

Failed Analytics Project of Boeing 737 MAX

Boeing 737 MAX before its failure:

Before the two crashes of the Boeing 737 MAX planes in 2018 and 2019, Boeing was a highly respected company with a long history of innovation and leadership in the aviation industry. The 737 series was one of Boeing's most successful aircraft, with over 10,000 units sold since its introduction in 1967. The 737 MAX was introduced as a modernized version of the 737 series, with advanced features such as fuel efficiency, increased range, and improved passenger comfort.

Boeing was also known for its commitment to safety and quality, and the company had a strong reputation for engineering excellence and innovation. In fact, the Boeing 777 and 787 aircraft had received numerous safety awards and were widely regarded as some of the safest and most advanced commercial aircraft in the world.

Boeing was also a major player in the global aviation industry, with a strong presence in markets around the world. The company employed over 150,000 people worldwide, and had revenues of over \$100 billion in 2018. With its long history of success and leadership in the aviation industry, Boeing was widely considered to be a model of innovation, engineering excellence, and corporate leadership.

Boeing, one of the world's largest aerospace companies, has been in the spotlight in recent years due to the issues with the 737 MAX aircraft. This aircraft has been involved in two fatal crashes, resulting in the loss of hundreds of lives. The crashes have been attributed to several factors, including design flaws, software issues, and problems with the certification process. While there are many factors that contributed to these crashes, one significant factor was the failure of Boeing's business analytics projects to identify and address safety risks.

What caused 737 MAX aircraft failure?

One of the contributing factors to the crashes of the Boeing 737 MAX aircraft was the company's failure to adequately address safety risks through its business analytics projects. Boeing relied heavily on data and analytics to design and develop the 737 MAX, but it appears that they did not adequately assess the potential risks associated with the aircraft's new design features.

One critical feature of the 737 MAX was the Maneuvering Characteristics Augmentation System (MCAS), which was designed to automatically adjust the angle of the aircraft's nose in order to prevent it from stalling. The system was designed to rely on data from a single sensor, which could provide inaccurate readings if the sensor malfunctioned. This meant that if the sensor provided incorrect information, the MCAS could potentially cause the aircraft to enter an uncontrollable dive.

Boeing's business analytics projects may have failed to fully consider the potential risks associated with this design feature. They may have relied too heavily on the data and not adequately assessed the potential risks associated with relying on a single sensor. In addition, they may not have adequately tested the MCAS system to ensure that it worked as intended and did not introduce new risks.

Furthermore, it appears that Boeing did not provide adequate information or training to pilots on how to deal with the MCAS system. Pilots were not informed of the system's existence, and were not trained on how to disengage the system in the event of an emergency. This lack of transparency and communication may have contributed to confusion and miscommunication among pilots, which could have contributed to the crashes.

Boeing has acknowledged that there were issues with the MCAS system and has taken steps to address these issues. They have made changes to the system to ensure that it relies on data from multiple sensors and cannot cause the aircraft to enter an uncontrollable dive. They have also committed to providing better training and information to pilots on the MCAS system.

What are the consequences of the crash?

The cost of the crashes involving Boeing's 737 MAX aircraft has been significant. The crashes resulted in the loss of 346 lives and had a devastating impact on the families and loved ones of the victims. In addition to the human toll, the crashes have had significant financial and reputational costs for Boeing.

After the crashes, the 737 MAX was grounded by aviation authorities around the world, which resulted in significant financial losses for the company. The grounding of the aircraft forced Boeing to halt production of the 737 MAX, which had a significant impact on its supply chain and the broader aerospace industry. According to a report by CNN Business, the cost of the grounding and production halt was estimated to be around \$20 billion.

Boeing has also faced significant legal and regulatory challenges in the aftermath of the crashes. The company has been the subject of multiple investigations, including by the US Congress, the Department of Justice, and the Federal Aviation Administration (FAA). These investigations have resulted in significant fines and penalties for Boeing. In 2020, the company agreed to pay \$2.5 billion to settle a criminal investigation into the crashes.

In addition to the financial costs, the crashes have had a significant impact on Boeing's reputation. The company has faced criticism from regulators, lawmakers, and the public for its handling of the 737 MAX and its response to the crashes. The incidents have damaged the company's reputation as a leader in the aerospace industry, and have eroded trust in the company among its customers and stakeholders.

Overall, the cost of the crashes involving Boeing's 737 MAX aircraft has been significant, both in terms of the human toll and the financial and reputational impact on the company. The incidents have highlighted the importance of safety in the aerospace industry, and have underscored the need for companies to ensure that their business analytics projects adequately assess and address potential risks.

Contribution of different phases causing failure:

The failures that contributed to the Boeing 737 MAX crashes were a result of issues in multiple phases of the analytics lifecycle, including the discovery phase, data sourcing and preparation phase, and the model planning phase.

1)Discovery Phase: During the discovery phase, Boeing may have failed to identify and fully understand the potential risks associated with the Maneuvering Characteristics Augmentation System (MCAS) and its interactions with other systems on the 737 MAX. This failure could be attributed to inadequate testing, incomplete data, or a lack of emphasis on safety as a top priority.

