

An abstract geometric design on the left side of the slide. It features a large purple quarter-circle in the top-left corner. Below it is a teal rectangle. To the right of the teal rectangle is a light blue circle. At the bottom, there is an orange quarter-circle on the left and a yellow quarter-circle on the right, both meeting at a vertical line.

Ethical Problem Solving



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Ethical Problem Solving



Engineering ethics problem-solving involves structured techniques like identifying **factual, conceptual, and moral issues**, using **line drawing** (spectrum of options) and **flow charting** (decision trees) to map consequences, engaging stakeholders, applying ethical principles (like autonomy, justice), and prioritizing public safety to systematically analyze dilemmas and reach justifiable solutions.

Factual, conceptual, and moral issues are the three core aspects of ethical problem-solving, where **factual issues** deal with "what is known" (resolved by research), **conceptual issues** concern "what terms mean" (resolved by definition agreement), and **moral issues** involve "what should be done" (resolved by applying principles like justice, rights, etc.), all requiring investigation, definition, and value judgments to navigate complex dilemmas.

Core Aspects Of Ethical Problem-solving

1. Factual Issues

- Definition:** What we know (or don't know) about a situation, including relevant data, circumstances, and potential consequences.
- How they're resolved:** Through investigation, empirical research, gathering evidence, and expert analysis.
- Challenges:** Facts can be unclear, disputed (e.g., global warming data), or difficult to predict (future outcomes).

2. Conceptual Issues

- Definition:** Ambiguities in the meaning of terms, concepts, or ideas relevant to the problem (e.g., "fairness," "privacy," "influence").
- How they're resolved:** By achieving consensus on definitions and understanding the scope of terms.
- Challenges:** Different interpretations of concepts can block agreement, even with clear facts.

3. Moral Issues

- Definition:** Questions about which moral principles, values, or duties apply and how to balance conflicting obligations (e.g., loyalty vs. truth, individual vs. community).
- How they're resolved:** By applying ethical frameworks (like utilitarianism, rights-based ethics) and agreeing on relevant moral principles.
- Challenges:** Moral disagreements are often the hardest to resolve, as they involve deep-seated values and judgments about right and wrong.

Ethical Problem- Solving Steps

1. Understand the Problem (Factual, Conceptual, Moral):

- Factual:** What are the known facts? Who is affected (stakeholders)?
- Conceptual:** What do key terms (like "safety," "risk") mean here?
- Moral:** What are the conflicting values or duties?
- Principles:** Autonomy, Beneficence (do good), Non-maleficence (do no harm), Justice.

2. Gather Facts & Identify Stakeholders: Get all relevant data and determine who has a stake in the outcome (public, clients, company, engineers).

3. Apply Ethical Frameworks/Principles:

- Utilitarianism:** Greatest good for the greatest number.
- Deontology:** Duties and rules (e.g., codes of ethics).
- Virtue Ethics:** Focus on moral character.

4. Use Specific Tools:

- Line Drawing:** Place the problem on a spectrum between clear positive (ethical) and negative (unethical) examples to see where it falls.
- Flow Charting:** Diagram potential decisions and their consequences step-by-step.

5. Consider Alternatives & Consequences: Brainstorm various courses of action and their potential outcomes, including unforeseen ones.

6. Make a Decision & Justify It: Choose the most ethically sound option, ensuring public safety is paramount, and be prepared to explain your reasoning.

7. Implement & Reflect: Put the decision into action and review the process for future learning. 5

Line Drawing Technique

Line drawing in ethical problem-solving is a visual technique for navigating gray areas by placing a moral dilemma on a spectrum between a clear "positive paradigm" (unambiguously right) and a "negative paradigm" (unambiguously wrong), using hypothetical cases to determine where the problem falls, helping to clarify its ethical standing. It involves defining the extreme examples, listing relevant features, plotting them on a line, and then placing the actual problem to judge its ethical acceptability.

How to Apply the Line Drawing Technique

1. Identify the Core Problem: Clearly state the ethical dilemma (e.g., "Dumping slightly hazardous waste into a lake that supplies drinking water").

2. Establish Paradigms:

- **Positive Paradigm (Clearly Right):** A morally unambiguous situation where the action is acceptable (e.g., disposing of waste in a safe, designated area with no impact).
- **Negative Paradigm (Clearly Wrong):** A morally unambiguous situation where the action is unacceptable (e.g., dumping highly toxic waste directly into the water supply, causing immediate harm).

3. List Relevant Features: Determine the key morally significant aspects of the case (e.g., waste concentration, regulatory limits, potential for harm, detectability, public knowledge).

4. Create the Line: Draw a line and place the positive and negative paradigms at the ends. Plot other hypothetical scenarios or features along the line, moving closer to the positive or negative end as they become more or less acceptable.

5. Locate the Problem: Place the actual problem (and its specific features) on the line, seeing where it aligns with the other examples.

6. Make a Judgment: Based on its position, determine if the problem leans towards the ethically acceptable or unacceptable end, guiding a more informed decision.

