

PROJECT REPORT

Tragedy of Flight: A Comprehensive Crash Analysis

1. INTRODUCTION

1.1 Overview

The objective of our project is to analyse and identify the common cause of flight crash using the data of past flight crashes. This project will explore the various factors that contribute to aviation accidents. The analysis of data is done using Tableau. The ultimate aim is to highlight the safety measures which can be followed to reduce future crashes. The results of this analysis will be used to inform policies and regulations aimed at improving aviation safety.

1.2 Purpose

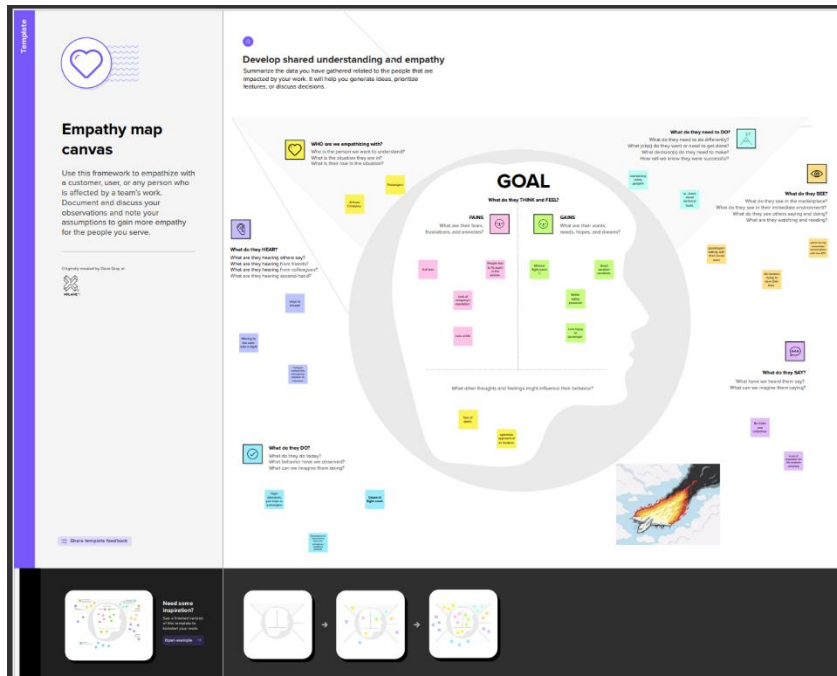
The purpose of this project is to analyse and visualize data related to flight crashes in order to gain insights into the causes, outcomes, and trends of these incidents. Specifically, the project aims to:

- Identify patterns and trends: The project helps identify patterns and trends in flight crashes, such as locations, operators, and other factors associated with these incidents.
- Visualize data for stakeholders: The project could use Tableau's data visualization capabilities to present data on flight crashes in an accessible and engaging way, making it easier for stakeholders to understand and act on the insights gained from the analysis.
- Overall, the purpose of the project would be to leverage the power of data analysis and visualization to better understand flight crashes, improve safety, highlight the major cause of flight crash and prevent future incidents.

