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DAT 250

Written Assignment 2

Launch Delays

The original launch date of mission STS-51-L that planned to launch Space Shuttle Challenger into space was January 22nd, 1986 (Presidential Commission, 1986). To accommodate a simulation for mission 61-C, mission 51-L needed to be postponed until January 23rd. Further complications led the Program Requirements Change Board to delay the launch from the 23rd to the 25th, and subsequently from the 25th to 26th due to “Kennedy work requirements” (Presidential Commission, 1986). On the window of launch for the 26th, the forecast presented unacceptable weather conditions and was postponed another time until the 27th. The 27th was interesting because of a handle that had to be mechanically removed manually. A technician was not able to remove it, so they requested power tools. Upon receiving the power tools, the batteries were dead and “the affair started to look like a rerun of The Three Stooges” (McDonald, 2009). They eventually resorted to a hacksaw. By the time the handle issue was resolved, a weather front had again arrived with strong crosswinds that would prohibit the space shuttle from launching and again postponing the date until the 28th.

Pressure to Launch and Concerns Raised by Roger Boisjoly

After the launch was scrubbed on the 27th at around noon, it was known at around 2:30 PM that cold temperatures were imminent for the launch day the next day by Roger Boisjoly, an engineer at Morton Thiokol (Presidential Commission, 1986). This was then communicated to upper management of Morton Thiokol at around 4:00 PM. Upon receiving this news, Allan

McDonald, director of the Solid Rocket Motor (SRM) Project at Morton Thiokol, voiced his concerns about the O-rings and cold temperatures to Cecil Houston, a Resident at NASA Marshall Space Flight Center (MSFC) at around 5:00 PM (Presidential Commission, 1986). Boisjoly, who was also the “chief seal expert on the O-ring Seal Task Force”, along with Arnie Thompson, and Brian Russell prepared about a dozen or so charts to communicate their reasoning for their concerns to NASA at around 9:00 PM. Bob Lund, Vice President of Engineering at Morton Thiokol, concluded their presentation by stating that O-Ring temperatures “must be equal to or greater than 53 degrees at launch” (McDonald, 2009). Lawrence Mulloy, NASA Solid Rocket Booster (SRB) Project Manager at Huntsville, “immediately said he could not accept the rationale that was used in arriving at that recommendation” (McDonald, 2009). George Hardy, Deputy Director of Science and Engineering at NASA/MSFC also said he was “appalled” that Thiokol could make such a recommendation (McDonald, 2009). Mulloy then shouted, “My God, Thiokol, when do you want me to launch, next April?”, “the eve of a launch is a hell of a time to be generating new launch commit criteria!” (McDonald, 2009). McDonald “had never heard George Hardy speak so harshly” and although he “had heard Larry Mulloy talk that way before”, it was always to challenge every detail of why it was safe to fly, but never to challenge why it was unsafe to fly.

Launch Decisions

Joe Kilminster, vice president of Space Booster Programs at Morton Thiokol then asked for a 5-minute caucus. During the caucus, Allan McDonald was not present. Jerry Mason began by saying “we need to make a management decision” (McDonald, 2009). Arnie Thompson and Roger Boisjoly continued to persist with photographs of “jet-black soot” observed from previous flights, exclaiming “Look *carefully* at these photographs! Don’t ignore what they are telling us,

namely, that low temperature causes more blowby in the joint!” (McDonald, 2009). Almost completely disregarding the opinions of Morton Thiokol engineers (including a handful more engineers that were in favor of Boisjoly and Thompson), Jerry Mason persisted, “Am I the only one who wants to fly?” claiming that they were “just going over and over the same information”, and that “it’s time for a decision” (McDonald, 2009). Then Jerry Mason asked 3 other senior people, Joe Kilminster (Vice President of the Space Booster Program at Morton Thiokol), Calvin Wiggins (Vice President and General Manager, Space Division at Morton Thiokol), and Robert Lund (Vice President of Engineering at Morton Thiokol) for their opinion. It is important to note that Jerry Mason was Wiggins’ boss and Wiggins was Kilminster’s boss and they gave their support (McDonald, 2009). Lund, the main representative for the engineers, was the only one to remain silent. Mason then told Lund that “it’s time for you, Bob, to take off your engineering hat and put on your management hat.” Lund then agreed and time decision was made to launch.

