Case #2 - Space Shuttle Challenger Disaster

0.1 Ethically ambiguous situations

We will be examining the Space Shuttle Challenger Disaster of 1986 where "the Challenger and its seven-member crew were lost 73 seconds after launch, when a booster failure resulted in the breakup of the vehicle".[1] The incident was the result of several critical oversights involving political officials, NASA and Morton Thiokol management as well as engineers. The case also involves several ethically ambiguous situations, where clear decision making would have been affected by complications that were occuring at the time.

One example of an ambiguous situation in the Space Shuttle Challenger Disaster was NASA having to choose between safety and productivity. Several months prior to the Challenger launch, NASA was under extreme pressure to launch in a timely manner. "Political pressure to provide a reliable, reusable space vehicle with rapid turn around time" would have "seriously hindered the ability for effective systems integration and development".[2] This created an ethically ambiguous situation for NASA: When a safety concern arises, should they spend additional time to investigate it or continue building the spacecraft in order to not miss deadlines? As seen with Challenger, the outcome can be catastrophic if critical safety concerns are not addressed properly. However, it is also important to note that "if the Shuttle never launches, NASA fails its mission in equal measure as it does when it has accidents".[3] This certainly would have placed huge amounts of stress on NASA, resulting in tough decisions leading up to the launch and an overall ambiguous situation.

Another ethically ambigious situation occured with groupthink and whistleblowing, when the "night before the fateful Challenger launch there was a teleconference between engineers and officials at Morton Thiokol, Kennedy Space Center and Marshall Space Flight Center".[4] A group of low level engineers at Thiokol expressed their concerns of the possibility of a critical failure of the O-rings in cold temperatures, but they were consequently shut down by NASA officials. A shuttle program manager Lawrence Mulloy said in the meeting: "My God, Thiokol, when do you want me to launch - next April?"[5] This type of groupthink would have led to an ambiguous situation in which the Thiokol engineers could have attempted whistleblowing (i.e calling management out on their choice to prioritize meeting deadlines over meeting safety requirements),

[1] Dumoulin, Jim. "Shuttle Orbiter Challenger (OV-99)". Science.ksc.nasa.gov. N.p., 2016. Web. 30 Jan. 2016.
[2] Forrest, Jeff. "Space Shuttle Challenger Disaster 1986". Dssresources.com. N.p., 2016. Web. 31 Jan. 2016.
[3] Vaughan, Diane. "NASA Cultures". history.nasa.gov. N.p., 2016. Web. 31 Jan. 2016.
[4] Hall, Joseph. "Columbia And Challenger: Organizational Failure At NASA". sciencedirect.com. N.p., 2016. Web. 31 Jan. 2016.
[5] Berkes, Howard. "Remembering Roger Boisjoly: He Tried To Stop Shuttle Challenger Launch". NPR.org. N.p., 2012. Web. 31 Jan. 2016.

but this would have come at the risk of stepping out line and appearing incompetent. Since the launch date had already been pushed back several days prior, the engineers at Thiokol had a very difficult choice to make: Should they speak up against their higher ups or accept their management's decision? Overall, the meeting the night before the Challenger launch was a common example of "go-fever" (being in a rush to finish a project while overlooking potential faults), and an ethically ambiguous situation for the engineers of Morton Thiokol.

0.2 Importance of stakeholders

- NASA managers and scientists

  NASA managers and scientists played a crucial role in the Space Shuttle Challenger Disaster as they were the ones overseeing the whole project. Since NASA scientists were trying to ensure the technology worked succesfully and NASA managers were trying to ensure a specific launch date was met, they both played a huge role in the outcome of the challenger incident.

- American Government

  The American Government, or the Reagan adminstration, also played a very large role in the Challenger incident. In addition to funding NASA financially, they were also interested in seeing the space shuttle completed as soon as possible in order to prove their competence to American citizens and the rest of the world. President Ronald Reagan even started the Teachers in Space Program, a program where a teacher was to be chosen to become the first citizen passenger in the history of space travel. In that way, Reagan said, "All of America will be reminded of the crucial role that teachers and education play in the life of our nation. I can't think of a better lesson for our children and our country."[6] Reagan adminstration's desire to inspire the lives of everyday people through the Challenger mission demonstrates their importance as a stakeholder.

