ENCS 521
Computer Engineering Ethics
Lecture 1:
Ethics and Professionalism

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Morals, Ethics, and Laws

- Morals are values that a person adheres to based on personal conviction.
- Ethics are standards of behavior expected from and individual by a group / society, and violating them would be frowned upon.
- Laws are rules about what you can or cannot do. They are enforced by the government.

What is a Profession?

- A profession is different from a mere "occupation" in the following aspects:
  - Requires extensive Training,
  - Requires vital knowledge and skills,
  - Control of services,
  - Autonomy in the workplace, and
  - Claim to ethical regulation.

Professional Ethics

- The set of standards adopted by professionals insofar as they view themselves acting as professionals.

- Examples of professions: Medicine, Pharmacy, Law, Architecture, Accounting… and Engineering.

Herbert Hoover on the Engineering Profession

… It is a great profession. There is the fascination of watching a figment of the imagination emerge through the aid of science to a plan on paper. Then it moves to realization in stone or metal or energy. Then it brings jobs and homes to men. Then it elevates the standards of living and adds to the comforts of life. That is the engineer's high privilege…

Herbert Hoover [continued]

… The great liability of the engineer compared to men of other professions is that his works are out in the open where all can see them. His acts, step by step, are in hard substance. He cannot bury his mistakes in the graves like the doctors. He cannot argue them into thin air or blame the judge like the lawyers. He cannot, like the architects, cover his failures with trees and vines…

Herbert Hoover [continued]

… He cannot, like the politicians, screen his shortcomings by blaming his opponents and hope that the people will forget…

… The engineer simply cannot deny that he did it. If his works do not work, he is damned.

Engineering Ethics

- The responsibilities and rights that aught to be endorsed by those engaged in engineering.
- Desirable ideals and personal commitments in engineering.
- The study of the decisions, policies, and values that are morally desirable in engineering practice and research.

Why study Engineering Ethics?

Desirable outcomes

- increased ethical sensitivity,
- increased knowledge of relevant standards of conduct,
- improved ethical judgment, and
- improved ethical will-power (that is, a greater ability to act ethically when one wants to).

Why study Engineering Ethics?
Practical Skills

- Moral awareness, *recognizing moral issues*
- Moral reasoning, *assessing arguments on opposite sides of moral issues*
- Moral coherence, *forming consistent viewpoints*
- Moral imagination, *alternative responses & creative solutions*
- Moral communication, *express & support your views*

نقابة المهندسين – مركز القدس
تقاليد وآداب المهنة

- أولاً: على عضو النقابة أن يتقيد بسلوكه وتصرفاته بمبادئ الشرف والاستقامة والنزاهة، وأن يقوم بجميع الواجبات التي يفرضها عليه هذا القانون وتفرضها عليه أنظمة النقابة بإخلاص و أمانه وتجرد.
- ثانياً: على العضو أن يسعى لحماية مهنة الهندسة، وأن يلتزم في معاملة زملائه بما تقتضيه قواعد اللياقة، وأن يحجم عن انتقاد أعمال عضو آخر علناً، وألا يسعى أن يحل محل عضو قد استخدم في عمل ما أو أن ينافسه للحصول على العمل بتخفيض أجوره الاعتيادية.
- ثالثاً: على العضو أن لا يعلن عن أعماله وإنجازاته مستهدفاً مدح نفسه، وألا يسعى لجلب الزبائن بوسائل الإعلانات أو باستخدام الوسطاء مقابل أجر أو منفعة.
- رابعاً: على العضو أن يمتنع عن إعطاء رأيه علناً في أي موضوع هندسي ما لم تكن عنده المعلومات الكافية، أو لم يكن قد اطلع على الحقائق المتعلقة بالموضوع.

نقابة المهندسين – مركز القدس
تقاليد وآداب المهنة

- خامساً: لا يجوز للعضو أن يسمح لمصلحته الخاصة أن تؤثر تأثيراً ضاراً على أي عمل هندسي يقوم به، وعليه أن يبين للشخص الذي يقوم له بالعمل مقدماً، ويوضح ما اذا كانت له مصلحة خاصة أو عمل آخر يؤثر في ذلك العمل.
- سادساً: لا يجوز للعضو أن يفشي أية معلومات تجارية أو فنية، أو مالية تتعلق بأي شخص يقوم له ذلك العضو بعمل هندسي إلا بموافقة ذلك الشخص.
- سابعاً: لا يجوز للعضو أن يقبل مكافآت مالية أو سواها من أكثر من مصدر واحد عن الخدمة الواحدة او الخدمات المختصة بالعمل نفسه، دون موافقة كل أصحاب المصالح في تلك الأعمال، كما لا يجوز له أن يقبل أية عمولة أو منحة رأساً أو بالواسطة من مقاولين أو جماعات أخرى تتعامل مع الأشخاص الذين يؤدي لهم العضو عملا هندسياً.

