

AMERICAN
COMIC BOOK
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AMERICAN
COMIC BOOK
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ADVENTURES INTO THE UNKNOWN!

N° 11
JUNE-JULY

10¢



Problems of the Unknown: The Engineer's Dilemma

Class Business

- Human Subject Module – due tonight
- Article Pres. / Discussion – 1st half of class
- 1st individual paper next week
- Week 4: Group Project instructions & sign up

Ethical Frameworks

1. Utilitarianism (consequentialism)

1a. Cost-Benefit Analysis

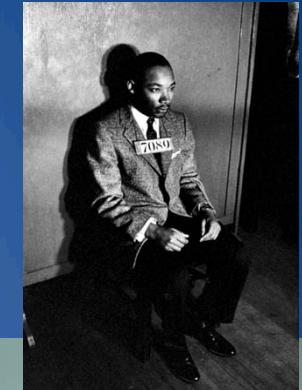
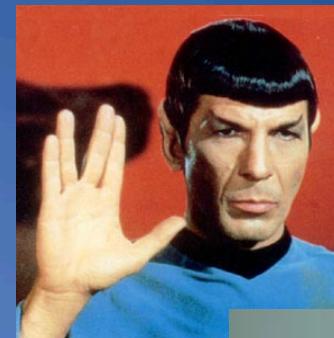
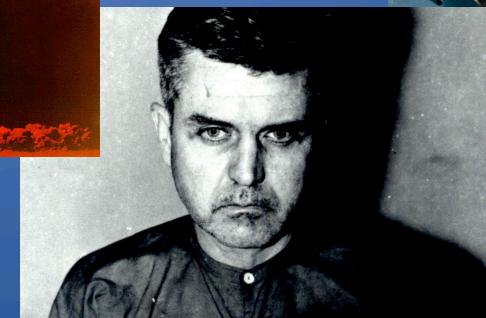
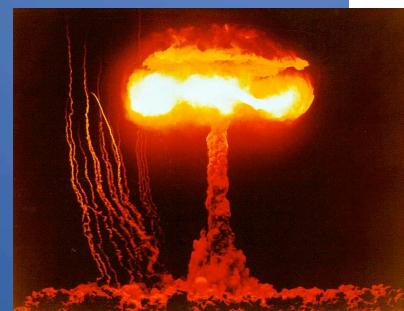
2. Deontological/Duty Ethics

3. Rights Ethics

4. Virtue Ethics

4a. Stoicism

5. Pragmatism



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ABC

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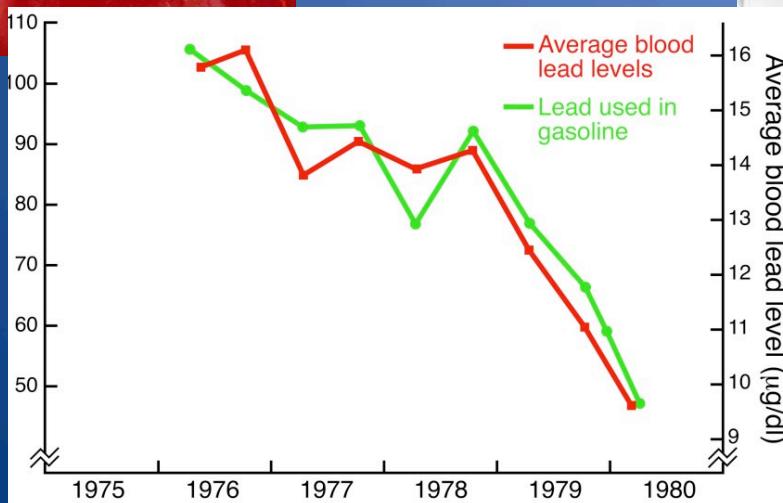
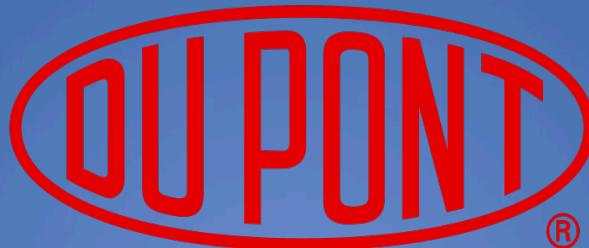
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Problems of the Unknown: The Engineer's Dilemma