2. Problem Definition & Design Thinking

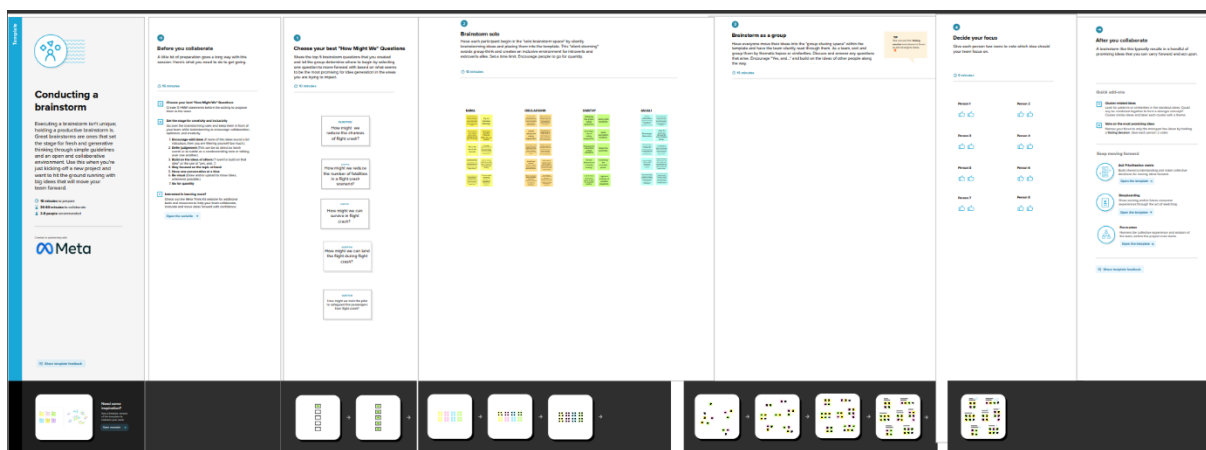
2.1 Empathy Map

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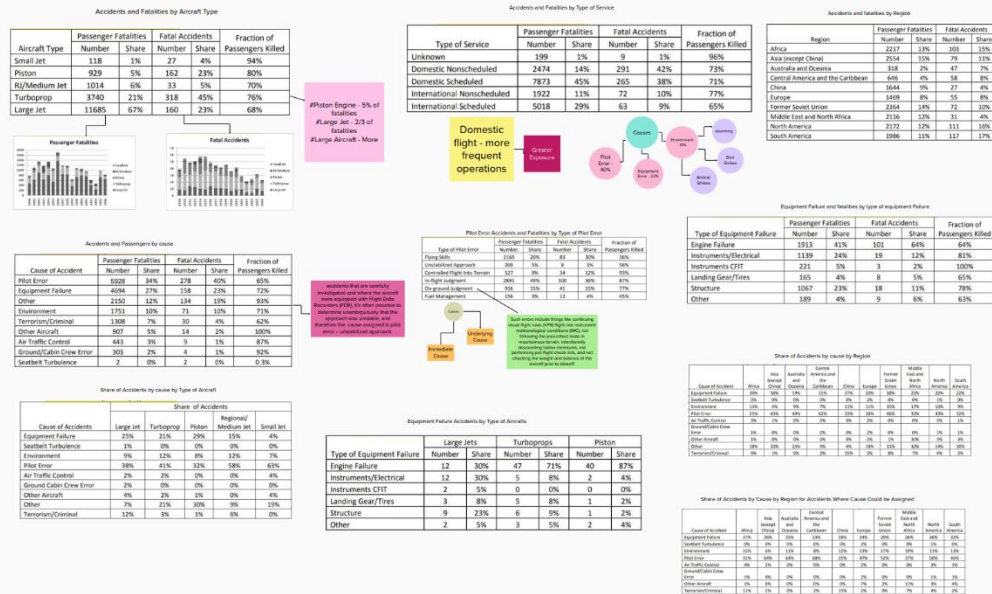


2.2 Ideation & Brainstorming Map

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3. RESULT

The following results can be inferred from our project:

- The maximum number of accidents happened in 1972.
- The major cause of flight crash in 1972 was pilot error followed by poor weather conditions.

These results were obtained after analysing the dataset. Now, the solution to reduce pilot error are:

- Pilot Training**
 Continuous training and development of pilots are essential to reduce errors in flight. Pilots must undergo regular training on new technologies, procedures, and regulations to enhance their knowledge and skills.
- Standard Operating Procedures**
 Airlines must develop and implement standard operating procedures to ensure that pilots follow the correct procedures during flight. This can help prevent errors caused by miscommunication or misunderstandings.
- Automation**
 The use of automation in the cockpit can help reduce errors caused by human factors such as fatigue or stress. However, it is important to note that over-reliance on automation can also lead to errors, so pilots must be adequately trained on the use of automated systems.
- Crew Resource Management**
 CRM is a training program that teaches pilots to communicate effectively and work as a team in the cockpit. It can help prevent errors caused by miscommunication or lack of coordination between crew members.

- **Risk Management**

Airlines should implement a risk management system to identify potential hazards and take proactive measures to mitigate them. This can help prevent errors caused by unforeseen circumstances or events.

- **Monitoring and Evaluation**

Airlines must continuously monitor and evaluate their safety management system to identify areas for improvement. This can help prevent errors from recurring and ensure that safety standards are maintained.

These solutions if implemented in the airline industry, would help to reduce flight crash drastically. The advantages and applications of these solutions have been discussed in the next section.

The data visualization steps are attached below.

Dashboard



Story




4. ADVANTAGES & DISADVANTAGES:

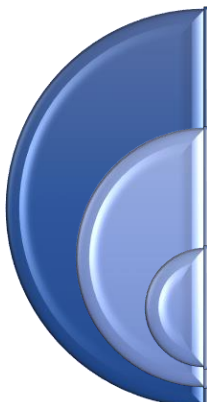
Reducing pilot error in flight crashes is a complex issue that requires a combination of strategies to improve aviation safety. Some strategies that can help reduce pilot error include and their advantages and disadvantages are listed below.

