ENGR 183/188EW
Writing Assignment #2: Ethical Case Study (Post-mortem Report)

Drafts, Due Dates, Lengths, File Format

- First draft: Approximately 1500 words; at time of discussion section Week 6 via email to your TA and also uploaded to Bruin Learn. Please note that the draft must include correct citations of sources and a complete list of references (see below for instructions regarding CSE Name-Year style) for all works cited in the draft.
- Final version: 2500 words or more (not including the list of references); due via email to your TA at the time of discussion section in Week 8 and also uploaded to Bruin Learn.
- **File Format: Please compose ALL your drafts using Google Docs only. This will make it easier to share your files with others for peer review and for your TA to make comments.**

The Writing Task

Your task is to write a paper that identifies and explores how ethical lapses led to a major engineering failure (see below for a list of topics). This kind of paper is called an ethical case study or a post-mortem (in Latin, "post" means "after" and "mortem" means "death"). Post-mortems are common in engineering. They formalize the process of learning from past failures. Post-mortems analyze projects once they have ended and identify what went well and what went poorly to improve future projects.

Your paper should describe the actions engineers and management should take to come to grips with the failure, utilizing one (in some cases more than one) of the ethical frameworks you have learned about as a guide to analyze past failure and implement procedures for future projects to prevent potentially dangerous accidents. Describe the advantages and disadvantages of the actions you propose and provide justification using one of the ethical frameworks as a guideline in the analysis process.

Audience

Identify an audience for your post-mortem write up. This can be either a government regulatory agency such as the NTSB or the FDA, the company's board of directors, etc. Write your post-mortem analysis to that audience, including information and analysis that would be of most interest and of most use to them. The audience you are addressing should be clearly specified in your paper.

Researching and Analyzing the Case

Choose one of the cases of engineering failure most related to your future career or professional interests. First, read about the case and understand the complex issues surrounding it, including the parties in the case (corporate, government, etc.) and the various components including engineering, management, regulatory, socio-technical, and ethical. Second, decide what the major issues surrounding the engineering failure are. Also, consider which of the ethical frameworks you have learned best explains the ethical lapses in this engineering failure case.

Structure

Your post-mortem should follow this structure:

1. **Abstract**: A short summary of the engineering failure, its consequences, why it happened, and what should be done to prevent future problems. Your abstract should also clearly identify your audience. This can be either a government oversight committee, a company's board of directors, etc. Be sure that you write your post-mortem to that specific audience, including information and analysis that would be of most interest and use to them. DO NOT begin to work on the Abstract until you have finished the first submission of the paper (due Week 3).

2. **Background**: The body of your post-mortem should begin with a narrative about what happened (the engineering failure) and what its consequences were.
3. **The Engineering Failure**: This section should explain what technical, engineering, management, regulatory, and/or other socio-technical factors led to the engineering failure.
4. **Ethical Analysis**: The section should analyze the ethical lapses (i.e. stakeholders' actions, decisions or interests, principles adopted or flouted, risks ignored and reasons for doing so, etc.) that contributed to the engineering failure. You must apply one (or more, if desired) ethical framework to your chosen problem. However, before you apply it to your problem, you must give a general explanation of the framework. A good paper will answer the question: Why does this framework apply to the party at fault? The textbook poses some good ethical questions about the case of the Ford Pinto at the bottom of page 69 and top of page 70. Try to brainstorm similar questions that apply to your own topic, and then answer them using at least one of the ethical frameworks you learned about in class to discuss the engineering failure. Page 95 of the textbook presents an example of how this might be done using Kant's theories applied to the Ford Pinto case. You might use this model to inspire your own ethical analysis (using duty ethics or utilitarianism or virtue ethics).
5. **Recommendations**: Drawing on at least one of the ethical frameworks, this section should first propose general ideas and then proceed to very specific recommendations about how to prevent similar failures from occurring in the future. What should have been done? What needs to be done in the future? Don't make simple arguments (i.e. there needs to be more or better regulations); instead, specify what regulations should be imposed (and by whom), what the parameters of such regulations should be, and how they might be enforced (and by whom). Describe the advantages and disadvantages of the actions you propose and provide justification, again using at least one of the ethical frameworks.
6. **Conclusion**: Your conclusion should address what we have learned (or should have learned) from the engineering failure you discuss. What progress, if any, has been made to prevent similar failures in the future? What remains to be done?

Research

As you start your research, you may want to aim for at least six (6) really good sources as your foundation. Ultimately, quality of sources is more important than quantity. You should use respected, authoritative sources such as (but not limited to) major news and journalistic sites, respected discipline-specific publications (e.g., *IEEE Spectrum*), peer-reviewed scientific or technical journals, government reports, etc. Here's a short list of some examples of reliable general audience sources:

IEEE Spectrum	*New York Times*	*Science*
The New Yorker	*The Washington Post*	*Nature*
The Atlantic	*New York Times Magazine*	*Nautilus* (http://nautil.us/)
Harper's Magazine	*The Guardian*	*NewScientist*
Wired	*Smithsonian*	
The Economist	*Aeon* (https://aeon.co/)	

These kinds of publications do extensive analysis and discussion of issues rather than simply report news. These are just a few examples; they represent the caliber of publication that you should be using. You can access all of the above (and thousands of others, of course) directly online, but for older articles and more specialized sources the best bet is to use one of the many databases available through the UCLA library website. Also, UCLA librarians can help you find the best studies and articles for your needs. Feel free to ask them for help!

Research Don'ts

You should not use blogs unless you can establish that the blog is widely accepted as authoritative (e.g. something written by an expert in the relevant field). You also should not use most regular news sources (like CNN.com or CBSnews.com or small-town newspapers) or Wikipedia unless it's just as a starting point to find better material. Just remember: your research should be primarily through UCLA library resources; it should not be a collection of random Google hits.