Thomas Midgley: A Cautionary Tale

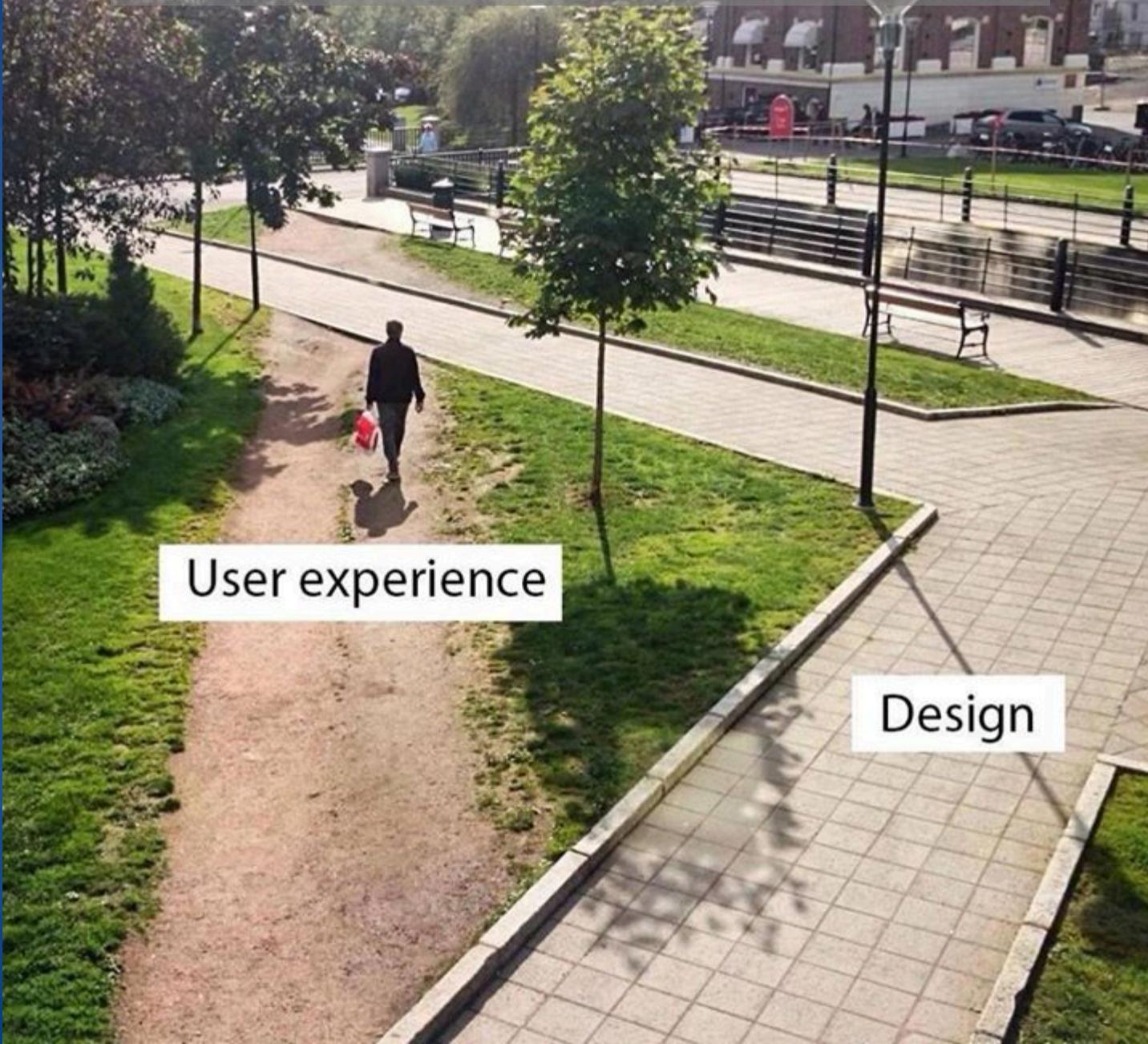


Should we think of engineering as Social Experimentation? Yes!



