**Introduction:** "Hello and good afternoon! Today Jason and I will be talking about megaprojects—specifically, US government sponsored megaprojects—and the ethical issues that can arise from an intimate intertwining of scientific and political goals which are often present in these large undertakings. Since you have all read the paper and are now familiar with the general ethical issues plaguing the scientific community, we will take a close look at a couple of cases where these issues coalesced and had major, negative consequences. In the book, *Science, Money, and Politics*, Daniel Greenberg has two good examples of this. These are the Strategic Defense Initiative, or SDI, and the Superconducting Supercollider, or SSC. Both are megaprojects which raked in billions of dollars of funding with very little scientific reasoning for doing so. The reasons the projects were able to garner so much financial support intertwines with the ethical issues presented in the paper."

**SDI** :

**What it is** :

- It was a defense program with the goal of producing a network of anti-ballistic missile defenses to shield North America from nuclear attack by the Soviet Union.
- It was proposed by President Ronald Reagan in 1983 and began development in 1984.
- The shield was to be built using advanced technology, consisting of relatively undeveloped technologies and heavily based in nuclear power.
- The core of the program was invested in the idea that the targeting systems would be able to destroy intercontinental ballistic missiles... with lasers... from space.
- Now, if that seems overly fantastic to you, you are not alone: the media branded the program as "Star Wars," referencing the recently released film.
- This relation conjures the image of the famous Death Star from the first film in the original trilogy.
- (pause) The reality is that it had a far greater resemblance to the Death Star from the third movie.

**Teller:** So where did this project come from?

- It boils down to two issues: the seclusion of the scientific community from national politics and the relative influence of those scientists who dare enter the public arena.
- One scientist in particular took on the latter role, and he was no newcomer to the politics of weaponry.
- Edward Teller was a leading nuclear physicist
- Contributer to the Manhattan Project
- Shifted to fusion research when fission created an inadequate bomb for him
- Left Los Alamos National Labs to push for formation of Lawrence Livermore National Laboratories, which was founded in 1952

- Pursued further research of nuclear weapons and avidly promoted their use
- Thought up creative ways to use nukes, such as to dig out canals and to shoot down nuclear missiles
- Reagan liked the latter idea and appointed Teller to his White House Science Council
- Teller was a close friend to Reagan and had most influence in the Council
- Teller used this position to promote both LLNL and his nuclear missile defense plans

**X-ray laser:** At this time, LLNL was developing a new kind of laser—the X-ray laser

- Teller believed that this type laser could be used for missile defense if one were to use the X-rays produced through nuclear fission and focusing them with a dozen lasing crystals to strike a dozen targets at once. This method was also discovered at LLNL
- That claim, however, was severely overinflated
- Several scientists who had worked on the lasers or had close relations with scientists who developed the laser were even skeptical
- Greenberg interviewed two of these scientists
- One was D. Allan Bromley, the presidential science advisor at the time SDI was announced and the mentor of a graduate student who built the first X-ray lasers. Greenberg quotes him as saying, "The X-ray laser was hyped as far as I know from the very beginning... That was one of those areas where Ed Teller really hoped to make Livermore a key player."
- Reagan's previous science advisor, who personally worked on the development of the laser, also had concerns about Teller's claims. When asked about it, he told Greenberg, "You know, Los Alamos, with all its imperfections, Los Alamos doesn't lie; Livermore lies."
- Unfortunately, neither of these advisors had either the influence or the guts to stand against Teller and the president

**Science community:** What was the rest of the scientific community doing during this time?

- The project was no secret to the public, and while some of the details were classified, it was a well-known fact that the system revolved around these X-ray lasers
- Well, many of the scientists were jumping at the prospect of more money
- In fact, the Strategic Defense Initiative Organization reported that over 3,000 university scientists applied for funds to aid in the missile defense endeavor
- However, not all scientists so willingly abandoned their integrity: about 2,300 researchers pledged to not apply for or accept funds from the Strategic Defense Initiative Organization
- Because of science's seclusion, this action was virtually meaningless and easily went unseen by the general public
- And this was the most effort that scientists were willing to put into it! They were perfectly content to allow public money to pour into fairy tale defense project which many of them knew was unfeasible.
- The scientific organization with the only political weight—the National Academy of Sciences—barely bothered to confront the issue

- The Academy would have liked to perform an independent study of the program, at least according to the then-president Frank Press
- Unfortunately, they refused to do the study without access to classified materials, which would only be given to them if the White House were to request a study from them
- To put a nail in the coffin, the majority of the Academy members signed a petition opposing SDI, which further removed them, politically, from being sought after by the White House for independent study
- It would have been possible for the Academy to perform a study using only non-classified material—specifically, they could have analyzed the claims about the X-ray lasers
- In fact, other organizations did precisely that, but since they did not have the political weight of the Academy, they had no impact on politics
- However, since there was no financial gain for the Academy in pursuing such a study—it would have cost them a few hundred thousand dollars—they did not bother, despite dramatic impact the program would have on the federal science budget

**Budgetary issues:** So the program continued.

- As expected, the program immediately began to consume the federal budget
- It began with $ 1 billion in 1984 and quickly grew to $3.9 billion by 1988
- It was estimated, if the program ever reached the deployment phase, that it would take between 400 and 800 billion dollars to put it in place, with additional costs to maintain it
- By the early 1990s, when the program was repurposed to focus on guided missile technology for regional missile defense, it had used over $30 billion dollars without producing missile-destroying lasers
- To put that into better perspective, the SDI outspent cancer research three to one
- Had the scientists upheld their ethical responsibilities to integrity and public welfare, this incident would have never happened

**Transition:** And now to tell us the tragic tale of the Superconducting Super Collider, here's Jason