysis, maintaining complete impartiality and avoiding any bias, favoritism, or advocacy that could taint their testimony

Value-neutral analysts: Engineers are completely impartial. Avoid taint of bias

Value-guided advocates: May adopt partisan views in controversial issues but remain honest and independent in their professional judgement

Computer Ethics:

Internet and free speech: internet raise issues that center around free speech (hate speech and spam). Two types of control of hate speech and porn have been attempted (1) top-down control: control from the government (2) bottom-up: start from household. **Power relationships:** internet concentrates data and power in a few centralized bureaucracies of big government and big companies, which is a threat to democracy. Other issues due to the internet (1) job elimination (2) customer relations (3) biased software (4) stock trading (5) military weapons. **Property:** issues about property and computers (1) embezzlement: theft of funds belonging to one's employer or in one's trust (2) data and software. **Privacy:** issues about privacy and computers (1) inappropriate access (2) hackers (3) legal responses: laws to protect our privacy. **Additional issues:** (1) computer failures (2) computer implementation (3) health conditions.

Environmental Ethics:

Environmental ethics = the study of moral issues concerning the environment and moral perspectives, beliefs, and attitudes concerning those issues

Engineering, ecology, and economics: **The invisible hand and the commons:** metaphors to highlight the effect of the marketplace on the environment: the invisible hand: businesspeople think only for their self-interest, which promotes society. However, businesses do not pay attention to the impact of their activity on the environment. **Environmental actors:** (1) Engineers: responsible for sustainable development and integrating the environment into understanding and solving problems. They need to be supported in this step. (2) corporations: should play the role of environmental leadership by promoting sustainability. Also, it is good for business. (3) government: set laws, incentive, and taxes to protect the environment. .

Environmental moral frameworks:

human centered ethics: focuses exclusively on the benefits of the natural environment to humans and the threats to human beings presented by the destruction of nature. Only humans have moral worth, so we only consider them in moral decisions while other creatures have instrumental value to promote human interest. **Utilitarian:** maximize good consequences for humans. Rights ethics: right to livable environment. **Duty ethics:** respect the environment as respect for human beings. Virtue ethics: such as humility, appreciation of beauty. **Sentient-centered ethics:** all sentient animals have inherent worth and damaging them is considered speciesism. animals deserve equal consideration, in that their interests should be weighed fairly, but that does not mean equal treatment with humans. **Biocentric ethics:** all living organisms as having inherent worth. our most fundamental feature is not our intellect but instead our will to live, by which he meant both a will to survive and a will to develop according to our innate tendencies. **Ecocentric ethics:** locates inherent value in ecological systems rather than individual organisms. **Religious perspectives:** rules set by religions can help advance ecological understanding.

Global justice:

Multinational corporations: moral responsibilities of multinational corporations. **Technology transfer and appropriate technology:** Technology transfer is the process of moving technology to a novel setting and implementing it there. Appropriate technology refers to the implementation of the most suitable technology for a new set of conditions (human values, economic settings, …). . **Promoting morally just measures:** companies should not only respect human rights, but also benefit the host countries in which they do business (more good than bad).

Privacy: Hackers – e.g., violations of privacy – Sometimes contend that all information ought to be freely accessible – But there are legitimate limits on access to information: individual privacy, national

Weapons development and peace: **involvement of engineers in weapons work:** two points of views: weapon engineering conflicts with personal conscience / expression of conscientious participation in national defense. **Defense industry problems:** (1) waste and cost overruns (2) peacetime secrecy in work of military import: this involves many issues and controversies **Peace engineering:** Designs of such things as bridges, tall buildings, reservoirs, and energy facilities must now consider the possibility of intentional assaults on structures and processes (terrorism).

Ethical Relativism Ethical principles are viewed as relative to the cultural, societal, or personal circumstances, suggesting there are no universal moral truths applicable to all cultures or situations. **AI**: This highlights the challenge in creating universally accepted AI ethics guidelines, as what is considered ethical in one culture might not be in another.

Ethical Relationalism (Pluralism) Recognizes the legitimacy of multiple ethical perspectives and values, advocating for respect and dialogue between different moral frameworks without insisting on one universal set of ethics.**AI:** Advocates for acknowledging and integrating diverse ethical perspectives in AI governance. This approach encourages multinational AI projects to respect and incorporate various ethical views, promoting inclusivity and fairness.

International Corporation Focuses on ethical practices within multinational corporations, emphasizing the need for them to operate responsibly across different cultural and legal environments.**AI:** Emphasizes the importance of multinational companies in AI to adhere to ethical standards across different countries. This includes respecting local laws and customs, protecting data privacy, and ensuring AI applications do not exacerbate social inequalities.

Just War and Proportionality Pertains to the ethical considerations in warfare, specifically the principles that justify entering a war (just war) and ensuring the use of force is proportionate to the achieved military objective, minimizing harm to civilians.**AI:** In the AI field, principles of Just War and Proportionality guide the ethical use of military AI technologies, ensuring they adhere to international laws and minimize collateral damage. This includes programming AI to make proportionate decisions, maintaining