Problem:

It is proposed that our company dispose of a slightly hazardous waste by dumping into a lake. A nearby town takes its drinking water supply from this lake. The research shows that with the amount of waste in the lake will be 5 parts per million (ppm). The EPA limit for this material has been set at 10 ppm. At the 5 ppm level, we expect no health problems, and consumers would not be able to detect the compound in their drinking water.

Analysis problem :

Positive paradigm: The water supply for the town should be clean and safe.

Negative paradigm: Toxic levels of waste are put into the lake.

Let's start by drawing a line and placing the positive and negative paradigms on it:

Negative paradigm (NP)

Positive paradigm (PP)

Dump toxic levels
of waste in lake

Water should be
clean and safe

1. The company dumps the chemical into the lake. At 5 ppm, the chemical will be harmless, but the town's water will have unusual taste.
2. The chemical can be effectively removed by the town's exiting water treatment system.
3. The chemical can be removed by the town with equipment that will be purchased by the company
4. The chemical can be removed by the town with equipment for which the taxpayer will pay.
5. Occasionally, exposure to the chemical can make people feel ill, but this only lasts aweek.
6. At 5 ppm, some people can get fairly sick, but the sickness only lasts a week, and there is no long-term harm.
7. Equipment can be installed at the plant to further reduce the waste level 1 ppm.

Flow-charting Technique

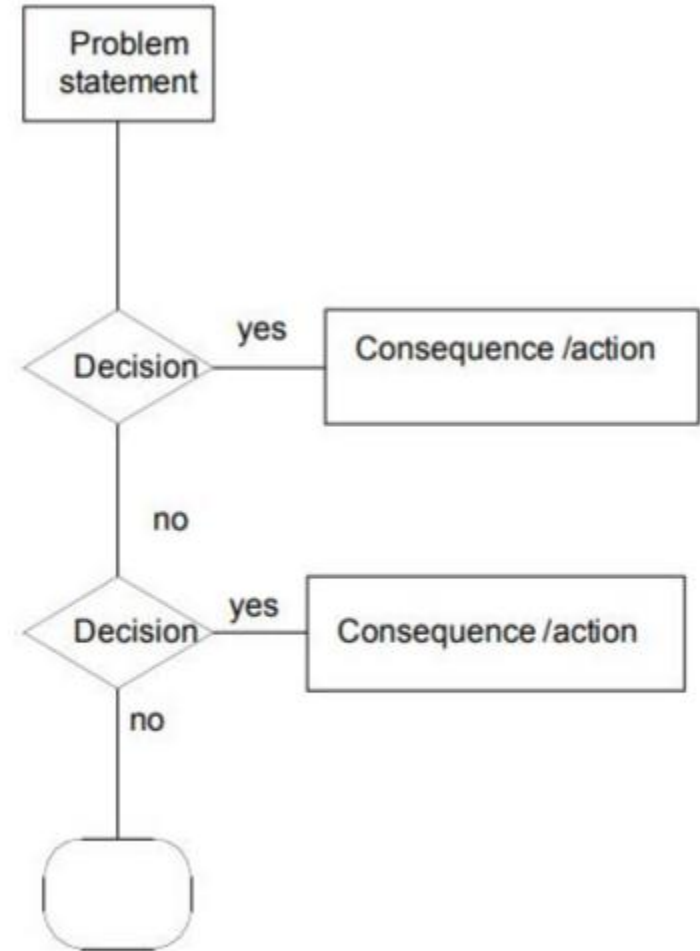
Flow charting in ethical problem-solving visually maps out complex moral dilemmas, showing sequences of events, decisions, and their potential consequences (both positive and negative) using standard symbols like ovals (start/end), rectangles (actions), and diamonds (decisions). This technique provides clarity, helps identify ethical/unethical paths, and reveals downstream impacts, though it requires creativity and objectivity as there's no single "correct" flowchart for a problem, emphasizing honest consideration of all outcomes.

How to Apply the flow-charting Technique

- 1. Define the Problem:** Start with the ethical issue at hand.
- 2. Identify Key Actions & Decisions:** Map out choices and potential actions using standard symbols.
- 3. Use Decision Points (Diamonds):** Branch the chart based on ethical considerations (e.g., "Does this satisfy rights?", "Is this fair?").
- 4. Explore Consequences:** Follow each path to see potential outcomes, including harms or benefits, using ovals for start/end and rectangles for steps.
- 5. Incorporate Ethical Frameworks:** Evaluate outcomes against ethical principles (e.g., utilitarianism, rights, duties).
- 6. Be Objective & Creative:** Don't avoid negative answers; explore all possibilities honestly.

Example Flowchart Structure:

- **Start:** The ethical dilemma.
- **Action:** Consider options (e.g., report, stay silent, investigate).
- **Decision Point 1 (Diamond):** Is reporting required? (Yes/No).
 - **YES Path:** Consequences (e.g., whistleblower protections, retaliation).
 - **NO Path:** Decision Point 2 (e.g., Is silence acceptable?).
- **Decision Point 2 (Diamond):** Does silence violate duty? (Yes/No).
 - **YES Path:** Leads to negative ethical outcomes.
 - **NO Path:** Leads to other consequences.
- **End:** The chosen action and its final ethical evaluation.





**Next
steps**

01.

02.

03.

04.

**Any
questions?
Ask away!**



Thank you