

Maverick Reynolds

Professor Farcau

POS 2041

12 November 2021

**The Dark Side of Space Exploration: How NASA's Search
for Publicity Led to the Challenger Disaster**

INTRODUCTION

Moments after the September 11 terrorist attacks, New York City fell completely under smoke. Residents witnessed the rapid collapse of the Twin Towers and the loss of over 3000 lives during the tragedy. Every news outlet and radio broadcast covered the event and the rest of the world wept with the United States that day. Many of those same people also lived through the Challenger disaster only fifteen years earlier. On January 28, 1986, space shuttle Challenger broke into pieces only seventy-three seconds after launch and killed all seven of the crew members aboard. Those at the launchpad looked up at the explosion from nearly nine miles below. Those at home watched the Y-shaped plume of smoke on live television only a few short minutes later.

Following the incident, the Shuttle program came to a grinding halt. President Reagan ordered chairman William Rogers to conduct a thorough investigation of the accident. He established the Rogers Commission to tackle this very problem and determine the leading factors that contributed to the mid-flight disaster. Five months later, the commission submitted their report to the President and released it to the public. The report gave a conclusive summary of the technical issues present with the shuttle, most notably the failure of the O-rings to properly seal the joint in the right booster during launch. The report also emphasized the managerial issues

present at NASA (the National Aeronautics and Space Administration) and the internal separation of the organization following the Moon landings. It colorfully highlighted NASA's failure to follow their safety protocols in an attempt to keep on pace with their over-ambitious launch schedule. However, the Rogers Commission Report lacked an analysis of the political (or institutional) aspects of the failure. NASA's relationships with their contractors, the public, and the government all impacted their behavior and practices during the Shuttle program.

Throughout the 1970s, NASA struggled to keep American interest in the space program and grew more desperate for its revival. The poor management practices that came culminated in a fierce battle between the engineers and administrators of the organization on the eve of the launch. Unfortunately, the executive decisions of management suffocated the engineers' technical judgments and permitted the launch of the Challenger shuttle. NASA's authoritative attitude had been developing throughout the 1970s and 80s and became the genesis of a mission failure over sixteen years in the making. This paper will explore how NASA's desire to increase attention and the quality of their public relations lead to faulty management practices and the Challenger disaster.

A BRIEF HISTORY OF NASA

NASA was born in 1958 in response to the Soviet Union's launch of Sputnik I. However, NASA's greatest development occurred after President Kennedy declared his goal of landing a man on the Moon by the end of the decade. At the time, this was one of America's greatest and most complicated endeavors ever undertaken. The nation needed an organization that could realize Kennedy's mission, win the Space Race, and do so with unmatched precision and excellence. When NASA took on the challenge, they did so with a very technical disposition and great deference to their engineers and technicians. Their administration had minimal leverage

over the engineers and worked tightly with the teams to solve difficult problems. NASA finely demonstrated its technical grace throughout the 1960s during the completion of the Mercury and Gemini programs. They served as the prerequisites to the Apollo program, and their success gave a strong spirit to the nation. On July 16, 1969, NASA reached its zenith when Neil Armstrong stepped out of the Apollo 11 Lunar Module and became the first person to set foot on the Moon. The nation not only won the Space Race that day but also fulfilled Kennedy's great proposal.

However, public interest and government spending for the space program sharply declined following the Moon landing. American interest suffered a hard blow as the public turned towards more 'down-to-earth' matters such as the Vietnam War. And as compared with its peak support (in the late 1960s) to the mid-1970s, NASA's budget was cut nearly in half. NASA no longer had a purpose since both the Space Race and the decade came to an end. Although they continued to launch missions to the Moon, lunar geology had no significance to the nation. The public maintained a 'that's enough' attitude towards NASA and no longer wanted them to continue missions, especially after the Apollo 13 near-disaster. The organization drastically wanted to change the public's attitude towards space exploration. NASA saw space exploration not as landing on a floating rock, but as the continual engagement and discovery of the cosmos. They desperately needed the practice of furthering the knowledge of mankind to become an everlasting endeavor.