Allan McDonald Objections

In another meeting with Allan McDonald after the caucus was over, Allan McDonald vehemently opposed the decision claiming that “if anything happens to this launch, I wouldn’t want to be the person that has to stand in front of a Board of Inquiry to explain why we launched this outside of the qualification of the solid rocket motor or any Shuttle system.” (McDonald, 2009). Allan McDonald even went as far to say that if he were the Launch Director, he would “cancel” the launch citing two more reasons, the inability to recover lost parts and ice formation (McDonald, 2009). Unfortunately, McDonald was told “But, Al, they really aren’t your problems”, “You really shouldn’t concern yourself with them.” (McDonald, 2009).

Rogers Commission Report

In the hearing for the Rogers Commission Report several weeks later, Mulloy was asked by the Commission, “So, as far as you knew, based upon what said, it seemed to be unanimous view of the Thiokol people on the telecom that they were recommend no-launch?” which Mulloy replied “At that point in time, yes, sir.” (McDonald, 2009). Although, he continued to talk about how Allan McDonald made a point about the secondary O-ring being in “proper position to seal if blowby of the primary O-ring occurred”, where “this comment by McDonald was perceived, I believe by all parties ... as a support point for a positive launch recommendation, or at least a positive point.” (2009, McDonald). Boisjoly also testified and said that “there was not one positive statement for launch ever made in that room” (Presidential Commission, 1986).

Stance

With 7 passengers dead in a terrible explosion of massive amounts of fumes, we all wonder what could have gone wrong and what small changes would have prevented the Challenger incident from happening. Technically, it would be impossible to prevent this disaster as the disaster is now in our past. But through this disaster, it is of utmost importance to take the lessons learned from this incident so that other tragedies can be prevented. Through these lessons, is it possible to learn how to avoid all tragedies from here on out? Still, that is unrealistic. However, there were some obvious points of where members involved in mission 51-L violated ethical principles. Had these ethical principles been established and applied in these situations, it would absolutely prevented the disaster from happening but would further close the gap for any possibility of an incident to occur for future missions. Unfortunately, there were violations of ethical principles by a number of people throughout the incident.

Violation of Act Utility

One of the clear ethical principles that were violated was Act Utilitarianism. Act Utilitarianism focuses on the consequences of all things considered and totals the amount of positive outcomes against the negative outcomes and states that the action that maximizes the net total amount of positives (or minimizes the amount of negative outcomes) is the morally righteous action (Quinn, 2020). Most will agree that the lives lost from the Challenger incident should never be weighed and the pain and suffering that happened as a result will almost outweigh any other positive outcome. Even though the Challenger incident led to a very important lesson, it should still be infinitesimally small compared to the intensity, purity, and extent of the pain suffered from the disaster. Unfortunately, a few of the senior management from Morton Thiokol and NASA tolerated a level of risk and did not properly assess the consequences of their actions, therefore failing to properly apply the Act Utilitarian framework. The few benefits that the Mason and Mulloy might have imagined, just to play devil's advocate, could be the increasing capital from the promise of contracts after showcasing more successful launches, increase in individual salary for having more successful launches on their resume, increasing reputation in society as the launch was to be broadcasted and endorsed by President Reagan which "was supposed to announce the inclusion of a school teacher" in his State of Union Speech, and also the competitive dominance in the international race to space and nationalistic pride (Altabbakh, Murray, Grantham & Damle, 2013). Had any of the uppermanagement at Morton Thiokol or Lawrence Mason carefully sat down to weigh the consequences of each outcome, despite the constant delays and pressure to launch, no matter how you calculate it, it would never compute to trade the lives of 7 individuals, nor would it even

justify the risk because surely the ability for a few individuals to completely control the outcome of launch decision would surely lead to another catastrophe.

Violation of Virtue Ethics

Another ethical framework that was consistently violated was Virtue Ethics. Virtue Ethics does not focus on the consequences but rather states that a good person does “the right thing at the right time for the right reason” (Quinn, 2020). One important motive to do virtuous things is for “genuine fulfillment and happiness” (Quinn, 2020). Both Jerry Mason and Larry Mulloy, after hearing the presentation from the engineering team that included Roger Boisjoly, were visibly and verbally against anything that would further delay the launch. It is certainly understandable to be upset that a launch had to be delayed again, but it was not virtuous for Mason or Mulloy to influence the opinion of others, especially with their positions of power in the decision. They violated the Virtue Ethics framework by disregarding the opinions of others but also violated it through compromising the integrity of the voting process by tarnishing the pure opinion of Robert Lund, asking him to “take off his engineer hat and put on his management hat” (McDonald, 2009). It was also evident that Jerry Mason seemed to view Roger Boisjoly’s opinions as inferior and not significant, even as Boisjoly vehemently explained, with photographs, why it was dangerous to fly at low temperatures. Surely, Jerry Mason could not have a fulfilling and happy relationship with any of the engineers, even if the launch was successful. It would be completely dysfunctional for Jerry Mason and Larry Mulloy to work together if Mason invalidated the hard work of engineers with just one teleconference. The decision for Mason to completely ignore and invalidate Boisjoly’s opinion and role, as well as the entire engineering team was a clear contradiction to virtue. Additionally, Robert Lund also did not fully adhere to virtuous principles. Even for Robert Lund, a successful mission would not

