CS 307 Homework I

Spencer Douglas

Question 1 - Carmen

4.05/4.06

Though it can be said that Carmen made her decision in line with 4.03--based on merit and not her partnership with ImagiCorp--she failed to disclose the unavoidable conflict of interest inherent in being a partner for a company which she has been asked to evaluate. She should have informed the company which hired her to make the evaluation so that they could decide if she was the best to make the recommendation.

1.06

Carmen's decision, being one made for a hospital, is an important one which will affect the general public. Though she was fair in her decision making process, the company which hired her sees her as an unbiased advisor and is unaware of her association with ImagiCorp, an unfair factor involved in her suggestion.

Question 2 - Boeing

The Boeing Company, an American aerospace company well-known particularly for their airliners, has been in the public spotlight since October 2018 due to a design flaw on their 737 MAX Airliner which led to two major plane crashes which killed everyone on board in both cases. This resulted in a combined death toll of 346 people in the span of just 5 months. After the second crash, all 737 MAXes were grounded to prevent further incidents. The first crash occurred a mere 19 months after the airplane received its FAA clearance allowing it to fly in the US and internationally. As of January 2020, it appears this will remain the case until at least mid-2020. No clear schedule has been publicly established.

Following investigations into the crashes, it was determined that the crashes were caused due to design oversights on Boeing's part. A system installed on the airliners, called MCAS, was designed to aid in autopiloting the plane. Sensors on the jet would detect if the angle of attack (the angle at which the airplane is flying) needs to be adjusted to prevent the nose of the airplane from climbing too high above the horizontal. This system would signal the rear stabilizers on the plane to adjust to bring the nose of the plane forward. However, despite at least 5 pilot complaints lodged about issues with the 737 MAX--including those specifically addressing the MCAS issue which would prove to be a fatal flaw--Boeing did not make design changes to correct issues, a clear violation of principle 1.03 of the SE code of ethics. Boeing failed to "approve software only if they have a well-founded belief it is safe, [perform as expected, or cause harm]."

Boeing's responsibility for the crashes can be attributed to a major oversight in the interdepartmental development process in which engineers had removed one of the sets of sensors on which the system for detecting the angle of attack of the plane relied. The assumption of the engineers was that there would be two sets of sensors, but Boeing failed in their management to properly disseminate this information to those working on the MAX, a failure to abide by principle 5.01. As a manager, you are directly responsible for those who work under you's work, and as a result, any harm they cause. By failing to disclose this important bit of information, the MCAS system was flawed--in both of the aforementioned deadly crashes, one of the sensors that the system used was broken and caused the planes to nose-dive.

In addition to knowing that this problem existed, Boeing actually *rejected* a safety system that was meant to address the issue in order to keep costs down. What's worse, they deliberately tried to mask the system's existence so that additional training measures were not necessary for pilots, arguing that since the system was meant to be automated in the first place, the pilots need not know how to operate it. Both of these actions clearly demonstrate how Boeing failed to abide by principle 6.05, putting their own interests (rolling out the new MAX as quickly as possible) ahead of the public's well being. Additionally, the latter is an example of being deliberately misleading about the characteristics of the system for their own interests, described in 6.07.

Since the crashes, Boeing has been entrenched in controversy and have been very much in the public eye--and rightfully so. As tragic as these crashes are, they are a tremendous reminder of why it is so important as an engineer to abide by a code of ethics and follow this code in the workplace. Boeing failed to work as a cohesive team, piecing different components of the plane together in segmented teams, and as a result the final product was flawed. When they realized this, they did not act in the interest of the public and correct their mistakes; they tried to cut costs and rush their product out by making the system rely on less hardware, more aggressive, and hidden from its wouldbe pilots. What resulted was clearly not a better product, and as a result, 346 people are dead. It's easy to think as software engineers that since what we make is not tangible that it cannot directly cause physical harm--but that is far from the reality. As software engineers, we have just as much of a responsibility to uphold the public wellbeing as any other engineering discipline, and the tragedies of the 737 MAX crashes should serve as a reminder of that--to Boeing and to all of us.

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