THE RISE OF THE SHUTTLE PROGRAM

When President Nixon approved the Space Shuttle program in 1972, he allowed NASA to show off a head-turning way to engage in space travel. After many years of development and five test missions with the Enterprise shuttle, the program launched its first official mission with space shuttle Columbia in 1981. The Shuttle program opened the door for scientists and the

military to launch experiments and satellites into space. It also effectively captured the attention of the public at the time. The program was publicized as a 'freight train to space' and was expected to constantly be engaged in orbital travel. The Orbiter launched vertically (like a rocket) from Cape Kennedy, Florida, and landed horizontally (like a glider) at either Kennedy Space Center or Edwards Air Force Base in California. It launched with two solid rocket boosters (SRBs) on either side of the main orbital tank. The orbital tank was the only expended component, meaning the Orbiter and both SRBs were refurbished for future missions. Since the Shuttle program refurbished part of its spacecraft (unlike the Apollo missions), it became the first reusable spacecraft and the cornerstone of a rapid launch schedule. The reusability of the shuttle was NASA's ticket into perpetuity and their escape from time-constrained missions. Lower costs and shorter breaks between missions meant NASA had a means of building longer-term projects, such as the construction of the International Space Station. They hoped America's interest would be kept alive through the projects using the Shuttle program, no matter their scale.

However, the program was very dangerous and filled with risks. It was originally expected to perform over fifty launches per year to prove the 'space bus' nature of the shuttles. Launching a shuttle nearly every week placed too heavy a burden on the ground crew; they simply could not keep up. During the refurbishment, teams often had to rush through critical tasks and disregarded necessary inspection checkpoints. NASA lost forty percent of their staff (over seventy percent of their quality control staff alone) due to their budget cut. They got away with using less strict preflight reviews to maintain management's self-imposed launch schedule. In addition, the SRBs had inherent difficulties that made their refurbishment difficult. Erosions occurring at both the head nozzles and the O-rings were discovered after only the second flight

of the program. There were also few places on the boosters for redundancies, which were highly desired to maximize safety in the event of a single-part failure. Fewer redundancies meant greater skepticism and increased uncertainty in the safety of the launch. The shuttles were complicated vehicles and NASA did not give them the proper care they needed.

HOW NASA'S MANAGEMENT CHANGED

Throughout the 1970s, NASA's managerial structure changed greatly due to decreases in both federal spending and public relations. Their lower budget led them to rely more heavily on contractors to supply and construct certain products. Outsourcing helped simplify the development process of the shuttles and served as a form of outreach for the organization. One of the largest contractors NASA worked with was Morton-Thiokol (now Northrop Grumman). The aerospace and manufacturing company won the contract in 1974 to design and build the SRBs for the Shuttle program. NASA also worked closely with Marshall Space Flight Center in Huntsville, Alabama to lead the design and assembly of the main propulsion system and external tank.

Although contracting increased NASA's outreach, it drastically exaggerated the divide between the organization's administration and their engineers. Contracting added additional relationships that had the potential to devolve into political problems. The effects of cold temperatures on the O-rings (a caveat Morton-Thiokol knew about) were kept secret from NASA for over a decade. This information was not discussed in detail until the evening before the launch out of fear of jeopardizing both the contract and the relationship with NASA. The Rogers Commission Report stressed the disconnect between management and their engineers. They began to use their position as a threat towards the engineers to demand quality products. There was pressure from above to keep up with their rapid launch schedule. If Morton-Thiokol could

not supply functional SRBs, NASA would hastily find another contractor. The organization favored a more bureaucratic orientation over the technical one they operated with throughout the Apollo program. The superordinates gave themselves greater leverage over the engineers and disregarded their feedback on flight rate and mission safety. NASA's new attitude guided their practices as the Shuttle program continued to launch flights throughout the early and mid-1980s.

THE TEACHER IN SPACE PROJECT

Since the first shuttle launch in 1981, the program has seen a general decline in public attention. Although it was beneficial for the scientists and the military, its meaning withered away for the American people. The launches were too routine to be special and the program was not doing anything the public felt they could relate to. To reinvigorate the nation's interest, NASA needed a project that was not only relatable but also unique. They also wanted their project to be simple and inexpensive to keep their burden light.

