# CMSC 304 Computer Ethics

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*Some slides from Drs. M. desJardin, E. Birrane*

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## Bookkeeping

- Discord set up for the class
  - Link coming soon via email
  - TA office hours are via Discord
- Still working on topics → schedule
  - Next several lectures are from book readings
  - We'll soon have a "finding readings" assignment
- Today's lecture:
  - What is responsibility?
  - All about ethical analyses (time permitting)
- Next lecture: Ethical frameworks/theories



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## Responsibility



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## The Challenger disaster

- The Human Disaster – January 28, 1986
  - 73 seconds after launch, space shuttle Challenger exploded 11km over the Atlantic.
  - Extremely cold temperatures made seals on the rocket booster fail.


- Primary issues
  - Engineers not listened to by management
  - When management did listen, "too little too late" to change NASA's mind.
  - Need to ask the question: who was responsible?
    - Legally. Morally. A lot at stake.

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## The engineers

- Roger Boisjoly (boh-zhe-lay)
  - Mechanical engineer, fluid dynamicist, aerodynamicist
  - Predicted o-rings would fail in cold weather
  - First Memo: July 1985 – memo raising this issue. Ignored.
    - Task force set up, including Boisjoly
      - No power. No resources. No management support.
      - After a month, gave up. Stated if problem not fixed, could lose the shuttle. Nothing happened.

- Bob Ebling (engineer) also voiced concerns.
  - Memo: October 1985 titled "Help!"
    - Up to Morton Thiokol (vice president), who took no concrete action.

"…if we do not take immediate steps … The consequences would be catastrophic and human lives would be put at risk."

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## The day before launch

- January 27th, 1986
  - Thiokol management initially supported its engineers' recommendation to postpone the launch, but NASA staff opposed a delay.
    - NASA believed that Thiokol's hastily prepared presentation's quality was too poor to support such a statement on flight safety.
  - NASA claimed that it did not know of Thiokol's earlier concerns about the effects of the cold on the O-rings
- Management reversed itself and recommended that the launch proceed as scheduled; NASA did not ask why

https://en.wikipedia.org/wiki/Space_Shuttle_Challenger_disaster#Thiokol.E2.80.93NASA_conference_call

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## This will totally never happen again…

- Tesla's self-driving car push sparked internal dissent
  - Elon Musk's ambitious goals for Autopilot technology have prompted safety warnings and resignations
  - After the announcement, someone asked Autopilot director Sterling Anderson how Tesla could brand the product "Full Self-Driving," several employees recall. "This was Elon's decision," they said he responded. Two months later, Mr. Anderson resigned.
  - Weeks before the October 2015 release of Autopilot, an engineer who had worked on safety features warned Tesla that the product wasn't ready, according to a resignation letter
    - Autopilot's development was based on "reckless decision making that has potentially put customer lives at risk," the engineer, Evan Nakano, wrote.

https://seekingalpha.com/article/4101969-teslas-self-driving-car-scandal

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## So… who is responsible?

- What does responsibility even mean?
- What is responsibility? What does it mean to be responsible?

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## Responsibility

- What is responsibility?
  - Being held accountable for **your actions** and for the effects of your actions
  - Accountability for your **failure to act** and for the effects
- There are two kinds of responsibility.
  - **Active Responsibility**: responsibility before something happens
  - **Passive Responsibility**: responsibility after something happens

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## Responsibility primer

- Some responsibility is based on your "role"
  - Role Responsibility: responsibility based on role you play.
    - Brother, sister, engineer, manager, friend, student, professor
  - Professional Responsibility: lifelong responsibility as an engineer.
- Some responsibility is NOT based on your role
  - Moral Responsibility: Based on moral obligation/norm/duty
    - Can transcend roles (Boisjoly) or be limited by roles (Mafioso)

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## Passive responsibility

- Accountability
  - When you must account for (or justify) your actions and rationales to those affected (Ex: NASA to the families, to society, and to our judicial system)
- Blameworthiness
  - Being the proper target of blame/consequences.
  - Wrong-Doing – When you violate a norm.
    - (Ex: NASA violated flight rules)
  - Causal Contribution – Your action/failure to act led to consequence.
    - (Ex: NASA decided to launch. Morton Thiokol decided to launch.)
  - Foreseeability – You were able to know the consequences.
    - (Ex: NASA/Morton Thiokol had the necessary information.)
  - Freedom of Action – You were not compelled/forced/manipulated to act.
- Were Ebling or Boisjoly blameworthy?

