Assignment 4

Failure in the code of ethics

The tragic accidents of Boeing 737Max have taken away nearly 350 lives. After carefully studying and analyzing the two similar accidents, the conclusion is that dozens of failures in the engineering code and ethics finally leads to the catastrophe. The accident made the whole aviation industry relearn the importance of strictly applying safety measures. As the engineering code of ethics defined "Engineers should paramount the safety, health and welfare of the public"[1]. In this case, Boeing allows the malfunctioning alerting system for MCAS to be an option for all airline companies. Therefore, based on the nature of the commercial company, profit is always the top priority and important safety feature is not installed on an airplane which directly caused accidents. The ignorance of the importance of safety, in the end, resulted in severe accidents. In contrast, Boring's opponent Airbus had set up a system with an excess amount of validation. Two to Three computers are assigned to the same task and an action will execute unless all the computers are in full agreement [2]. Therefore, Boeing failed in this code of ethics because compares to safety, Boeing thinks lower price and their effect in increasing sales is more important. Moreover, FAA, Federal Aviation Administration, is a Regulatory body responsible for establishing a national standard and ensuring that every company is consistently implementing the standards-based engineering code of conduct [2]. In theory, FAA should qualify and disqualify products based on the standards and codes. But in the case of Boeing 737MAX, Boeing as a commercial company persuaded FAA to set the MCAS safety system as an option, which betrays the codes and ethics and the original duty of the regulatory body. [3] Thirdly, the disclosure made by engineers is not treated properly by Boeing. Before the accident, there are two known disclosures made by engineers cautioning about the negative effects of introducing a new system into the airplane but without being required to re-training the pilot. [4] Due to the cost and consequences of the extended releasing date, the request for change and disclosure is being ignored by Boeing. In this case, the code of ethics being ignored is that companies should encourage engineers to stand up and reveal the proper concern during the development stage for the safety of the public. Furthermore, Boeing is not properly responding and dealing with the issue being pointed out. When the first accident occurred, Boeing did not immediately postpone all the Boeing 737 MAX flights and immediately start the investigation. [5] But instead state the accident is due to the insufficient training of the crew member and the improper procedure before the accident. [4] It is clear that Boeing ignores the suggestion from the engineers and do not take responsibility for their system, all the actions go against the engineering code of ethics. Last and most importantly, Boeing has the

responsibility to communicate with the pilot about the change in the design and how to react in an emergency. The accident is also because the crew member does not have training from Boeing about the proper reaction when MCAS is not working properly. On the other hand, a company should rigorously unit test their product before the release to the customer. The cases of Boeing 737 max have shown the pressure from society and its main competitor Airbus causes a significant negative impact on Boeing's decision. Therefore, the rush in the progress finally leads to the accident, which goes against the code of ethics that the company should protect the public welfare. As the accident revealed, Boeing had failed in a handful of codes and ethics which finally leads to the accident in the end. The unfortunate accident has again emphasized the importance of following the code of ethics and the possible consequence when codes are ignored

Knowledge Base	Understanding of concepts in mathematics	Aircraft is an art of mathematics. All the current airplane is validated by the formula before it is assembled.
	Understanding of concepts in natural science	The weather is an important concept in flying an airplane. Forecasting has significantly improved the safety of current airplane. This attribute failed because of the underestimation of malfunction of MCAS due to the cold weather.
	Understanding of engineering fundamentals	Engineering fundamentals are applicable because the engineering concept is applied during the manufacturing process. Without the engineering fundamentals, the airframe and all its systems will not be proven to be safe. In this case, this is failed because no safety measure is implemented after the malfunction of MCAS.
	Understanding of specialized engineering knowledge	This attribute is also applicable. Because all the industry has their

		specialty and aerodynamics is for instance a specialized engineering knowledge in aviation.
Problem analysis	Formulate problem statement	This is relevant because when studying the problem in the 737 max, engineers must first formulate the possible problem in it. Then, investigation needs to further scope down the problem. This is successful because some engineers point out the problem.
	Develop models to solve engineering problem	All the engineering problem can be made into models. The models can help us to stimulate what happened exactly during the accident. This attribute failed because there is not follow up model after engineers pointing out the problem.
	Critically evaluate solutions of engineering problems	This is relevant because the possible solution can be proposed after the problem is being carefully evaluate. In most cases, the evaluation will point out the key factor that leads to the accident and in the case the key is the malfunctioning MACS.
Investigation	Design experiments to investigate the problem	This is important because sometimes things are perfect in theory but not in reality. It also helps the people to learn what exact occur during the accident.
	Gather information from relevant sources	Other experts might know more about a problem and its possible solution. Gather information from