In 1984, President Reagan started the Teacher in Space Project (TISP) to achieve this goal. The project was intended to carry teachers and educators into space as payload specialists. The teachers would then return to Earth and share their stories and experiences with their students. It would inspire both children and adults to give greater attention to the fields of science and technology. NASA selected Christa McAuliffe, a New Hampshire teacher, from over 11,000 others who applied for the opportunity. Her customary status and virtuous character made her the ideal representative of the general public and a star candidate for the position. She was assigned to fly on mission 51-L aboard Challenger along with six other astronauts. The flight was the twenty-fifth for the Shuttle program and was intended to carry a second Tracking and Data Relay Satellite (TDRS-B) as well as the Spartan Halley Spacecraft into orbit.

The launch was NASA's most anticipated and exciting event since the Moon landing in 1969. Over two and a half million pupils nationwide would view Challenger's launch on January 28th and thousands of families would tune in from home. After returning, Christa would embark on a nine-month lecture tour across the United States and speak to both children and other educators about how the experience inspired her in STEM studies. If successful, the launch would critically change the nation's attitude towards space exploration. The successful flight of a fellow civilian would make space travel seem more accessible to the public and encourage the possibility of anyone building the future. It would be a landmark day for NASA and a project that would forever be remembered as one uniting the nation.

THE CALL FOR A DELAY AND THE LACK THEREOF

The engineers, however, knew this particular flight was going to be extremely problematic. On the eve of the launch, the Cape received notice of a cold front coming towards Florida's east coast that could potentially bring subfreezing temperatures to the launchpad. Although they knew about the problems the O-rings had with lower temperatures, it had never required attention. Allan McDonald (director of the booster project) and his team of engineers determined the lowest possible temperature at which the O-rings could properly seal the joints to be fifty-three degrees Fahrenheit. A three-way teleconference call between Morton-Thiokol, Marshall Space Flight Center, and Cape Kennedy was quickly scheduled for the engineers to present their recommendation. Along with McDonald, Roger Boisjoly and Arnold Thompson spoke loudly about the catastrophic consequences of launching Challenger the next morning. The engineers implored NASA to delay the launch, but management did not believe the argument was substantial enough. Larry Mulloy and George Hardy (SRB project managers) were appalled at Morton-Thiokol's recommendation. Mulloy did not hide his disapproval at all; "My God,

Thiokol...when do you want me to launch — next April?” he asked. Management demanded proof the O-rings would fail below the predicted temperature, which the team could not provide. And when Challenger exploded after taking off above ice the following morning, the engineers were not the least bit surprised.

There were three main reasons why NASA refused to delay Challenger’s launch. Part of NASA’s plan to increase the quality of their public relations through the TISP was for Christa to broadcast two lessons over PBS on her fourth day in space. This was a non-negotiable part of her schedule. All astronauts are required to follow a strict and rigid schedule created many months before takeoff. This meant Tuesday became the only reasonable day to launch the shuttle. If the launch would have been delayed by another day, Christa’s lesson would broadcast on a Saturday; it likely would not have been heard by many pupils. For the broadcast to go out during the week, the mission would need to be pushed to that Friday.

Delaying the mission by a few days would not normally be a problem for NASA. Challenger’s launch had already been pushed back by nearly half a year from its intended launch date. However, if NASA delayed the mission, it would not be included in President Reagan’s 1986 State of the Union Address. Although there was no direct pressure from the federal bureaucracy, NASA wanted to ensure the shuttle launched before Reagan’s speech later that evening. The organization believed this flight deserved special recognition and praise. It would be the initiation of the TISP and hold a special place in the heart of the nation. The flight would also make a wonderful ending to the address and invite a spirit of exploration and discovery into the people. It was an opportunity for publicity NASA simply could not afford to miss.

Furthermore, mission 51-L had already been delayed five times. Payload accommodations and circuitry problems with the TDRS-B Satellite delayed the flight by over

five months. Afterward, two weather delays and difficulty with an exterior handle the prior morning (due to freezing temperatures) brought the launch to Tuesday, January 28, 1986. NASA claimed these delays did not shake their projection of 1986 being their most ambitious year yet. But the public only became more skeptical and displeased with their efforts. The prior mission (61-L with Columbia) set a record of seven postponements before launch. The delays were caused mostly due to the weather and last-minute technical problems and cost NASA over one million dollars in fuel and overtime pay. They delegitimized the Shuttle program and distanced it from the bleeding edge of space exploration. To the public, NASA seemed more like a happy-go-lucky rocket club that burned through federal spending without actually expanding any horizons. Neither did they improve the quality of the refurbishment and launch processes during the program. Journalists and news outlets were happy to emphasize the organization's inability to create a reliable program for both scientists and astronauts. They exaggerated the uncertainty the delays brought to NASA's schedule and the apparent carelessness they had for their spacecraft. Management knew mission delays would only reinforce this image, so they focused on committing Challenger's launch to a specific date in an attempt to increase their faithfulness. But a launch deadline did not solve any of the technical issues at hand.