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## Active responsibility

- Our duty to take care for certain state-of-affairs or persons.
- Five features of active responsibility.
  - Adequate perception of threatened violations of norms
  - Consideration of the consequences
  - Autonomy (ability to make your own decisions)
  - Displaying conduct based on a consistent code
  - Taking role obligations seriously

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## Ideals

- One way to put these into perspective is by making **ideals**
  - Ideal: Ideas that aim to achieve some optimum or maximum
  - Professional Ideals: Ideals allied to (or enabled by) a profession
- We will examine 3 ideals as examples
  - Technology Enthusiasm
  - Effectiveness and Efficiency
  - Human Welfare


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## Engineering ideal: technology enthusiasm

- What is technology enthusiasm?
  - Wanting to develop new technological possibilities and taking up technological challenges
  - The "existential pleasures of engineering"
- What do we like about it?
  - Engineers can be intrinsically motivated by the work they are doing
- What is the potential problem?
  - Easy to overlook negative effects and relative impact on society
- Related concepts
  - Technophilia: Love of (new) tech, possibly associated with narcissism/addiction
  - Technocracy: governance through technical knowledge
  - Transhumanism: enhance the human condition through technology
    - Brain emulation, cryonics, more

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## Engineering ideal example: Wernher Von Braun

- One of the fathers of modern rocketry.
  - Designed the Saturn V rocket for the Apollo missions.
  - Dramatically improved Goddard's rocket motor designs.
- Lifelong love of rocketry and space.
  - Proficiency in physics and mathematics
    - Realized it was needed to construct rockets for spaceflight.
- Member of Hitler's National Socialist Party
  - Developed V-2 rocket. 5000 launched. 1100 landed. >3000 people killed.
  - V-2 rockets built by slave labor in Germany
    - *"My refusal to join the party would have meant that I would have had to abandon the work of my life. Therefore, I decided to join."*
- Director of NASA Marshall Space Flight Center
  - Featured in Disney space series. Guest speaker at APL in the 70s.


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## Engineering ideal: effectiveness and efficiency

- What is effectiveness and efficiency?
  - **Effectiveness**: Extent to which an established goal is achieved
  - **Efficiency**: Ratio between goal achieved and effort required
- What do we like about it?
  - Seems neutral, free from politics and moral choices
  - Based on measurement, objective
- What is the potential problem?
  - Effectiveness and efficiency are not always worth pursuing
    - Book example: extermination of many groups by Nazis in WWII
  - Goals and costs may be value-laden
  - Goals and costs may not have a single definition
    - Efficiency in terms of cost, but not in energy consumption

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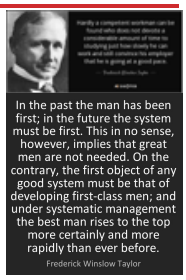
## Engineering ideal example: Frederick W. Taylor

- Founder of Taylorism
  - Also called "scientific management"
  - There is one right way to do things
  - Too many problems stem from inefficiency
- Some good ideas
  - Methods based on scientific study
  - Train workers effectively
  - Better split between managers/workers
- Largely abandoned in the 1930s
  - Evolved and subsumed by other things
  - Consider joint optimizations

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## Engineering ideal: human welfare

- Do things that help people
  - Health, the environment, and sustainability
  - Hold paramount the safety, health, and welfare of the public
- What do we like about it?
  - No danger of forgetting that a moral obligation exists
  - Reinforces that professional engineering is not morally neutral
- Example: Johan van Veen
  - Father of the Delta Works (plan to protect after 1953 flood)
    - In the flood, 1835 people died and 72,000 evacuated
  - Van veen warned in 1930s that dykes were insufficient
    - Sworn to secrecy. Continued to publish warning using a pseudonym. **Did he do enough?**

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## The Tension Between Engineers and Managers

(Why) does it exist?
How do we address it?