1. PILOT TRAINING

ADVANTAGES

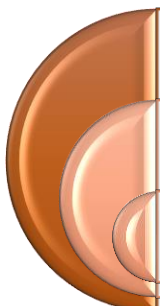
	Enhanced skills: This type of training helps pilots develop advanced skills in aircraft handling and control, which can make them better pilots overall.
	Confidence: Pilots who have undergone upset recovery training are likely to have more confidence in their ability to handle challenging situations, which can improve their decision-making abilities in the cockpit.
	Improved safety: Upset recovery training helps pilots learn how to recover an aircraft from dangerous situations, reducing the risk of a crash and increasing safety for passengers and crew.

DISADVANTAGES


	Risk of injury or damage: There is always a risk of injury or damage to the aircraft during upset recovery training, which can be expensive to repair.
	Limited effectiveness: Some experts argue that upset recovery training may not be effective in preventing all types of crashes, and that other factors such as pilot fatigue, communication breakdowns, and system malfunctions may also contribute to accidents.
	Limited availability: Upset recovery training may not be widely available to all pilots, particularly those who work for smaller airlines or in less developed regions.

2. STANDARD OPERATING PROCEDURES (SOPs)

ADVANTAGES

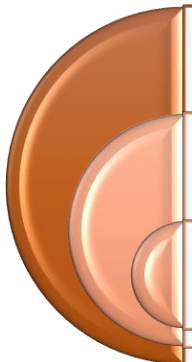
	Clarity: SOPs provide clear guidelines for crew members to follow in emergency situations, reducing the likelihood of confusion or misunderstandings.
	Efficiency: SOPs can help crews perform tasks more efficiently during an emergency, which can help to save time and potentially lives.
	Regulatory compliance: Many aviation regulatory agencies require airlines to have SOPs in place for emergency situations, so following them can help airlines stay in compliance with regulations.

DISADVANTAGES


	Overreliance: Crew members may become over-reliant on SOPs and not use their own judgment or experience in emergency situations.
	Training requirements: SOPs may require additional training and certification for crew members, which can be costly and time-consuming.
	Limited effectiveness: In some cases, following SOPs may not be enough to prevent a crash or mitigate the severity of an emergency situation, particularly if the situation is unprecedented or evolving rapidly.

3. AUTOMATION

ADVANTAGES

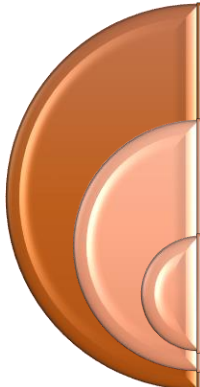
	Speed: Automated systems can perform tasks quickly, which can be critical in emergency situations where time is of the essence.
	Reduced workload: Automated systems can reduce the workload on pilots during emergency situations, allowing them to focus on other critical tasks.
	Consistency: Automated systems can perform tasks consistently and without deviation, which can help to ensure that tasks are performed correctly every time.

DISADVANTAGES

	Complexity: Automated systems can be complex and difficult to understand, which can make it challenging for pilots to troubleshoot issues or understand system failures.
	Failure modes: Automated systems can fail or malfunction, which can lead to unexpected or dangerous situations if pilots are not prepared to take over manual control.
	Limited situational awareness: Automated systems can limit a pilot's situational awareness in emergency situations, potentially leading to missed cues or critical information.


4. CREW RESOURCE MANAGEMENT (CRM)

ADVANTAGES



Improved communication: CRM emphasizes effective communication between crew members, which can reduce the risk of misunderstandings or errors during emergency situations.
Enhanced situational awareness: CRM emphasizes situational awareness, which can help crew members to quickly recognize and respond to emergencies.
Improved teamwork: CRM promotes effective teamwork and coordination among crew members, which can help to reduce errors and increase safety.

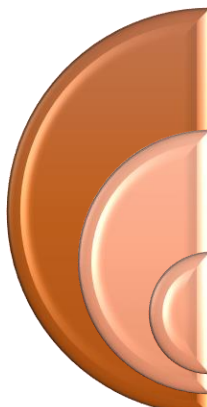
DISADVANTAGES



Training requirements: CRM training can be time-consuming and costly, which can make it challenging for some airlines to provide adequate training to all crew members.
Resistance to change: Some crew members may be resistant to adopting new CRM practices, which can make it challenging to implement CRM principles across an entire organization.
Limited effectiveness: In some cases, even when CRM principles are followed, they may not be enough to prevent a crash or mitigate the severity of an emergency situation.