نقابة المهندسين – مركز القدس
تقاليد وآداب المهنة

- ثامناً: يحظر على أي عضو يشغل وظيفة أو يكون مستخدماً في أجهزة الدولة أو المؤسسات الرسمية أو شبه الرسمية أو البلديات الاشتغال في الأعمال الهندسية الحرة ما لم تسمح له بذلك قوانين وأنظمة الدائرة او المؤسسة التي يعمل بها، ويشترط ألا يتعارض ذلك مع قانون وأنظمة النقابة.
- تاسعاً: يحظر على أي عضو يشغل وظيفة أو يعمل مستخدما في أجهزة الدولة أو المؤسسات الرسمية أو شبه الرسمية أو البلديات السعي إما مباشرة وإما بواسطة الغير لجلب الزبائن من الذين لهم علاقة بوظيفة له أو لغيره.
- عاشراً: يحظر على عضو النقابة أن يعمل متفرغا لأكثر من جهة واحدة.

National Society of Professional Engineers (NSPE) Code of Ethics

Fundamental Canons

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.

(More extensive Rules of Practice follow in the Code)
http://www.nspe.org/ethics/eh1-code.asp

IEEE Code of Ethics

We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree:

1. to accept responsibility in making engineering decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;

2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;

IEEE Code of Ethics (cont.)

3. to be honest and realistic in stating claims or estimates based on available data;

4. to reject bribery in all its forms;

5. to improve the understanding of technology, its appropriate application, and potential consequences;

6. to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;

7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;

IEEE Code of Ethics (concl.)

8. to treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin;

9. to avoid injuring others, their property, reputation, or employment by false or malicious action;

10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics.

http://www.ieee.org/portal/index.jsp?pageID=corp_level1&path=about/whatis&file=code.xml&xsl=generic.xsl

Meanings of “ being Responsible”

- Obligations, *actions that are morally mandatory*
- Accountable, *capacity to understand and act on moral reasons, being answerable for meeting obligations*
- Conscientious, *diligently try to do the right thing*
- Blameworthy / Praiseworthy, *especially Blameworthy*

“Dilbert”

Which moral framework is adopted by each of the engineers?