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## Tension between engineers and managers

- There is a natural tension
  - Engineers are salaried and typically work for managers in a hierarchy
    - Responsibilities as employees
    - Responsibilities as engineers (e.g., human welfare ideal)
- We will review three models for dealing with this tension
  - Separatism
  - Technocracy
  - Whistle-Blowing

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## Dealing with tension: separatism

- Engineers/scientists provide **technical inputs**
- Management/political organizations make **value decisions**


- Tripartite (consisting of 3 parts) model
  - Part 1: Policy (politicians, managers) – Establish objectives for project/product, provide resources, enforce boundaries
  - Part 2: Engineers – Design, develop, create, execute those projects/products
  - Part 3: Users – Benefit or suffer from the project/product
- Implications for Engineers?
  - Only responsible for "their part"
  - Only have their professional responsibility.
  - How projects are conceived or used is someone else's problem.
  - The "hired gun" from Westerns.

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## Dealing with tension: technocracy

- Government by technical experts
- Engineers take over…
  - As managers (companies), politicians (society)
- Believe in rule by technocrats
  - Technocrat: member of the skilled elite.
- Form of paternalism
  - Making decisions for people because "you know better"
- Is technocratric rule problematic?
  - Why do we assume engineers have the right skillsets?
  - Removes from people their moral autonomy
    - Undemocratic and "paternalistic"
    - What if their values are not your values?

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## Dealing with tension: whistle blowing

- Unapproved disclosure of abuses to remedy them or warn others.
- When is it a moral requirement?
  - Serious and considerable harm to the public
  - Communicated internally to no effect
    - Exhausted all such internal means
  - Reasonable evidence of the threat or abuse
  - Belief that whistleblowing will prevent harm at reasonable cost

- Are there any problems with whistle blowing?
  - Often forces people to make big sacrifices
  - Terrible thing to have to rely on – not everyone will make that sacrifice
  - Often immediately ends or disrupts communications between engineers and managers.

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## Why is it so hard to responsibly develop new technology?

Because it's new…

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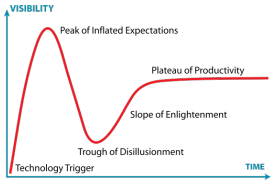
## The hype cycle

- Can we put technology development in perspective?
- Claim: most technology development follows a pattern
  - People get more excited about the promise of a technology
  - It takes years for "reality" to catch up
    - And it never fully catches up




By Jeremykemp at English Wikipedia, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=10547051

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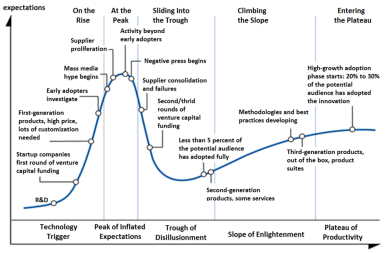
## The hype cycle




By NeedCokeNow - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=27546043

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## What does the hype cycle tell us?

- In the hype cycle, we don't understand technology
  - Creators tend to focus on the "art of the possible"
  - Less focused on how to make it "idiot proof"
  - Generate excitement to fund the engineering
- Are there other lessons here?
  - What if it isn't just utility that we are bad at predicting?
    - What about unintended consequences?
    - Hidden costs? Hidden dangers? Environmental concerns?
  - When can we figure out that our technology is dangerous?
    - Is there a point where it is too late?
- How can we assess technology before it's too late?

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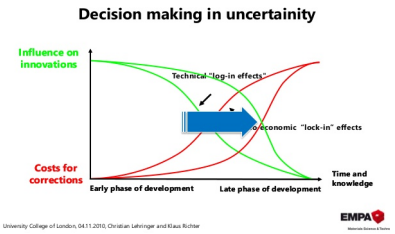
## The Collingridge dilemma

- In **development**, easy to steer technology, consequences unknown.
- Once **implemented**, hard to steer technology, consequences known.

