

Engineering Ethics AWMA LA Section: 2024

Robynn Andracsek, PE
Providence Engineering and Environmental Group LLC

robynnandracsek@providenceeng.com
816-377-1288



Engineers, in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health, and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.



AGENDA



Challenger Explosion

Chernobyl

Artificial Intelligence



The image is a triptych consisting of three vertical panels. Each panel shows a close-up of a hand holding a sword. The hand is positioned at the hilt, with fingers wrapped around it. The sword's blade is visible, extending upwards and to the left. The background is a solid, deep blue. The overall image has a slightly blurred, artistic quality. The word "CHALLENGER" is centered across the three panels in a white, bold, sans-serif font.

CHALLENGER

What were the systemic issues?

- Engineers vs managers
- Culture of complacency or one of safety?
- O-rings are a small part on a large project
- Political pressure? Teacher, broadcast w/ president, embarrassment, already postponed twice
- Communications
- Leaks had happened repeatedly before; not something that happened the night before
- Management structure



Whistleblowing vs Confidentiality

II. Rules of Practice

Engineers shall hold paramount the safety, health, and welfare of the public.

- a. If engineers' judgment is overruled under circumstances that endanger life or property, they shall notify their employer or client and such other authority as may be appropriate

VS

- b. Engineers shall not reveal facts, data, or information without the prior consent of the client or employer except as authorized or required by law or this Code



Acceptable Risk

- "Would you allow your [partner] or children to use this product without any reservations?" If I could not answer that question with an unqualified, "Yes," he said, I should not sign off on the product for others to use. That is what ethical analysis of acceptable risk should be.
- Roger M. Boisjoly, "NASA, Morton Thiokol Must Rethink Risk", The Scientist, September 21, 1987, page 11



Whistleblowing

- When to go:
 - Outside chain of command?
 - Outside the company?
 - To the public?
- "The fact that people are in a hierarchy tends to amplify misperceptions. A low-level person has a fear that something might happen and reports it to a higher level. As it goes up the hierarchy, information gets distorted, usually to reflect the interests of the bosses."

Trudy E. Bell and Karl Esch, "The Fatal Flaw in Flight 51L," IEEE Spectrum, Volume 24, number 2, February 1987, page 50.

- "The research on the subject of whistleblowers leads to two conclusions. First, all whistleblowers attempt to achieve problem resolution through their organizational chain of command; and, second, they are all punished by the organization after whistle blowing outside the organization."

<https://onlineethics.org/cases/professional-responsibility-and-conduct>



CHERNOBYL



Ethics: Risk and Safety

- Was it human error or a design flaw?
- How does safety relate to ethics?
- Ethics of risk <https://www.jstor.org/stable/26240349?seq=7>
- What were the ethical failures?
- What were the ethical successes?
- How did Chernobyl affect the future of nuclear power? The future of the Soviet Union?



Lessons Learned

- Chernobyl a stepping stone for a new philosophy – new term in nuclear energy “safety culture”
- Nuclear power plants (NPPs) as units of national importance
- Safety first! Priority given to people’s safety and preservation of the environment rather than productivity
- Overhaul of current and future projects with focus on risk minimization
- Emergency preparedness and safety measures
- Understand, respect and minimize risk
- International and national emergency response systems, highly involving the community

<https://supernet.isenberg.umass.edu/courses/Vienna-2013/Chernobyl%20Disaster.pptx>





Is it Ethical to use AI in Engineering?



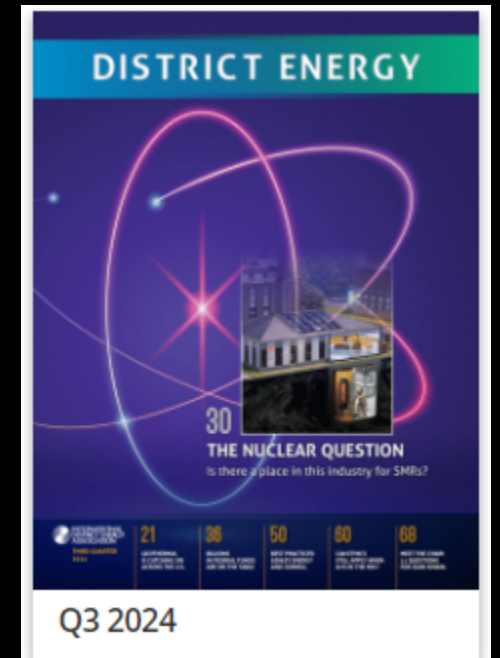
Which Tools are Plagiarism?