		other source can expand the insights on a problem. This is failed at first because Boeing didn't learn the solution used by Airbus and later similar system is applied in developing the newer version of 737 MAX.
	Synthesize information from multiple sources	In most cases, information is not prepared for the specific cases one is looking for. Therefore, synthesize multiple sources will help experts to gain a more comprehensive understanding. In this cases thorugh reading the data from the black box.
Design	Define design requirements and specification	This is relevant because the design requirement for 737 max is to fit the new engine into the old airframe. As we've learned, this is the root of the accident. This attribute also failed because 737 airframe is no longer capable of hold the latest engine.
	Generate and refine potential solutions	In the accident the malfunction alerting system for MCAS is proposed as the solution. The solution is effective but not strictly enforce which cause the accident. This failed because the alerting system is set as optional.
	Critically evaluate and compare design choices	This is important because if the engineer can critically evaluate the current problem, the severity of malfunctioning MACS will appear. Therefore, a better solution might

		be proposed and avoid the accident. This failed because there is no backup solution after MCAS failed and the design used by Airbus is not being referenced.
Use of engineering tools	Select appropriate engineering tools	Using the proper engineering tool will help an engineer to systematically evaluate the system. In this case, this is successful because some engineers had found the deficiency in MCAS.
	Create and/or modify appropriate engineering tools	Some tools might be used for other purposes but might also work in these cases. Therefore, this attribute is relevant to help solving the problem.
	Use engineering tools appropriately	Even if the tool is correct, incorrect result will be generated if interpreted differently. Therefore, having the tool is important, it also more important to use it properly.
Individual and team work	Contribute as an active team member	Aviation requires group works to finish the task. If members are not active, the job will be done incorrectly and leads to accident. In this case, Boeing failed in this attribute because it does not actively update the problem in MCAS.
	Collaborate with others to complete tasks	As mentioned above, collaboration is important in large project. Moreover, learning from other's successful experience will make the task completed in a better way. This is failed because Boeing does

		not work with other companies to solve this issue.
Communication skills	Generate appropriate documentation to communicate	This is important when working in a large group. People needs document to quickly understand part of the system.
	Orally resent information within the profession and to society at large	This is important to quickly update on a subject.
	Interpret information including instruction	This is important because one must understand the instruction before starting on the project. In this case, it failed because the one who is responsible for MCAS does not understand the importance of MCAS and does not rigorous test the system.
professionalism	Articulate the roles and responsibilities of the professional engineer in society	One should be responsible for his project and his work. In the cases, the attribute failed because Boeing is not responsible for the aircraft it releases to the market.
	Describe the importance of codes, standards, best practices, laws, and regulations	The standard defines the least amount of safety measurement a company needs to achieve. But in this case, the attribute failed because Boeing persuade FAA to trust 737 MAX is safe to fly.
Impact of engineering	Identify the relevance of and uncertainty associated with the different aspects(health, safety, social and cultural)	This attribute is not being paid with careful attention, because the possibility of failing MACS doesn't make Boeing to add instructions on how to respond under an emergency.

	Analyze the social health safety and environmental aspect of an engineering project, incorporating sustainability consideration	This will help the society to grow better in a clean and sustainable way.
Ethics and equity	Identify ethical and unethical behaviour in professional situations	Ethical behavior will help the company develop product in a good manner and identifying the unethical behavior will avoid the possible consequence. But in these cases, the whistle blower is being ignored so this attribute is considered as failing.
	Identify how an engineer is accountable to multiple stakeholders in engineering practice	Not only to the company, but the stakeholder also includes government and general public, engineers should be responsible to make the product safe to use. But in this case, only part of the stakeholder is taken into consideration.
	Identify equitable and inequitable situation and behaviours	This will help to develop a healthy working environment. But in this case, it failed because the disclosure made by engineers is being ignored.
Economics and project management	Apply project management techniques in engineering projects	This will help the project to finish in an organized manner. But is not related to Boeing 737 Max cases.
	Perform economic analyses of engineering project with attention to uncertainty and limitation	In this case, the economic factor weigh over the importance of safety and finally cause the accident.
Lifelong learning	Identify gaps in their knowledge skills and abilities	This is relevant because the design can be further improved only after the designer understand his capability. This will further help

		him to design the solution with the focus in the possible issue.
	Obtain and evaluate information or training from appropriate sources	Learning from others is always important to help a person be more successful. Aviation requires a ton of collaboration and learning before an airplane can be assembled.
	Reflect on the use of information or training obtained	Thinking about other's advantage and then learn from others is the best way to improve oneself. Nobody is perfect, but progress can be made to attempt making a near perfect product. This attribute failed because Boeing does not reflect on why Sirbus needs so many safe measures on their system.

Reference

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