Example:
The Challenger Explosion

Mission 51-L

NASA

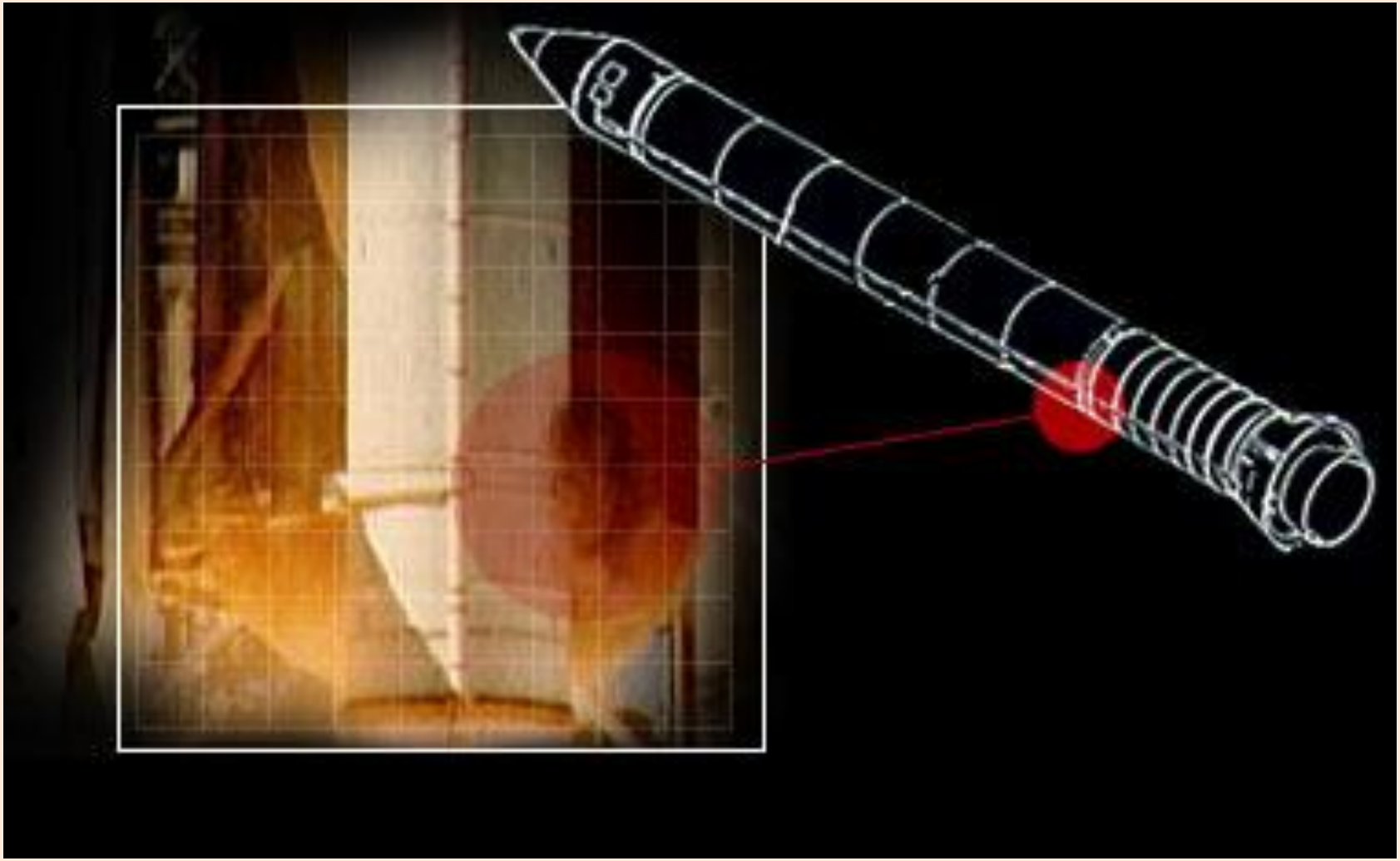
January 28, 1986

- On the cold freezing morning of January 28, 1986.
- The 10th flight of Orbiter Challenger. The 25th NASA space shuttle.
- One of the most publicized launches because it was the first time that a civilian, a school teacher, was going into space.
- The launch of Challenger had been delayed five times due to bad weather… and January 28 was the coldest day that NASA had ever launched a shuttle.
- Seventy three seconds into flight, the Orbiter Challenger exploded, killing all seven of its crew.

