

**ENCS4210, COMPUTER ENGINEERING ETHICS.**

**Paper #1**

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**Section 2.**

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**Space Shuttle Challenger**

**Abstract:**

# It is well accepted that the tragic destruction of the Space Shuttle Challenger on 28 January 1986 was the result of organizational failure (Organizational failure at NASA, 2003).

# Many studies had been done on the case of the Challenger space shuttle disaster. These studies linked the explosion of Challenger with engineering ethics. The Challenger disaster in particular had been discussed due to the infamous teleconference that took place the night before the launch, in which some engineers tried to postpone the launch (Schwartz, 1987).

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**Introduction:**

**1.1 short story of challenger**

The NASA space shuttle Challenger exploded on January 28, 1986, just 73 seconds after liftoff, bringing a devastating end to the spacecraft’s 10th mission.

The disaster claimed the lives of all seven astronauts aboard, including Christa McAuliffe, a teacher from New Hampshire who would have been the first civilian in space.

It was later determined that two rubber O-rings, which had been designed to seal the sections of the rocket booster, had failed due to cold temperatures on the morning of the launch.

The tragedy and its aftermath received extensive media coverage and prompted NASA to temporarily suspend all shuttle missions (History editor's website, 2020).

**1.2 research objectives**

In this research paper the researcher will answer the following questions:

* Who were the involved actors in this case?
* Why did the engineers object to the launch, although the technical specifications were achieved?
* Why did NASA press to launch the space shuttle in spite of the objections?
* Was whistleblowing justified in this case?

2. literature review and answering questions:

In this section the researcher is trying to answer the research questions. The Crew Members' details Who died in the disaster are discussed as follows:

1)Christa McAuliffe:

A teacher from New Hampshire who was to become the first civilian to fly in space. She earned her spot on the shuttle by winning the teacher in Space Project, a contest launched by President Ronald Reagan and NASA that received over 11,000 applications. McAuliffe had a training for six months to join the crew. She helped doing experiments on the space station as well as giving lessons that would be broadcast to classrooms across the country.

2)Ellison Onizuka:

Like many of his fellow Challenger astronauts, Onizuka was a trained engineer who served in the armed forces during the 1970s, serving as a test pilot throughout the decade. In 1978, he was one of 35 hopefuls chosen for NASA’s first new astronaut program since 1969, a group dubbed “The 35 New Guys,” despite the presence of six women in the class.

Onizuka flew on one previous space shuttle mission and a hero in Hawaii and icon to Asian Americans.

3)Ronald McNair:

McNair went on to read a lot of books, earning his Ph.D. in physics from MIT. Just a few years later, he was invited to join that class of ‘78 at NASA. No Black person had ever flown into space at that point, who was invited to become an astronaut.

His first flight was aboard the Challenger in 1984, and on that journey, he became the first person to play music in space. He had planned to become the first person to play a concert via live feed during the Challenger mission that never made it past the Earth’s atmosphere.

4)Judith Resnik:

Judith Resnik was just 28 when she was asked to join NASA as a part of the 1978 class. She scored a perfect 1600 on the SAT, attended Carnegie Mellon for undergraduate and then earned a Ph.D. in electrical engineering from the University of Maryland. In between her two degrees, she worked for RCA, helping on high-level projects for major clients (including NASA) and then went on to work for the National Institutes of Health as a biomedical engineer.

5)Dick Scobee:

The commander of the Challenger on that fateful morning in late January. Francis Richard Scobee had a remarkable career in both the Air Force and NASA. He served in the Vietnam War, flying in combat missions for three years before returning to the United States and becoming a test pilot for cutting edge aircraft through the late 1970s.

After that, he was chosen as a candidate to become an astronaut in 1978, in the same class as Onizuka, McNair and Resnik, and aced all of the training and exams. That was no surprise, because not only was he a great pilot and aerospace engineer, Scobee was something of a polymath.

6)Gregory Jarvis:

The only other crew member who didn’t come through traditional astronaut training, Gregory Jarvis was an engineer who wound up on the Challenger through hard work and a lot of bad luck.

7)Michael J. Smith:

He was a Vietnam vet and joined NASA at the turn of the decade. He was known as a bright student and impressive athlete who spent much of the 1980s helping the space agency develop new parts and procedures for the space shuttle program (biography.com website)

The objection of the engineers:

The mission’s launch from Kennedy Space Center at Cape Canaveral, Florida, was delayed for six days due to weather and technical problems.

The morning of January 28 was unusually cold, and engineers warned their superiors that certain components—particularly the rubber O-rings that sealed the joints of the shuttle’s solid rocket boosters—were vulnerable to failure at low temperatures. However, these warnings went unheeded, and at 11:39 a.m. Challenger lifted off (www.history.com/topics/1980s/challenger-disaster)

Launching the space shuttle in spite of the objections:

*Schedule Pressure:*

A major reason for the space agency's failure to heed the warnings, the report says, was pressure to meet an "over-ambitious" schedule of 24 shuttle flights a year by 1990. The pressure caused such extensive disruption that the shuttle program probably would have soon broken down, even in the absence of an accident, it says (Challenger Disaster Blamed on O-Rings, Pressure to Launch)

whistleblowing justification:

Allan J. McDonald, a rocket scientist and whistleblower who refused to sign off on the launch of the Challenger space shuttle over safety concerns. After the explosion, it had been argued that the tragedy could have been averted if the officials' heeded warnings from engineers like himself.

Mr. McDonald insisted that takeoff be postponed, according to accounts of the deliberations that later emerged in news reports. A critical component of the rocket booster was the O-ring, a rubber gasket that served to contain burning fuel. Because of their composition, O-rings were highly vulnerable to temperature drops, and engineers warned that their effectiveness could not be guaranteed below 53 degrees Fahrenheit.

In addition to the matter of the O-rings, Mr. McDonald said he raised weather-related concerns including the danger that ice might damage the shuttle’s exterior. However, a protocol required the senior engineer to sign off on the launch. When Mr. McDonald refused, his supervisor signed on behalf of him.

4.conclusion:

Catastrophic events can be traced in part to the group decision-making process. In addition, the quality of group decision making among different engineers might be the main cause of the disaster. They neglected the benefits of the group thinking in the Challenger launching process which led to a major drawback in the Challenger space shuttle launching decision.

In summary, a combination of schedule pressure, miscommunication, and a failure to adequately address technical concerns led to the ill-fated decision to launch the Challenger. The disaster prompted a reassessment of NASA's decision-making processes and a reevaluation of the safety culture within the organization.

5. references:

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5)https://www.washingtonpost.com/local/obituaries/allan-mcdonald-dead/2021/03/10/572bd0d6-81a3-11eb-ac37-4383f7709abe\_story.html to answer question 4