5. RISK MANAGEMENT

ADVANTAGES



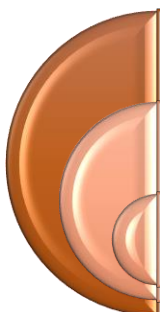
Proactive approach: Risk management takes a proactive approach to identifying and mitigating risks, which can help to prevent crashes from occurring.
Structured: Risk management provides a structured framework for identifying and assessing risks, which can help to ensure that risks are adequately considered and addressed.
Ongoing process: Risk management is an ongoing process that can be continually evaluated and adjusted, which can help to ensure that safety measures remain effective over time.

DISADVANTAGES


	Time-consuming: Risk management can be time-consuming, which can make it challenging for organizations to devote the necessary resources to identify and address all potential risks.
	Limited effectiveness: Even with risk management measures in place, there is always the possibility of unexpected or unforeseen risks that can lead to a crash.
	Cost: Implementing risk management measures can be costly, which can make it challenging for some airlines to afford the necessary resources and technology.

6. MONITORING AND EVALUATION:

ADVANTAGES

	Improved safety: M&E can help identify areas of improvement in flight safety protocols, leading to fewer accidents and fatalities.
	Enhanced decision-making: M&E data can help aviation authorities make more informed decisions regarding safety regulations and operational procedures.
	Improved accountability: Monitoring and evaluation can hold airlines, regulatory agencies, and other stakeholders accountable for their actions related to aviation safety.

DISADVANTAGES

	Cost: M&E can be costly, requiring significant investment in data collection, analysis, and reporting.
	Privacy concerns: M&E involves the collection of sensitive data, raising privacy concerns for individuals involved in a flight crash.
	Limited applicability: M&E findings may not always be applicable to all aviation contexts, as the causes of flight crashes can vary depending on factors such as location and airline.

5. APPLICATIONS

The proposed solutions can be applied in the field of aviation training academy. Each airline has its own training period and course for both pilots and crew. When the stated steps are followed in the course of training, there are better chances of reducing flight crashes.

Installation of advanced safety equipment and automation techniques can be used in aircraft designing and ideation stage.

The SOP's can be rewritten to tackle a wide range of emergency situations.

Hence, this project can be used to get a better perspective on the causes of flight crash and to develop solutions to reduce the same.

6. CONCLUSION

The following conclusions can be drawn from our project:

- The major cause of flight accidents in general is pilot error.
- The second common cause of flight crash is poor weather conditions.

As the later can't be controlled and has a lot of uncertainty, the former can be minimised by using the proposed solution. A proper application of pilot error reduction solutions can help save lives. We may conclude that development of aviation industry with the latest technology and techniques is necessary for safer air travel. Our project gives insights about the major causes of flight crash and methods to reduce them.

7. FUTURE SCOPE

There is a great future scope in the field of developing strategies to minimise flight crashes.

- ❖ **Advanced Navigation Systems:** Advanced navigation systems such as GPS and other satellite-based technologies can greatly enhance the accuracy of flight paths and reduce the risk of collisions with other aircraft or obstacles on the ground.
- ❖ **Better Aircraft Maintenance:** Regular and thorough aircraft maintenance is crucial for ensuring the safety of the aircraft and preventing equipment failure or malfunction. Implementing more advanced maintenance techniques and technology can further improve safety.
- ❖ **Improved Communication:** Communication breakdowns between pilots, air traffic controllers, and other personnel can lead to confusion and potential accidents. Improving communication protocols and utilizing advanced communication technology can help prevent such issues.
- ❖ **Enhanced Safety Regulations:** Governments and regulatory bodies can play a crucial role in enhancing safety standards in the aviation industry. Implementing and enforcing more stringent safety regulations can help prevent accidents and improve overall safety in the industry.
- ❖ **Use of Artificial Intelligence (AI):** AI can be used to analyse large amounts of data from various sources, such as weather patterns, flight paths, and aircraft maintenance records, to identify potential safety hazards and provide real-time solutions to prevent accidents.

Overall, a combination of these enhancements can help prevent flight crashes and ensure safer air travel for passengers and crew. The next step of our project will be to research and develop better strategies to reduce pilot error and enhance aviation safety. We will develop better solutions for the issues. Also, we will examine methods to reduce flight crash due to poor weather conditions.