The Explosion

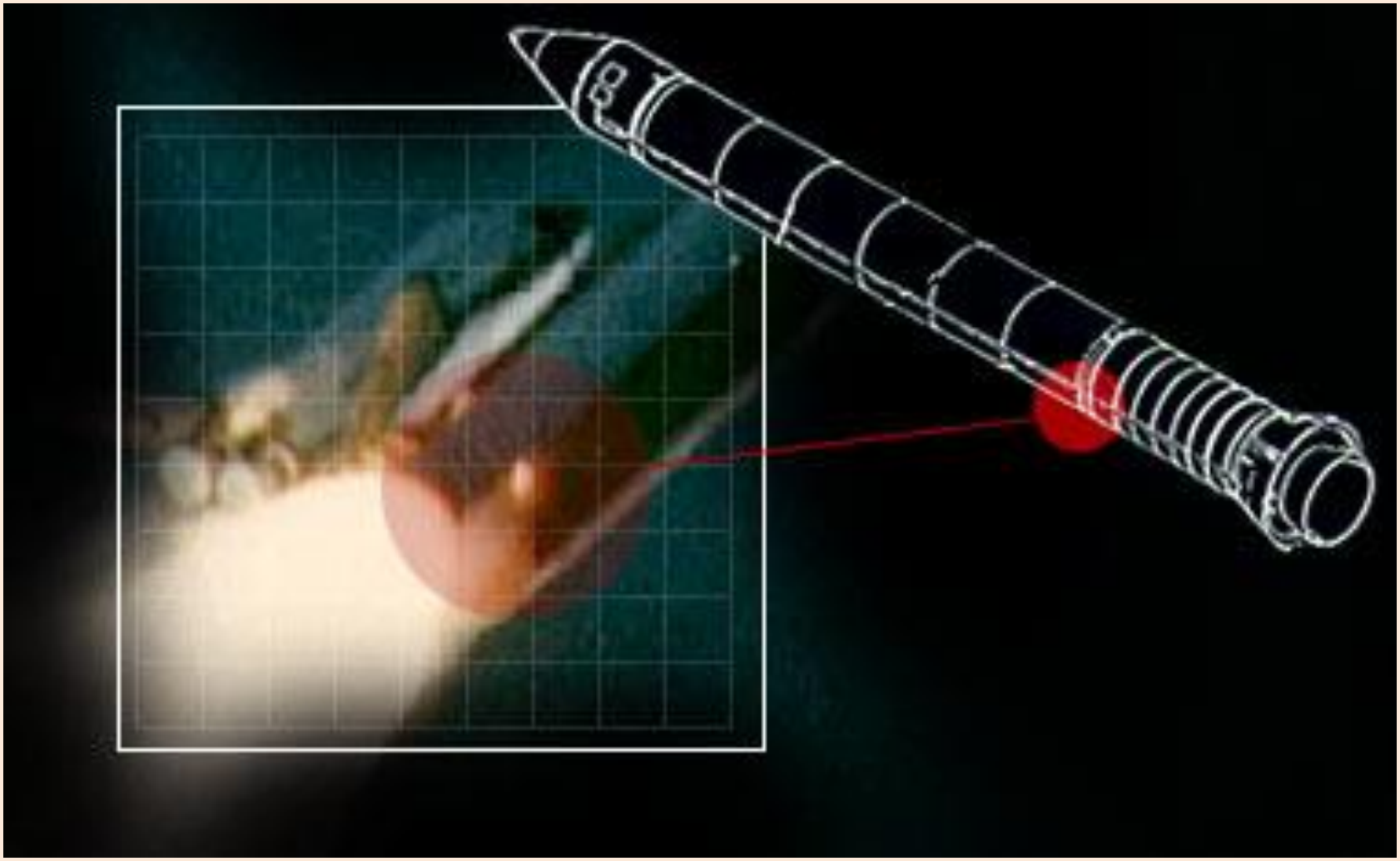
CNN Online Archive

3 Seconds



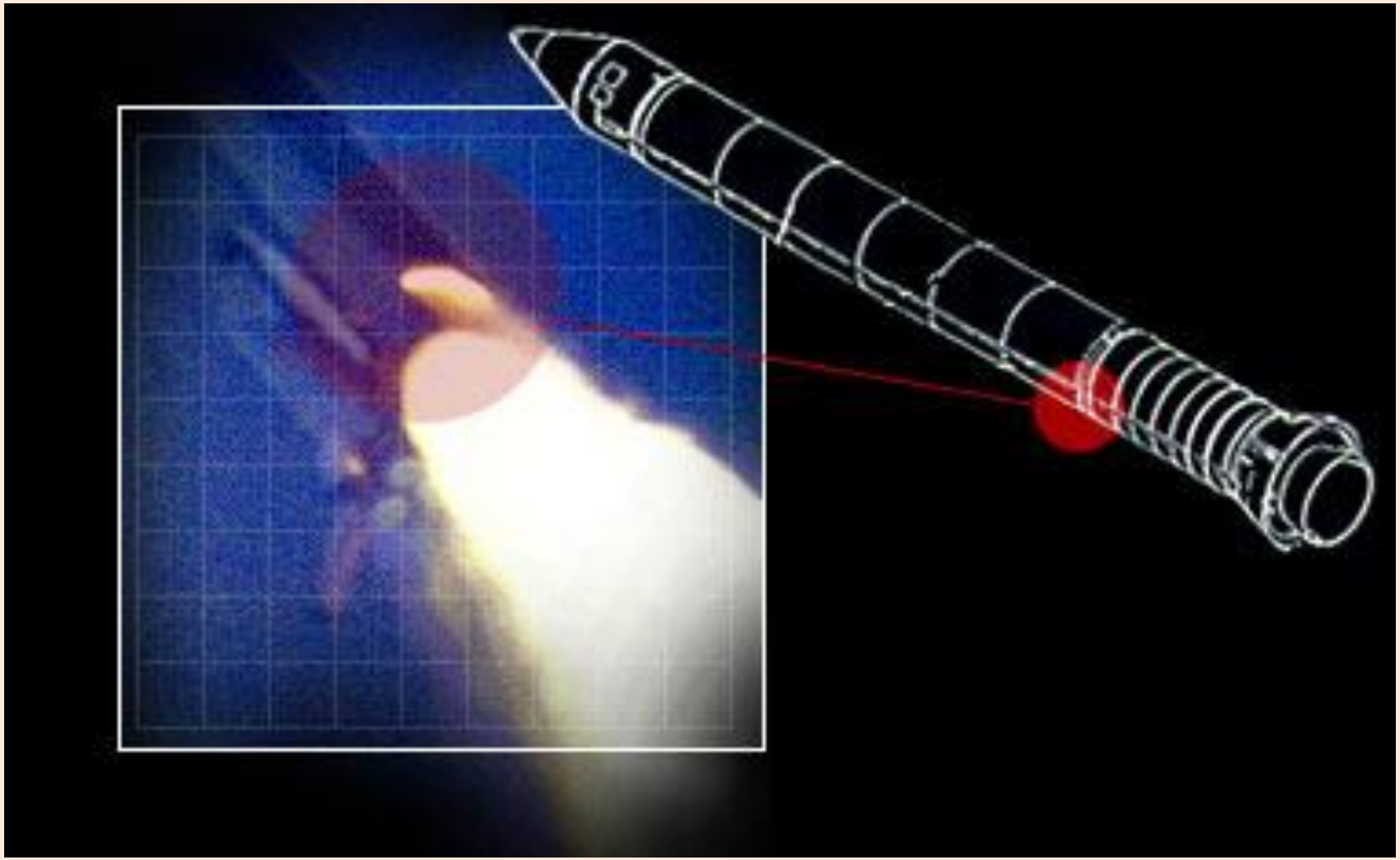
CBS News.Com Interactive Challenger Disaster

