Management Ignores Engineers’ Objection to the Launch of The Challenger Space Shuttle

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ABSTRACT

This paper focuses on the Challenger Space Shuttle disaster and the ethical decisions that led to it. For a project to succeed, the project manager must navigate between the triple constraints of scope, schedule, and budget. The conclusions of the Rogers Commission Report identified a fourth constraint- human factor. Schedule and budget were kept, but not all aspects of the scope were assessed objectively. The human factors included subjective decisions made by individual people in the leadership of both Thiokol and NASA. Before the 25th launch of the shuttle, the engineers had checked and found problems with the seal on the O-Ring and new parts were ordered. NASA limited the time so that they could refurbish the launch pad in time to send the next probe to Haley’s comet before the Russians. The parts were expected to arrive several months later. The engineers at Thiokol and one NASA manager opposed the launch due to concern of temperatures impacting the O-Rings. The engineers adhered to the Code of Ethics for Engineers regarding safety of the public above all else, and refused to sign off on the launch, but both Thiokol Corporation management and NASA’s management decided to proceed with the launch.

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On January 28, 1996, the Space Shuttle Challenger exploded just 73 seconds after launch, killing all six astronauts on board and one schoolteacher. An investigation was launched immediately to understand the causes for this explosion. The investigation concluded that the immediate cause was a technical failure of a part, the O-Ring, that did not hold up to the pressures and cold temperatures expected on the launch date. The O-Ring was engineered by the Thiokol corporation. Further interviews with the engineers from Thiokol concluded that this technical failure was foreseen and that human factors led to this tragic outcome.

Before the Challenger disaster, there were twenty-four successful launches. The engineers from Thiokol checked the shuttle after every mission and stated that there were issues and problems with the O-rings as well as the temperature expected at launch date of the space shuttle. The engineers concluded that the seals of the O-Rings were slowly eroding and needed to be replaced. New parts were ordered, but the parts would “take many months to manufacture” (Department of Philosophy and Department of Mechanical Engineering, p. 5).

There was a strict schedule constraint for the launch of the space shuttle. NASA did not want any more delays. NASA needed to have the launch pad reconfigured in time for a different mission; to carry a probe to study Haley’s comet a few days before the Russia’s own probe (Department of Philosophy and Department of Mechanical Engineering, p. 3).

Many engineers either knew or suspected that there were going to be problems with the O-Rings at the temperature the morning of the Challenger launch. The engineers tried to communicate their concerns to their superiors, but in the end, were ignored. There was a teleconference with Thiokol and NASA’s management before the launch to discuss their concerns of the engineers privately. Jerald Mason, a senior executive at Thiokol, after a few minutes of discussion “finally turned to Bob Lund, Engineering Vice President at Thiokol and said, “Take off your engineering hat and put on your management hat” (Department of Philosophy and Department of Mechanical Engineering, p. 6). Joe Kilminster, an engineer in Thiokol management, went back to the conference and recommended the launch. In the Rules of Practice from the Code of Ethics for Engineers, it states that “if [the] engineers’ judgement is overruled under circumstances that endanger life or property, they [the engineers] shall notify their employer or client and such other authority as may be appropriate” (National Society of Professional Engineers, p. 1). Thiokol engineers were convinced that they should delay the launch but there was no process in place that allowed for the engineers to communicate- that the operation should be terminated- directly to the client (NASA), as required in the Code of Ethics for Engineers. Alan McDonald, one of the people present at NASA management in Florida, expressed his concerns with Thiokol’s decision of recommendation to NASA management, who in turn, still decided to approve of the launch (National Society of Professional Engineers, p. 6).

Worries involving money and revenue took precedence over safety. NASA and the government put immense pressure on Thiokol Corporation. They were strict on the time of the launch and were clear that if everything was not done on time, then they would find another company and Thiokol in return would lose a lot of money and “potential revenue should they disagree with NASA” (Jeff Forrest, 2009). The first rule of the Fundamental Canon in the Code of Ethics for Engineers states that “engineers, in the fulfilment of their professional duties, shall: 1. Hold paramount the safety, health, and welfare of the public.” The decisions made by, Jerald Mason, an engineer at Thiokol, to recommend the launch violated this code.

The main problems in the Challenger disaster involve difficulties in scheduling, budget, communications, and ethical decisions. In order to understand the moral and technical decisions, as well as the outcomes of the investigation of Challenger disaster, it is important to study and look further into the reasons and outside pressures that occurred. Not one party can be held responsible for what happened, but that does not mean that no one was at fault. The Rogers Commission Report was published and released to the public and is now taught in Ethics classes worldwide. The managers in management companies study this event to make certain that similar events do not happen to them. Engineers and management need to work together in order to ensure that projects come out successfully. In order to continue to send humans into space for future missions, safety must be the top priority, and it can be achieved only when all parties involved, especially the engineers and their managers, abide by the code of ethics.

References

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