The "Collingridge dilemma" (Collingridge 1980)




University College of London, 04.11.2010, Christian Lehringer and Klaus Richter

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## Technology assessment example: Teflon

- The invention of Teflon is a great story!
  - Established in 1972, defunded in 1995
- Making Teflon involved some harsh chemicals.
  - PFOA (perfluorooctanoic acid) a.k.a. C8
    - Purchased by Dupont starting in 1951; dumping in the Ohio river

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## Technology assessment example: Teflon

- Eventually, we understood the ramifications of this chemical
  - Multiple internal memos/emails (discovered in course of trial)
    - Known toxic (by Dupont) in 1960s
    - Classified toxic internal to company (not external) in 1988
- Hard to make changes to existing processes!
  - PFOA still found in Teflon by Dupont in 2006
  - Dupont stops dumping C8 in the Ohio river in 2014
  - Essentially poisoned entire town in Ohio

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## Dupont Timeline

**FYI: FACTS TIMELINE**

| | |
|---|---|
| 1951 | DuPont started purchasing PFOA (C8) from supplier to manufacture Teflon. DuPont specified that PFOA should not be flushed into surface water, but over decades, DuPont pumped PFOA powder into Ohio River. |
| 1984 | DuPont continued to conduct secret medical studies on PFOA. DuPont found the presence of PFOA in local water supply, and the levels were 3 times of its internal safety limit. DuPont declined to make the information public. |
| 1990 | DuPont's scientists understood that the landfill drained into Dry Run Creek and found a higher concentration of PFOA, but did not disclose this fact. |
| 1993 | The supplier ceased production of PFOA. Instead of using an alternative compound, DuPont built a new factory to manufacture the substance for its own use. |
| 2000 | DuPont developed an alternative to PFOA, but the discussions at the corporate headquarters decided against it, because of the PFOA's huge annual profit of $1 billion. |
| 2001 | DuPont requested a gag order to block Bilott from providing information about PFOA to the government. After it failed, DuPont re-evaluated the safe exposure level to a new threshold to avoid the lawsuits. |
| 2013 | DuPont ceased production of PFOA, and replaced PFOA with an alternative with unknown human effects. |

From: https://slideplayer.com/slide/13618554/

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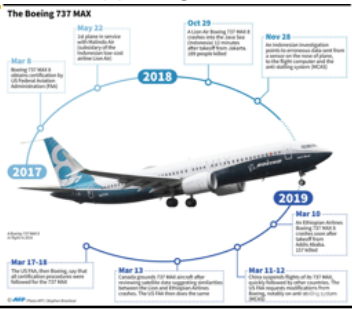
## This will totally never happen again...

- Boeing MAX...

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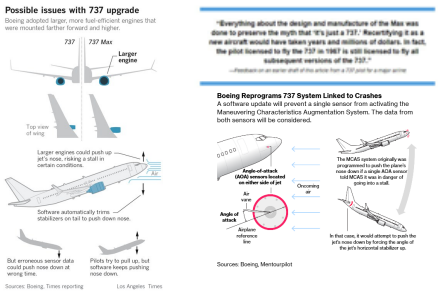
## This will totally never happen again...







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## This will totally never happen again...

- Boeing's **optional** safety features, in part, could have helped the pilots detect any erroneous readings
  - One of the options, the angle of attack indicator, displays the readings of the two sensors
  - The other, called a disagree light, is activated if those sensors are at odds with one another
- Boeing will soon update the MCAS software, and will also make the disagree light standard on all **new** 737 Max planes
- The angle of attack indicator will remain an option that airlines can buy
  - Neither feature was mandated by the Federal Aviation Administration
  - All 737 Max jets have been grounded
- "They're critical, and cost almost nothing for the airlines to install," said Bjorn Fehrm, an analyst at the aviation consultancy Leeham. "Boeing charges for them because it can. But they're vital for safety."

https://www.nytimes.com/2019/03/21/business/boeing-safety-features-charge.html

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