- An experimental process
- Usually using **humans** as subjects (often unknowingly)
- w/o review board oversight
- Ultimately engineering designs/ products meant to be public, **part of society**
- The very definition of *modernity* = adoption of technology into everyday life

Designs not always used as intended...



How is engineering experimental?

- Projects carried out in partial ignorance (many uncertainties)
- Final outcomes unknown
- Knowledge gained before & after projects completed
- Customers are test subjects
- Think broadly & anticipate issues!



Road to the A-Bomb & H-Bomb

Radium craze 1890s-1920s

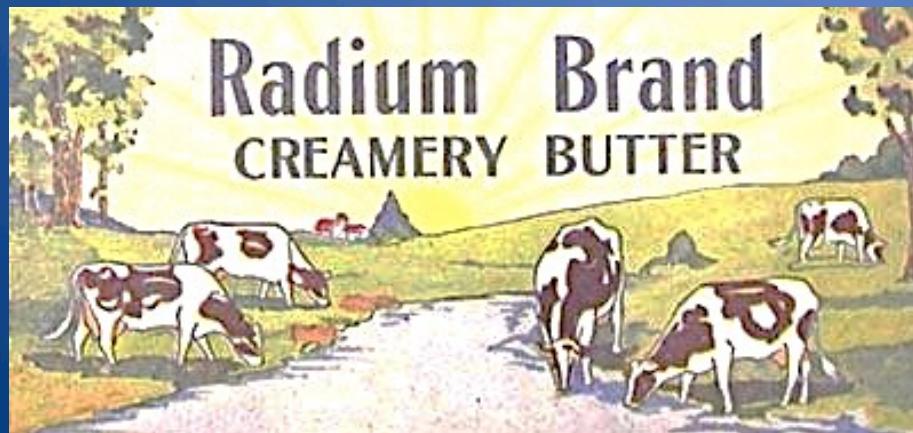
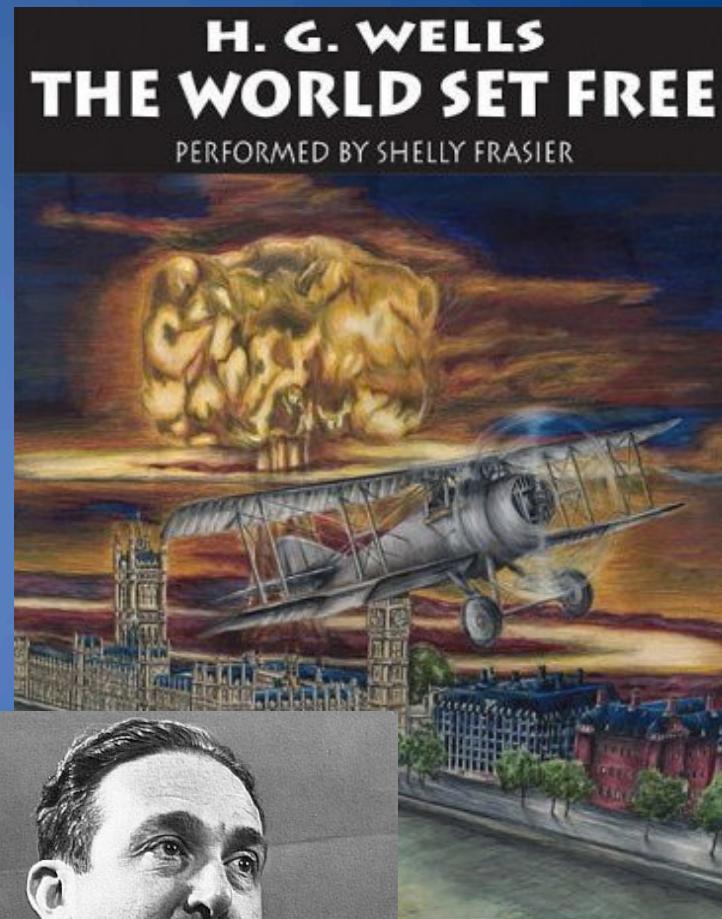
H.G. Wells *The World Set Free* (1913)

Lord Rutherford: “talking moonshine”

Einstein: “shooting birds in the dark”