2)Data Sourcing and Preparation Phase: Boeing may have also failed to source and prepare the appropriate data for use in developing the MCAS. For example, there were reports that Boeing relied on a single angle-of-attack sensor to feed data into the MCAS, which could have led to faulty readings and contributed to the crashes. This issue could be attributed to poor data sourcing and preparation practices, as well as a lack of consideration for the potential impact of faulty data on the performance of the MCAS.

3)Model Planning Phase: Finally, during the model planning phase, Boeing may have failed to fully understand the potential consequences of the MCAS malfunctioning or operating improperly. This could be attributed to a lack of thorough risk assessment, inadequate testing and validation of the MCAS

software, and insufficient consideration of the potential impact of the MCAS on the overall performance of the aircraft.

Overall, the failures that contributed to the Boeing 737 MAX crashes were a result of issues throughout the analytics lifecycle, from the discovery phase through the model planning phase. The lessons learned from this tragedy highlight the critical importance of robust risk management, effective governance and oversight, transparency and communication, and continuous improvement in the use of business analytics and other decision-making processes in industries where safety is a top priority.

What are the lessons learned?

The crashes of two Boeing 737 MAX planes in 2018 and 2019, which resulted in the deaths of 346 people, were a tragic and sobering reminder of the importance of safety in aviation. Investigations into the causes of these crashes revealed a number of failures across various aspects of the aircraft's design and operation, including issues related to the use of business analytics in the development and testing of the plane's Maneuvering Characteristics Augmentation System (MCAS).

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Robust Risk Management: One of the key lessons learned from the Boeing 737 MAX crashes is the importance of robust risk management practices. This includes identifying potential risks early in the development process, conducting thorough risk assessments, and implementing appropriate risk mitigation strategies. In the case of the MCAS, Boeing failed to fully understand and mitigate the risks associated with this system, which contributed to the crashes.

Effective Governance and Oversight: Effective governance and oversight are critical to ensuring the safety and reliability of complex systems such as commercial aircraft. This includes establishing clear lines of authority and responsibility, implementing rigorous testing and validation procedures, and ensuring that all stakeholders are accountable for their actions. In the case of the 737 MAX, there were issues related to the oversight of the certification process and the role of regulatory authorities in ensuring the safety of the aircraft.

Transparency and Communication: Clear and open communication is essential to ensuring that all stakeholders are aware of potential risks and are able to make informed decisions. In the case of the 737 MAX, there were concerns about the transparency of the certification process and the communication of critical safety information to pilots and airlines. Improving transparency and communication can help to build trust and confidence in complex systems and can contribute to better decision-making.

Continuous Improvement: Finally, the lessons learned from the Boeing 737 MAX crashes highlight the importance of continuous improvement in the use of business analytics and other decision-making processes. This includes investing in research and development to improve the safety and reliability of complex systems, implementing effective training and education programs for all stakeholders, and encouraging a culture of continuous learning and improvement.

In conclusion, the crashes of two Boeing 737 MAX planes were a tragic reminder of the critical importance of safety in the aviation industry. Investigations into the causes of the crashes highlighted the failures across various aspects of the aircraft's design and operation, including issues related to the use of business analytics in the development and testing of the plane's Maneuvering Characteristics Augmentation System (MCAS).

The lessons learned from this tragedy are valuable for all industries that rely on complex systems and decision-making processes, particularly those where safety is a top priority. The key takeaways include

the importance of robust risk management practices, effective governance and oversight mechanisms, transparency and communication, and continuous improvement in the use of business analytics and other decision-making processes.

Moving forward, it is critical for all stakeholders in the aviation industry, including regulators, manufacturers, airlines, and pilots, to work together to implement the lessons learned from the Boeing 737 MAX crashes. By doing so, we can ensure that the safety and reliability of complex systems are continuously improved, and that tragic events like these never happen again. Ultimately, the lessons learned from this tragedy can serve as a powerful reminder of the critical importance of safety in all industries, and the need for robust risk management, effective governance, transparency, and continuous improvement in decision-making processes.

What did Boeing do to rectify their mistakes?

Boeing has utilized business analytics to address the issues related to the crashes of the 737 Max. Specifically, Boeing has used data analytics to improve its safety management systems and to gain insights into the factors that contributed to the accidents.

Here are some ways in which Boeing has used business analytics to rectify the issues:

Data collection and analysis: Boeing has collected data from a variety of sources, including the aircraft's sensors, pilot reports, and maintenance records. The company has then used analytics tools to analyze this data and identify patterns or anomalies that may indicate a safety issue.

Predictive analytics: Boeing has also used predictive analytics to identify potential safety risks before they become critical. For example, the company has developed algorithms that can detect anomalies in the aircraft's systems and alert maintenance crews to take corrective action.

Simulation modeling: Boeing has used simulation modeling to test the updated software and pilot training before implementing them in the aircraft. This allows the company to identify and address any potential issues before they occur in the real world.

Customer analytics: Boeing has also used customer analytics to better understand the needs and preferences of its airline customers. This has helped the company to develop more tailored products and services that meet the specific needs of different airlines.

Overall, Boeing's use of business analytics has enabled the company to identify and address the factors that contributed to the crashes of the 737 Max. By leveraging data and analytics tools, Boeing has been able to improve its safety management systems and ensure that the aircraft is safe to fly.

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