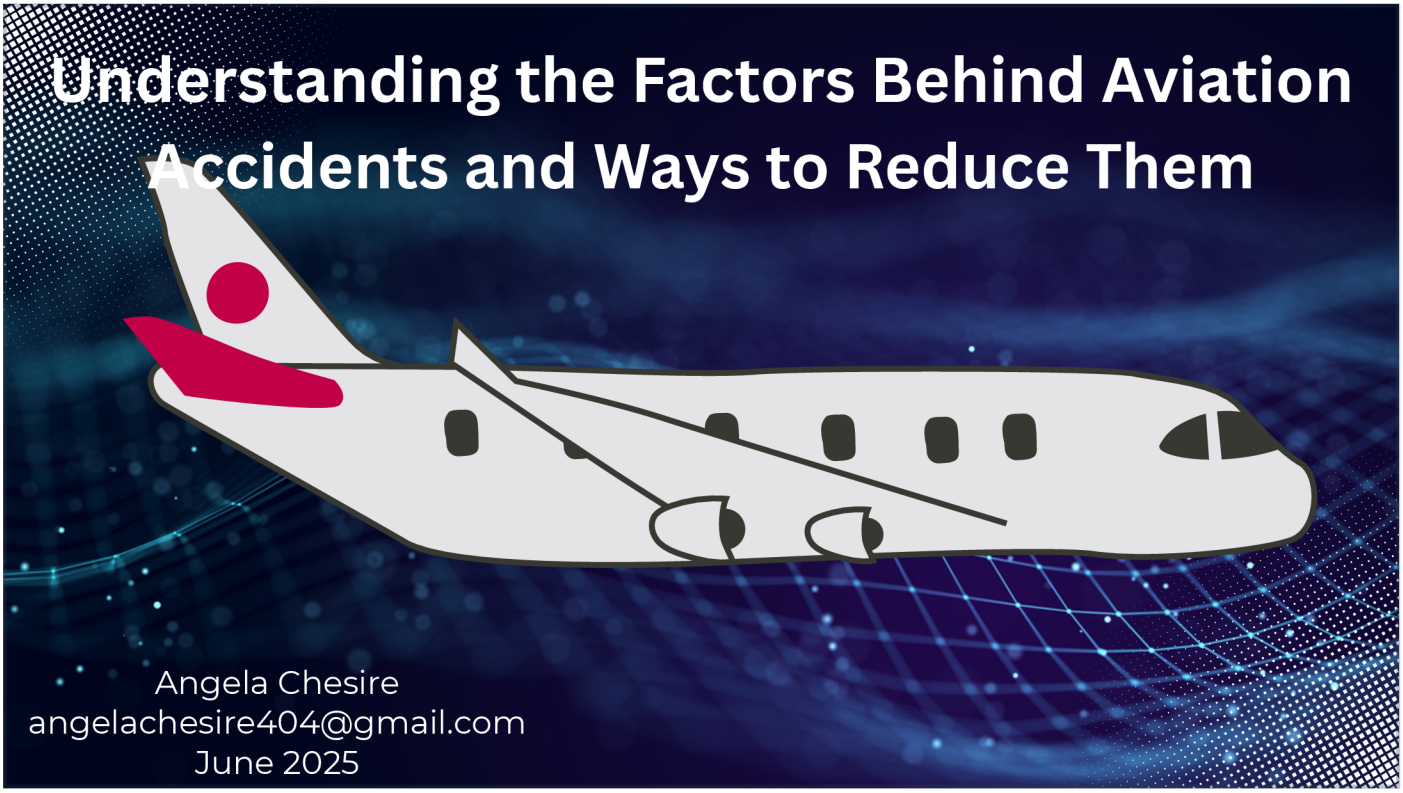
Understanding the Factors Behind Aviation Accidents and Ways to Reduce Them