Leo Szilard’s chain reaction

Context: Nazis & WW2



A-Bomb Engineers & Physicists believed they were doing the right thing

- Saw a greater good: stop Nazis, Japan
- Hoped to have input into bomb's use (didn't)
- Assumed postwar controls (IAEA)
- Hoped bomb could lead to *peaceful* nuclear power

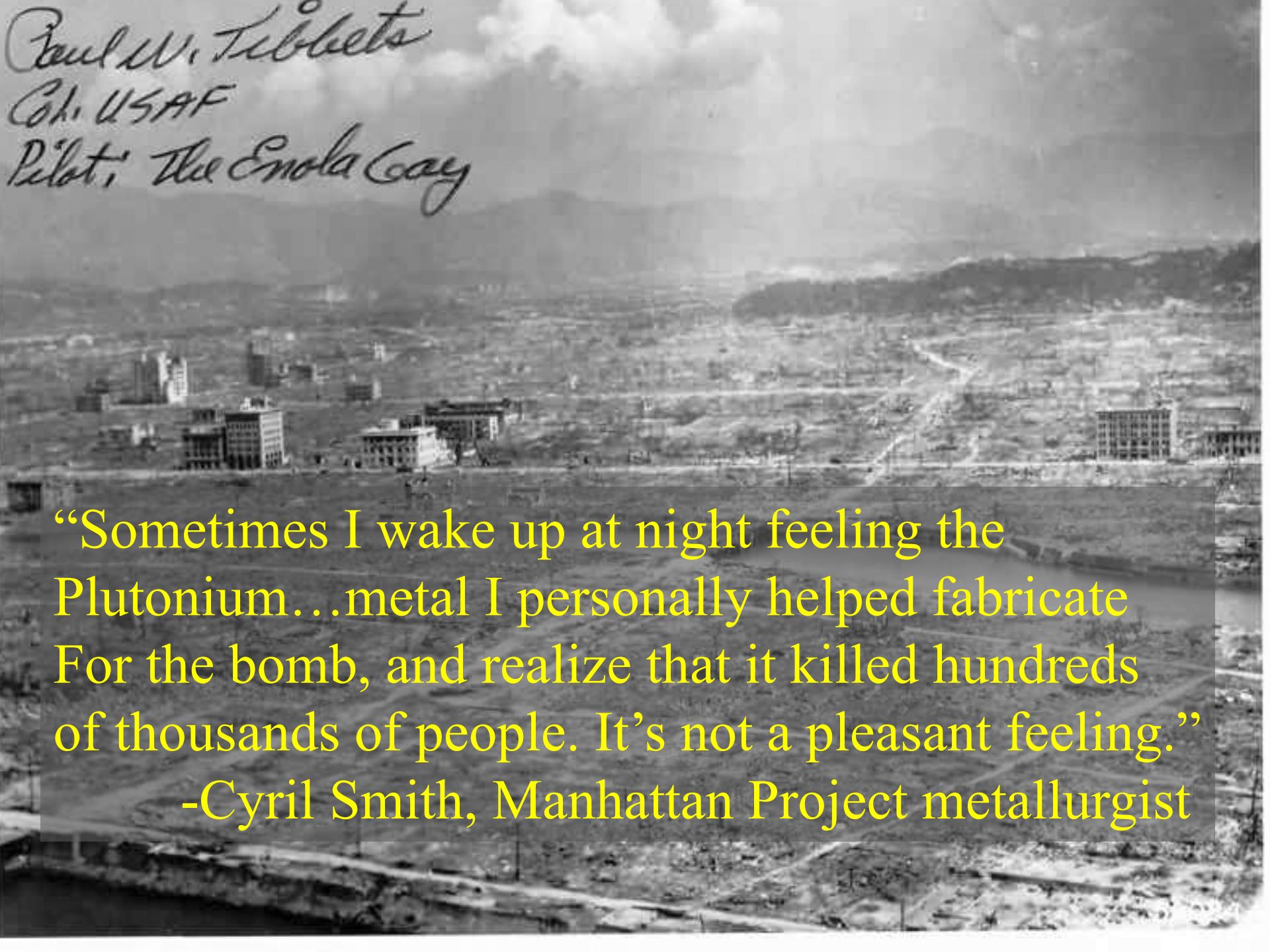


Oppenheimer & Groves at ground zero

Paul W. Tibbets
Col. USAF
Pilot, the Enola Gay