justify his decision to ultimately betray the opinions of his entire team. He lacked virtue in the sense that his opinions should represent the voice of the engineers in their totality. His agreement to go forward with the launch was clearly misaligned with the engineers as a team. This relationship would not have cultivated a sense of leadership or trust among the engineers. Had Mason, Mulloy, or Lund exercised good virtue, the Challenger incident would have been prevented.

Moral Responsibility for Morton Thiokol Engineers

Morton Thiokol engineers did almost everything that they could have possibly done to avoid the Challenger incident. After the first delay that was made official at 12:00 PM on the 27th, that marked the starting point of flight readiness preparation for all of those involved. Only 2 hours after, Roger Boisjoly immediately voiced his concern by making the necessary calls to people and initiating conversation among the senior managers. From the very beginning, Boisjoly knew exactly what could go wrong and presented it along with support from other engineers using concrete evidence for his conclusions. Boisjoly. Additionally, Boisjoly was anything but quiet when his claims were being questioned by upper management, exclaiming “Look *carefully* at these photographs! Don’t ignore what they are telling us, namely, that low temperature causes more blowby in the joint!” (McDonald, 2009). Robert Boisjoly did the most virtuous action for his position at the company, which was to be an active participant, an initiator of conversation, and an expert of his craft. Additionally, Boisjoly properly calculated the consequences of the possible outcomes and determined the best utilitarian moral decision, which was to advocate for not launching.

Moral Responsibility for Thiokol Senior Management

Thiokol senior management at the time included Robert Lund, Joe Kilminster, Jerald Mason, and Calvin Wiggins. All four of these managers were presented with the information that Roger Boisjoly had prepared concerning the danger of low temperature and O-rings. It was completely inappropriate to approve a launch where any engineer had even a suspicion that something could go wrong even if it was inconclusive, especially because it was the engineer's job to build and test the reliability of the system. Although Jerry Mason was the one that put pressure on everyone else, it was still not acceptable for the other senior managers to agree with him and sign a recommendation for launch. Mason violated many principles of virtue, which included not maintaining integrity of the voting process. Even though he eventually got all senior members to sign, it was clear that the signatures did not represent their pure opinion. It was also unvirtuous for Kilminster and Wiggins to allow their conflict of interest, which was to stay loyal to Mason's decision for sake of losing their job to affect their vote (Mason was Wiggins's boss and Wiggins was Kilminster's boss) (McDonald, 2009). Additionally, they did not consider the utilitarian outcome. Any risk of failure of the O-rings should have presented itself as a catastrophe and inevitable death of the 7 onboard. The four managers failed to see the most utilitarian outcome, which was to not recommend launching if they were able to prove beyond a shadow of doubt that a failure was not possible.

Moral Responsibility for NASA Management

The managers from NASA that were mainly involved were Stanley R. Reinartz, Lawrence Mulloy, and George Hardy. It was not clear that Hardy or Reinartz heard the full presentation from Roger Boisjoly, but Mulloy was in the conference, implied from the responses written in McDonald's book. It was also likely that Reinartz heard the presentation because when

Allan McDonald arrived at 8:45 PM, Reinartz was already there (McDonald, 2009). Both Reinartz and Mulloy clearly knew about the objections from Morton Thiokol because Allan McDonald had expressed his opposition after the caucus at around 11:15 PM (Presidential Commission, 1986). When reporting up the chain of command to Arnold Aldrich, the concern about O-rings was not even mentioned (Presidential Commission, 1986). When relaying that information to Dr. Lucas, who was not even part of the chain of command, he was told that “it had been concluded agreeably that there was no problem, that he had a recommendation by Thiokol to launch and our most knowledgeable people and engineering talent agreed with that” (Presidential Commission, 1986). The deceitful nature of these communications was a clear violation of the virtue of honesty and transparency, a trait that was of utmost importance to prevent the disaster. Although NASA had gotten the signatures from Morton Thiokol, concerns about temperature should have been communicated to as many people as possible and with as much detail as possible as well. The virtuous action would be to allow any engineer’s concern from any sector of NASA and its contractors to voice their concern and allow their opinions to be heard through all pipelines of communication. Rather, these concerns were concealed and hidden by Reinartz, Mulloy, and Hardy.

Bibliography

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