- Thesaurus
- Spellcheck
- Grammar check
- Human proofreader
- Grammarly.com
- ArcGIS
- AutoCAD
- AERMOD
- AI for first draft
- AI to refine language



PROMPT #1

Answer "what is a good engineer?" in a 500-word essay with at least four references. There should be a distinct introduction and conclusion paragraph. Make sure to correctly identify what information is from a reference. Cite references at the end in a numbered list and include hyperlinks. In text citations, reference the numbered list with (1) for example. Make sure to cite the NSPE code of ethics and use this as your frame of reference for most of the paper. Outside of that, find scholarly references (*i.e.* research papers, historical events related to ethics) to back up your claims.



Engineering is more than just a profession; it's a calling. A good engineer embodies a unique blend of technical expertise, creativity, and ethical responsibility. In this essay, we will explore the essential qualities that define a good engineer, drawing from scholarly research and ethical guidelines. We'll delve into the characteristics that elevate engineers from mere practitioners to exceptional problem solvers and innovators.

A good engineer understands that technology serves people. They prioritize solving valuable problems for customers over technical wizardry. Whether designing software or building bridges, they keep the end user in mind. Customer-centric engineers create solutions that resonate with real-world needs.

The ****National Society of Professional Engineers (NSPE)**** provides a comprehensive framework for ethical engineering practice. Engineers who adhere to this code demonstrate integrity, honesty, and commitment to public welfare.



Key principles include:

1. Hold paramount the safety, health, and welfare of the public.

Engineers prioritize public well-being above all else.

2. Perform services only in areas of their competence. Ethical engineers recognize their limits and seek continuous improvement.

3. Issue public statements only in an objective and truthful manner.

Transparency and honesty build trust.

4. Avoid conflicts of interest. Engineers act impartially, avoiding situations that compromise their professional judgment.



PROMPT #2

- This is not at all how I would write this paper. Can you please make your work more narrative. It should be 3 body paragraphs without headers, and they should all be referenced in the beginning of the paper. Try to use case studies of ethical disasters to frame your work as well.



In the vast landscape of engineering, where equations and blueprints meet real-world challenges, the mark of a truly exceptional engineer extends beyond technical prowess. It encompasses a commitment to ethical conduct, a dedication to societal well-being, and a relentless pursuit of excellence. In this essay, we embark on a journey to understand what makes an engineer not just good, but great.

Picture an engineer standing at the precipice of innovation. Their eyes gleam with ambition, fueled by the desire to create something remarkable. But what sets them apart? It's their unwavering determination—the kind that drove the Wright brothers to conquer the skies and Elon Musk to redefine space travel. Exceptional engineers dream big, pushing boundaries with relentless curiosity. They don't settle for mediocrity; they strive for mastery. This ambition isn't merely about personal success; it's about leaving a legacy—a bridge that connects communities, a software system that transforms lives. Their pursuit of excellence is a beacon that inspires others to reach higher.

The National Society of Professional Engineers (NSPE) Code of Ethics serves as their compass. It whispers, "Hold paramount the safety, health, and welfare of the public." It reminds them that their decisions ripple through generations. The Challenger Space Shuttle disaster, the Volkswagen emissions scandal—these are cautionary tales etched in engineering history. Exceptional engineers learn from these failures, ensuring that their creations uplift humanity rather than harm it.



Artificial Intelligence

- Output must be checked by human
- Like any tool, garbage in = garbage out
- AI lacks human subtlety
- Cite its use in references
- Use with caution, oversight, and transparency

Can AI ethically be used as an engineering tool?





POP QUIZ

Why Was TRI Created?

On December 4, 1984, a cloud of extremely toxic methyl isocyanate gas escaped from a Union Carbide Chemical plant in Bhopal, India.

Thousands of people died that night in what is widely considered to be the worst industrial disaster in history. Thousands more died later as a result of their exposure, and survivors continue to suffer with permanent disabilities.

In 1985 (8 months later), a serious chemical release (aldicarb oxide and four other chemicals) occurred at a similar plant in West Virginia, then owned by Union Carbide.



The WV release went undetected by workers because a high-temperature alarm was out of service, a level indicator in the tank was broken, a newly installed gas detection system had not been set to test for aldicarb oxide, and a water-spray system that was supposed to keep the gas from going offsite wasn't up to the task.



POP QUIZ

Which Canons Are Involved Here?



Engineers, in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health, and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