*Paul W. Tibbets
Col. USAF
Pilot, The Enola Gay*



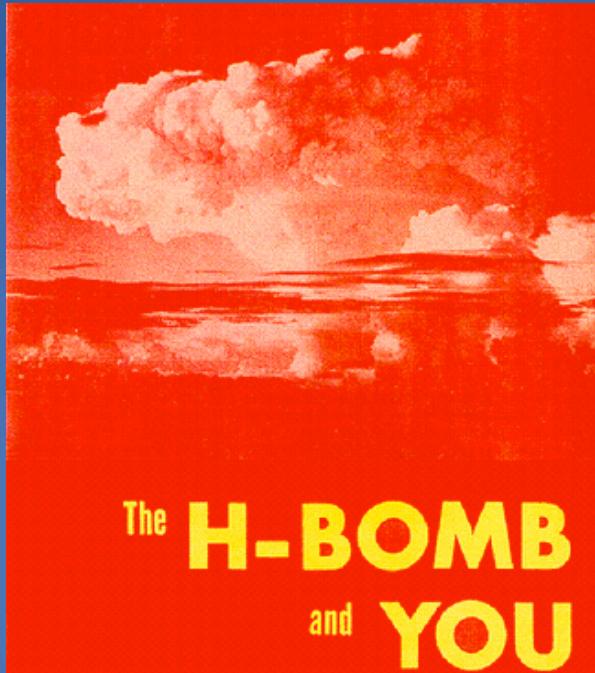
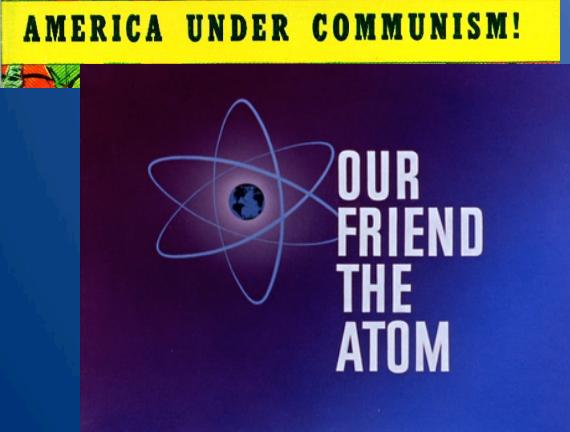
“Sometimes I wake up at night feeling the Plutonium...metal I personally helped fabricate For the bomb, and realize that it killed hundreds of thousands of people. It’s not a pleasant feeling.”
-Cyril Smith, Manhattan Project metallurgist



“Now we’re all sons-of-bitches.”