- Morton Thiokol Managers and Engineers

  Morton Thiokol played a huge role in the Space Shuttle Challenger Disaster as they were the ones who manufactured the SRB's (Solid Rocket Boosters), which contained a fatal design flaw in the O-rings that ultimately led to the destruction of the Shuttle. In addition, Thiokol engineers tried to warn NASA against the dangers of launching the Space Shuttle in low temperatures on several occasions. Roger Boisjoly, a booster rocket engineer at Thiokol even sent a memo to the company's vice president

[6] Citizens In Space,. "Teachers In Space: The History". N.p., 2012. Web. 31 Jan. 2016.

about the flawed design of the O-rings several months prior to the incident.[7] Both the company's role in designing the SRB's as well as the Thiokol engineers who tried to prevent the Challenger disaster made Morton Thiokol an extremely important stakeholder in the events that followed.

0.3 Resolution of the ambiguous situation by critical stakeholders

- Government: After the Challenger incident, Regan began an investigation on the cause of the incident. The commission discovered that the O-ring seals had become brittle in the cold temperature and failed to function. In addition, they found that Morton Thiokol had ignored possible warnings that could have lead to failure, and that NASA officials were aware of the warnings but did not take action. The government suspended NASA's plans for further flights during the investigation. After the investigation, the commission came up with nine recommendations for improving safety and NASA was instructed to respond in one month with their plans for implementing the recommendations.
- NASA: In response to the commission, NASA redesigned their solid rocket boosters to improve technical safety and created an Office of Safety to ensure quality and reliability, as well as to change the culture in the company to avoid whistleblowing and groupthink. In addition, NASA postponed plans to fly citizens for 22 years. The NASA Day of Remembrance was created and serves to remind us of the subject of engineering safety.
- Morton Thiokol: Morton Thiokol's contract with NASA was not terminated. Stated in the contract, the maximum penalty Morton Thiokol would receive is 10 million. Roger Boisjoly, an engineer at Morton Thiokol who had warned about the O-rings quit his job to become a speaker for engineering ethics and safety.

0.4 Our views on the resolution of the ethical situation

Overall, we found the resolution to be satisfactory. Although the changes that were made did not completely mitigate all possible dangers of space, we believe that the increased rules and regulations that were passed following the Challenger disaster were adequate in order to prevent future similar disasters from happening.

From the perspective of the stakeholders, we can also examine this ethically ambiguous situation. Before the Challenger accident, Morton Thiokol's management were able to veto the safety concerns of their

[7] Webcitation.org,. "Webcite Query Result". N.p., 2016. Web. 31 Jan. 2016

engineers without a second thought. After the Challenger disaster, NASA recognized the importance of the advice from Engineers. The culture around NASA changed and over 100 changes were made "to the [space shuttle] to make it safer and more reliable".[8] 30 years later, we have had multiple successful space missions following Challenger such as Endeavour, Challenger and Discovery.[9] The government also took action to stop space missions for 2 years while it investigated the issue of safety in space. We believe that all of this combined served adequate protection to future astronauts in space.

Another major aspect of discussion involves the engineer, Roger Boisjoly. He rallied Morton Thiokol's engineers and tried to stop the management from issuing the go ahead for the launch. After the disaster, he assisted with the investigation by testifying his findings to the presidential commission responsible for reviewing the disaster. Even though he was shunned by his colleagues and eventually was forced to resign his position and leave the company, he changed the mindset around whistle-blowers and issued a new era of transparency.[10]. In 1988, Roger Boisjoly was given the Award for Scientific Freedom and Responsibility by the American Association for the Advancement of Science.[11]. We believe that despite the fact that Roger Boisjoly was initially shunned by his colleagues, the effort he put into ensuring the future safety of space travel combined with the fact that he received the Award for Scientific Freedom and Responsibility showed that he was successful in changing the people's view on the importance of engineers and safety.

[8] Crane, Rachel. "30th anniversary: How the Challenger disaster changed NASA". CNN.com. CNN., 2016. Web. 31 Jan. 2016.

[9] Crane, Rachel. "A Chronology of Defining Events In NASA History, 1958-1998". nasa.gov. NASA., 2012. Web. 31 Jan. 2016.

[10] Boisjoly, Roger. "Ethical Decisions - Morton Thiokol and the Space Shuttle Challenger Disaster". onlineethics.org. N.p., 15 May 2006. Web. 31 Jan. 2016.

[11] Boisjoly, Roger. "The Challenger Disaster". onlineethics.org. N.p., 15 May 2006. Web. 31 Jan. 2016.

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