59 Seconds



CBS News.Com Interactive Challenger Disaster

64.7 Seconds



CBS News.Com Interactive Challenger Disaster

Report of the Presidential Commission on the Space Shuttle Challenger Accident

- In view of the findings, the Commission concluded that the cause of the Challenger accident was the failure of the pressure seal in the aft field joint of the right Solid Rocket Booster. **The failure was due to a faulty design unacceptably sensitive to a number of factors.** These factors were the effects of temperature, physical dimensions, the character of materials, the effects of reusability, processing and the reaction of the joint to dynamic loading.
- **"The decision to launch the Challenger was flawed."**

http://www.jlhs.nhusd.k12.ca.us/Classes/Social_Science/Challenger.html/Challenger.html

Open Discussion

- What are the losses caused by the Challenger explosion?
  - Write a list on the whiteboard.
- What would be the losses caused by further delays to the shuttle launch?
  - Write a list on the whiteboard.
- Was the launch decision an acceptable *risk*?
  - How is *risk* estimated?
  - How does *risk* factor into the decision?

Eample: Ford Pinto

- Short Video: https://www.youtube.com/watch?v=lgOxWPGsJNY

On August 10, 1978 a tragic automobile accident occurred on U.S. Highway 33 near Goshen, Indiana. Sisters Judy and Lynn Ulrich (ages 18 and 16, respectively) and their cousin Donna Ulrich (age 18) were struck from the rear in their 1973 Ford Pinto by a van. The gas tank of the Pinto ruptured, the car burst into flames and the three teen-agers were burned to death.

Subsequently an Elkhart County grand jury returned a criminal homicide charge against Ford, the first ever against an American corporation.

Court is in session

- Elkhart County v. Ford Motor Company.

- Ford produced Pintos with weak gas tanks from 1969-1976.
- A federal regulation that would have required Ford to install a safer gas tank did not take effect until 1977.
- Alterations to protect the weak gas tank would have cost $11 per vehicle.

Ford's Cost-Benefit Analysis

Benefits

Savings:	180 burn deaths, 180 serious burn injuries, 2,100 burned vehicles
Unit Cost:	$200,000 per death, $67,000 per injury, $700 per vehicle
Total Benefit:	180 × ($200,000) + 180 × ($67,000) + 2,100 × ($700) = $49.5 million.

Costs

Sales:	11 million cars, 1.5 million light trucks
Unit Cost:	$11 per car, $11 per truck
Total Cost:	11,000,000 × ($11) + 1,500,000 × ($11) = $137 million

Finally…


IF YOU REFUSE TO DO SOMETHING ABOUT OUR PRODUCT'S SAFETY FLAW, I WILL BE FORCED TO CONTACT OUR CEO!
TRY IT.
THIS E-MAIL WILL MAKE HIM DROP EVERY-THING AND CALL ME.
HUNDREDS WILL DIE... BLAH, BLAH, BLAH... WHATEVER. FORWARD THE MESSAGE TO THAT POINTY-HAIRED GUY.