CONCLUSION

After the Challenger disaster, NASA saw a permanent slowdown in shuttle launch frequency. The organization waited over two years before launching Discovery in 1988. During this period, they developed their own safety office and advisory panel to discourage the launches of unprepared missions as demanded by the Rogers Commission. Their report criticized NASA for its lack of technical checkpoints and pitiful practices. It sided heavily with the overworked engineers and expected an immediate change. The Rogers Commission also drew attention to the

organization's lack of proper communication and judgment during the teleconference on the eve of the launch. The foresight of McDonald's engineers was sufficient to provide convincing evidence of a mid-flight failure the following day. Although Morton-Thiokol was to blame for the technical failure of the O-rings, NASA's improper management put them at ultimate fault.

It is important to notice the roots of public relations and political appeal in NASA's arguments against a mission delay. These motives were only lightly reviewed by the Rogers Commission Report, yet they were the primary reasons for a Tuesday launch. Management's attraction to a January 28th launch showed a severe case of both groupthink and ignorance in the organization's superordinates. Exploring the cosmos requires extreme precision and expertise. There are many risks involved and it does not need to be made any more uncertain with the introduction of politics. There is simply no place for institutional issues and external influences in a technically oriented organization.

The Challenger disaster powerfully exposed the faulty bureaucratic structure of NASA. It showed the nation that NASA was no longer the deferential organization it used to be. They purposefully violated their duty of making the safety of their astronauts and teachernauts their primary concern in pursuit of institutional gain. After hearing about the tragedy, President Reagan postponed his State of the Union address for a week and delivered a much shorter speech focused only on the Challenger disaster. He invited the nation into a period of mourning and remembering by defining the day exactly opposite of how NASA envisioned: a truly national loss. The events of September 11th may have been difficult to prevent, but the Challenger disaster was almost certainly an avoidable calamity. On that day, President Reagan powerfully called NASA to be an organization that fully exercises its ability to avert national tragedy.

WORKS CITED

Broad, William J. "Space Shuttle Liftoff Delayed For 7th Time, Setting Record." *The New York Times*, 11 Jan. 1986, p. 6.

Challenger: A Rush to Launch. WJXT Films, Jacksonville: WJXT Local station, 2016,
https://www.youtube.com/watch?v=EA3mLCmUD_4&ab_channel=JasonPayne.

Ellrod, D.F. "The Spin on Space: NASA's Public Relations Concerns as a Factor in the Challenger Disaster." *Philologia*, vol. 1, no. 4, 2009.

Hall, Joseph Lorenzo. "Columbia and Challenger: Organizational Failure at NASA." *Space Policy*, vol. 19, no. 4, 2003, pp. 239–247.

Lunner, Chet. "Frozen Part Puts Shuttle on Ice." *News-Press*, 28 Jan. 1986.

Presidential Commission on the Space Shuttle Challenger Accident. "Report to the President by the Presidential Commission on the Space Shuttle Challenger Accident." *Washington, D.C.*, 5 vols, 1986.

Romzek, Barbara S., and Melvin J. Dubnick. "Accountability in the Public Sector: Lessons from the Challenger Tragedy." *Public Administration Review*, vol. 47, no. 3, edited by American Society for Public Administration, Wiley, 1987, pp. 227–38.

Teitel, Amy Shira. "Challenger Explosion: How Groupthink and Other Causes Led to the Tragedy." *History.com*, A&E Television Networks, 25 Jan. 2018,
<https://www.history.com/news/how-the-challenger-disaster-changed-nasa>.

The Editors of Encyclopædia Britannica. "Challenger Disaster." *Encyclopædia Britannica*, Encyclopædia Britannica, Inc., 14 Jan. 2009,
<https://www.britannica.com/event/Challenger-disaster>.