-Kenneth Bainbridge, director of the Trinity Test

New Context: the Cold War

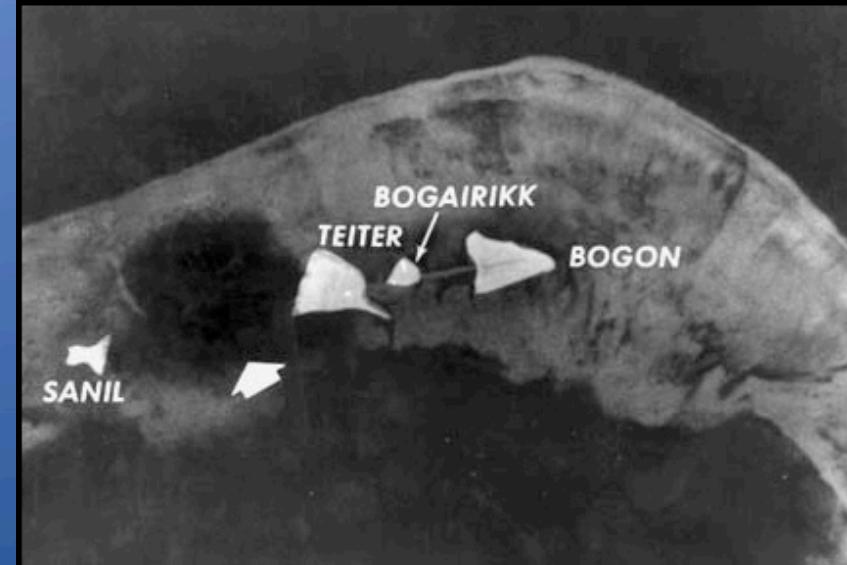
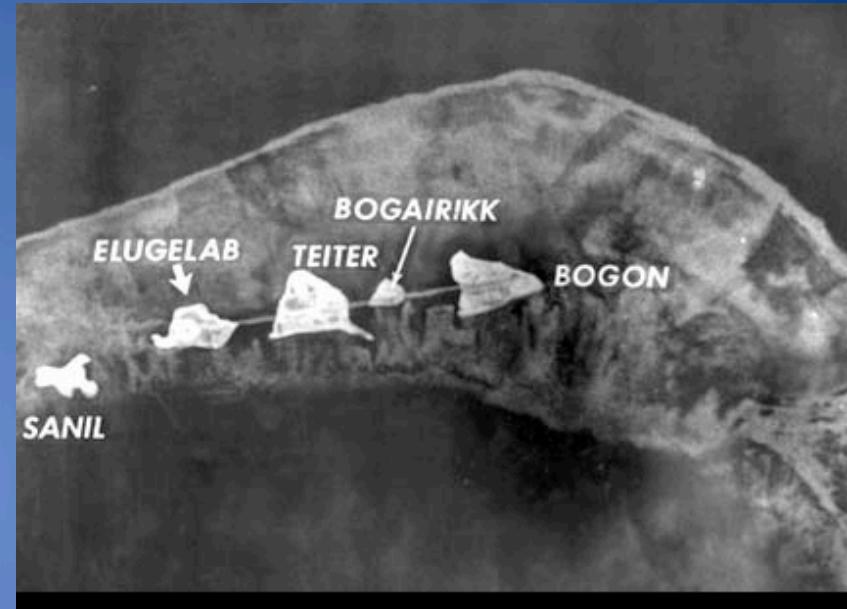
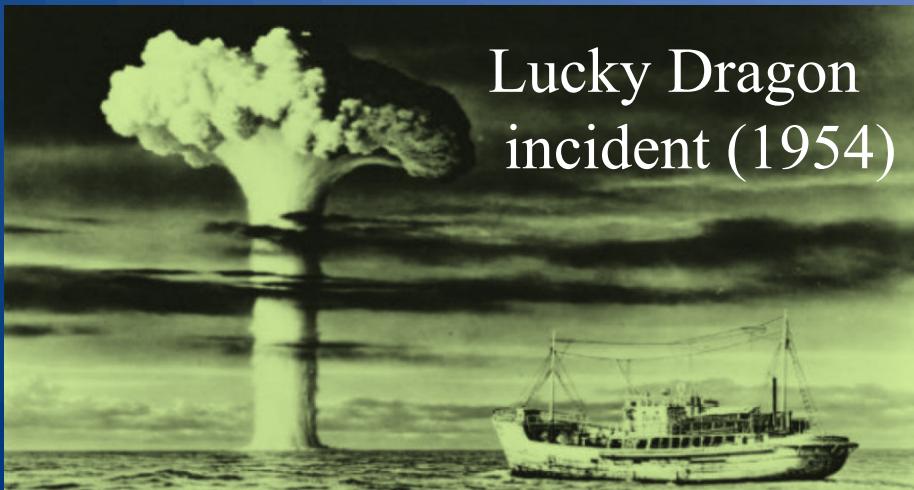


- U.S. vs. USSR
- “Red Scare”
- Nuclear arms race
- H-Bomb
- Edward Teller v. Oppenheimer