Citations and List of References

Correct documentation style is an essential component of excellent student work. All citations within the text of your paper (in-text citations) and the list of all sources cited at the end of your paper should be documented using the CSE (Council of Science Editors) Name-Year system. Please note that there are actually three different CSE systems: 1) Citation-Sequence, 2) Citation-Name system, and 3) Name-Year System. You should use the Name-Year system as this is the most similar to the other widely used citation systems. There are numerous guides to this documentation system online. We recommend this guide from the Writing Center at the University of Wisconsin-Madison: https://writing.wisc.edu/handbook/documentation/doccse/nameyear/

McGill University offers another excellent CSE Citation Style guide that is downloadable as a PDF: https://www.mcgill.ca/library/files/library/cse-name-year-citation-style-guide.pdf

Like many other citation styles, the CSE Name-Year system requires you to use parenthetical citations (author's name/s and year of publication) at the end of sentences and paragraphs that quote, summarize, paraphrase, or otherwise use information from any source. You should also, where possible, use what is called a "signal phrase" to cite essential information about the source(s) in the lead-up to using research material. For example:

> According to a recent Harvard study of civilian deaths and injuries caused by drone-use in warfare, [blah blah blah…] (Henderson et al. 2017).

or:

> A U.S. Department of Transportation report details the injuries caused by driverless cars: [blah blah blah...] (US DOT 2018).

At the end of your paper, include a complete list of References (it should be titled "References") which should list only those sources you've actually cited in your paper. To help you format this correctly, you can use an online tool such as "Cite This for Me" (https://www.citethisforme.com/council-of-science-editors-author-date/source-type).

Please note that ALL DRAFTS (not just the final draft) MUST have all citations and a list of references done correctly. This is to help you keep track of where your information is coming from and also to help your TA identify if there are any problems with the sources of your research.

ECS / Postmortem Topic List

Choose one of the following or, if you want, you can choose your own topic but please be sure to get it approved by your TA.

- I-35 Bridge (Minneapolis, Minnesota) – On August 1, 2007 the I-35 Bridge across the Mississippi River in Minneapolis collapsed catastrophically, killing 13 and injuring 145. The cause was an undersized gusset plate, which was not noticed during the design phase or during repeated inspections. Start with the National Transportation Safety Board's report.

- Synthes' Norian XR Bone Cement – During the early 2000s Synthes, Inc. introduced a new bone cement (Norian XR) for human use without required clinical trials, in spite of clear evidence of harmful – often fatal – results when used for spinal surgery.

- St. Francis Dam – A concrete dam near Los Angeles fails catastrophically on first filling in 1928 due to bad design and construction. [Email Browne for a very recent contribution to the literature on this failure].

- Takata Airbags – Takata provided airbags for many of the world's automobile manufacturers. After a chemical change in the airbag, the chemical had a propensity to deteriorate, especially in warm and humid climates. The deteriorated chemical could explode, throwing pieces of the airbag container into the passenger compartment. There have been at least 11 deaths and 180 injuries. Takata knew and destroyed engineering results documenting the problem.

- GM Ignition Module – For want of a sufficient spring in a GM ignition module, the key assembly would turn "off" when bumped or when the car hit a bump. When turned off, the driver loses not only power steering and power brakes, but the airbag. GM, its engineers, and its lawyers knew about this problem – which has resulted in about 125 deaths – for at least ten years without fixing the problem.

- Volkswagen Air Pollution Controls – Volkswagen, for many years, had software that activated pollution control equipment on its cars only when the cars were undergoing smog tests.

- Guidant Ventak Prizm 2 DR model defibrillator – The device was a defibrillator intended to restore normal heart rhythm. Guidant knew that the model in question leaked (when in the body) and might not deliver the electrical shock needed by the patient. Guidant knew of the problem, but failed to notify doctors, patients, or the Food and Drug Administration.

- **Bay Area Rapid Transit (BART) District Train Controls** – When the BART system was being designed in the late 1960s-early 1970s, it was supposed to be completely computer controlled. Unfortunately, the designers of the control systems were in over their heads and the system failed during testing. To this day, there is an operator at the front of each train. What went wrong?

- **Guidant PRIZM Defibrillators** – In the early 2000s, Guidant Corporation released a new version of their medical defibrillators which unfortunately failed by leaking once inside of patients' bodies. What happened, why did it happen, and what were the repercussions to Guidant in civil court, criminal court, and the market?

- **Intel Pentium Chip** – In the early 1990s, Intel released its Pentium chip. A small mathematical calculation error was discovered almost immediately. Intel did almost everything in its power to avoid acknowledging the bug or fixing the problem. Intel's actions should be compared with those of Hewlett-Packard in 1973 when faced with a similar situation with its new HP-35 hand calculator.

- **Iowa Democratic Party Phone App** – During the Iowa presidential caucuses in early 2020, the Iowa Democratic Party introduced a smartphone app for reporting caucus results to party headquarters in Des Moines. It was an unmitigated disaster. What went wrong with both design and implementation?

- **UBER Autonomous Vehicle** – In early 2018, an UBER test autonomous vehicle killed a pedestrian who was walking her bicycle across the street in Arizona. The software was not ready for prime time in that it could not recognize someone crossing a street; it could only recognize a series of "blips" in front of it a second or so apart, recognizing them as independent "blips" rather than a continuous series of contacts indicating someone crossing the street. In short, the software could not "track."

- **Volkswagen Diesel Emissions Scandal** – In the early 2000s, Volkswagen's engineers and computer scientists in Germany rigged the emissions control systems of its diesel automobiles to only engage when the cars were on the test stands, not on the road. They got caught. To date, it has cost Volkswagen $33 billion and two of its engineers are spending their time in federal prison.