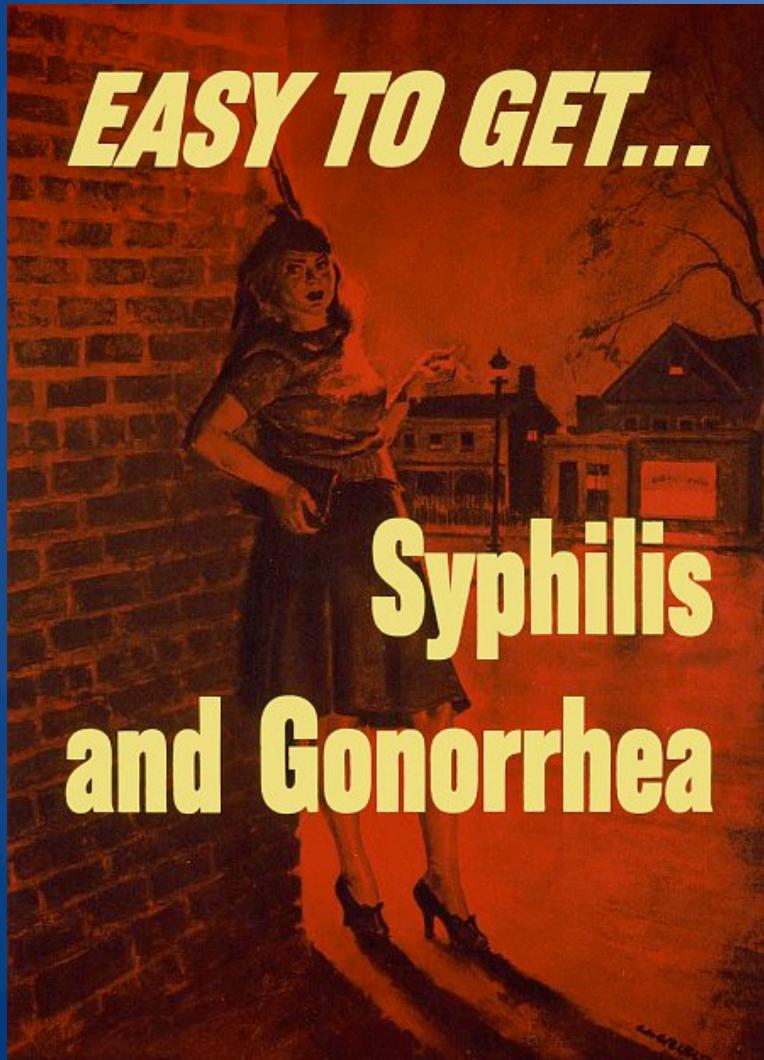
Were H-Bomb makers irresponsible?



Lucky Dragon
incident (1954)



Chemwar & Syphilis Experiments: More Irresponsible Experimentation?



- WW2 Chem warfare experiments
- Guatemala 1946-1948
- Tuskegee, AL 1932-1972(!)
- No informed consent
- Learned a great deal, but...
- Illness, death, distrust
- Est. of ethical codes, review boards (OHRP)
- Knowledge gained but at what cost?

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What constitutes responsible experimentation?



(optional) Complies with
Human Subjects standards

1. Conscientiousness

- Keep eyes open; remember 1st principal

2. Comprehensive perspective

- Seek new info

3. Moral autonomy

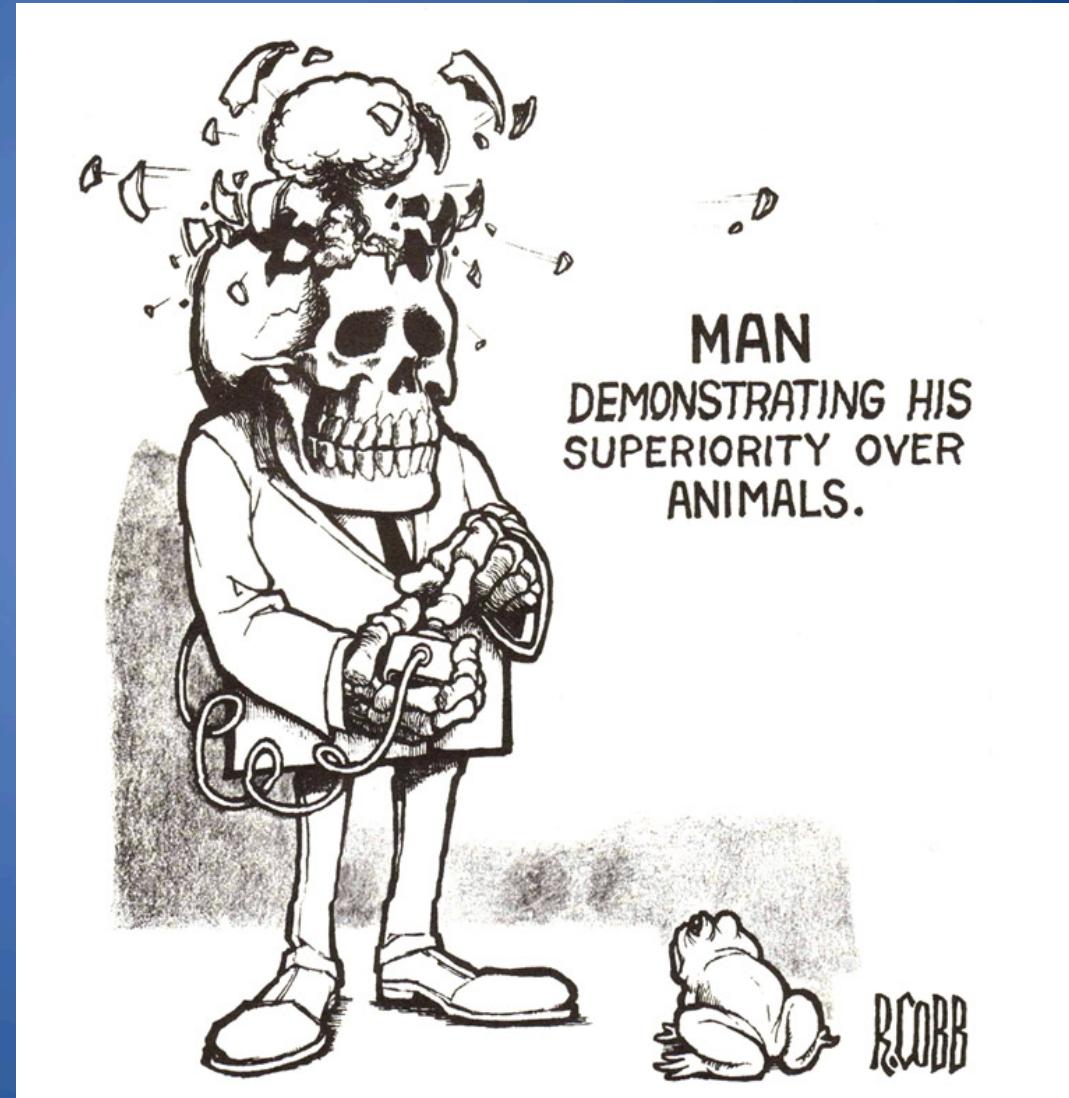
- Question your goals/actions

4. Accountability

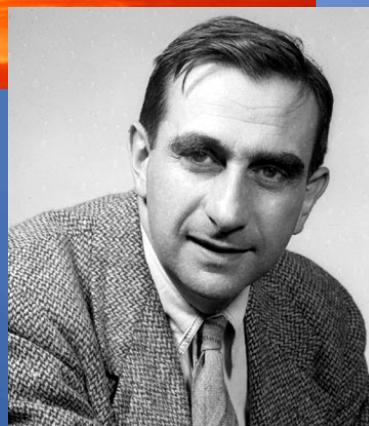
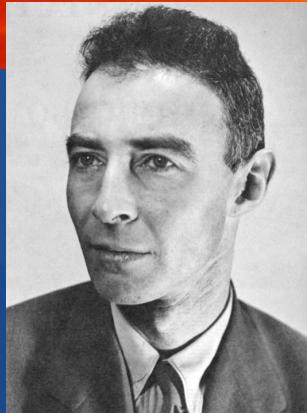
1. Take responsibility

What are the implications of Responsible Experimentation?

1. Monitor the consequences of your work
2. Provide Fail-Safe design
3. Seek informed consent from users/ subjects



The Nuclear Boy Scout (2012)



David
Hahn

Oppenheimer: “Physicists have known sin.”

Class Business

- Individual Paper (Due Sunday 10/21)
 - approx. 1-1 ½ pp. (500-750 words)
 - Answers both parts and all questions!
- Group Project
 - Form Groups in class 10/22
 - Scenarios, group lists will be on GS next week
 - Set up blogs by 10/26 - update as you go
 - Most meetings outside of class
 - Final week are group presentations