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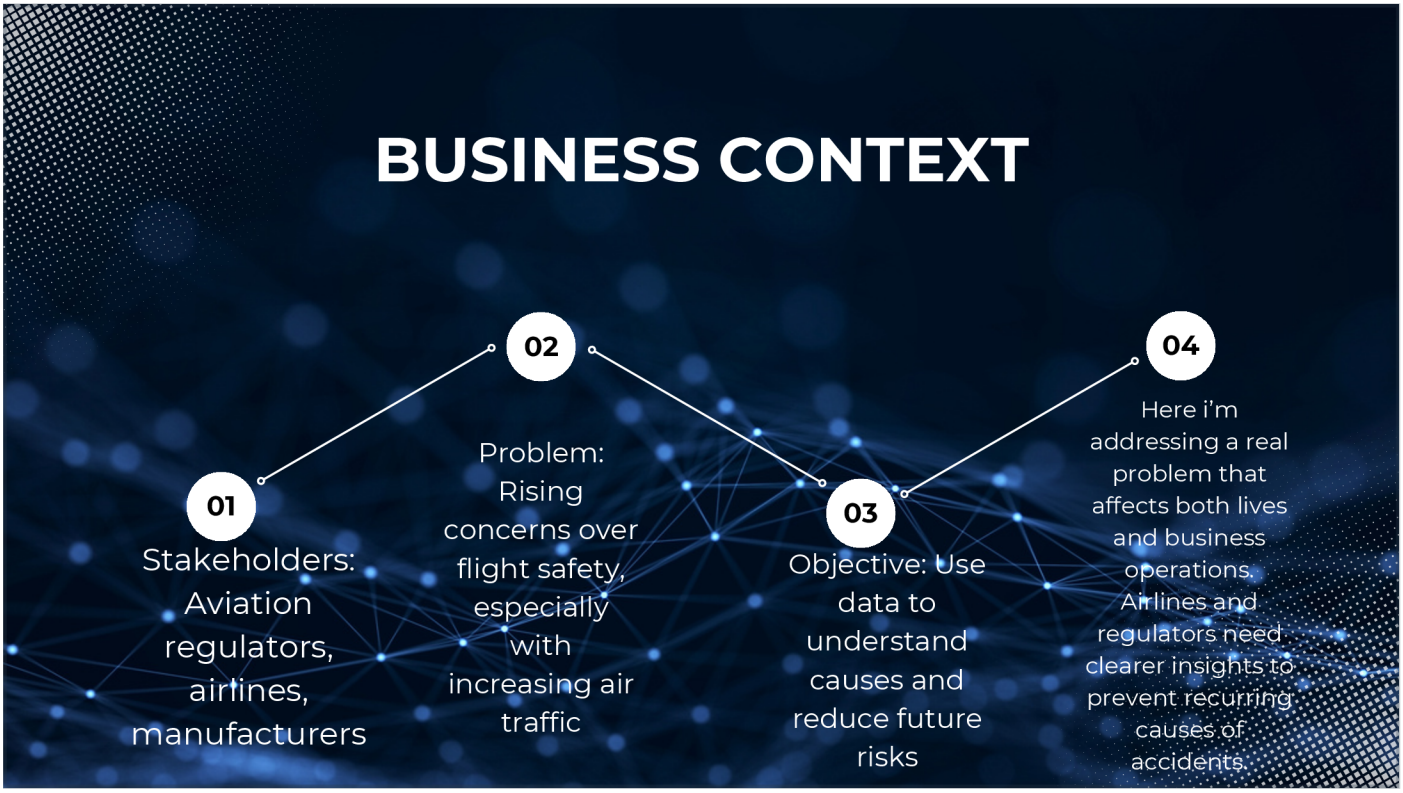
INTRODUCTION
Each year, thousands of flights take off but not all land safely. This project explores the key factors contributing to aviation accidents, aiming to improve safety outcomes through data insights.
I'll take you through how data can help identify root causes and inform better decisions in aviation safety.

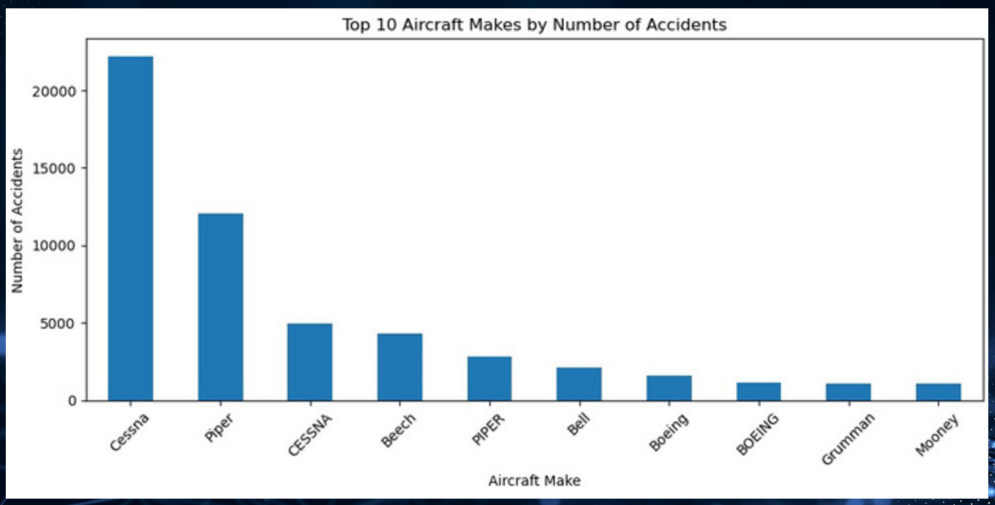

BUSINESS CONTEXT
01
Stakeholders: Aviation regulators, airlines, manufacturers
02
Problem: Rising concerns over flight safety, especially with increasing air traffic
03
Objective: Use data to understand causes and reduce future risks
04
Here i'm addressing a real problem that affects both lives and business operations. Airlines and regulators need clearer insights to prevent recurring causes of accidents.

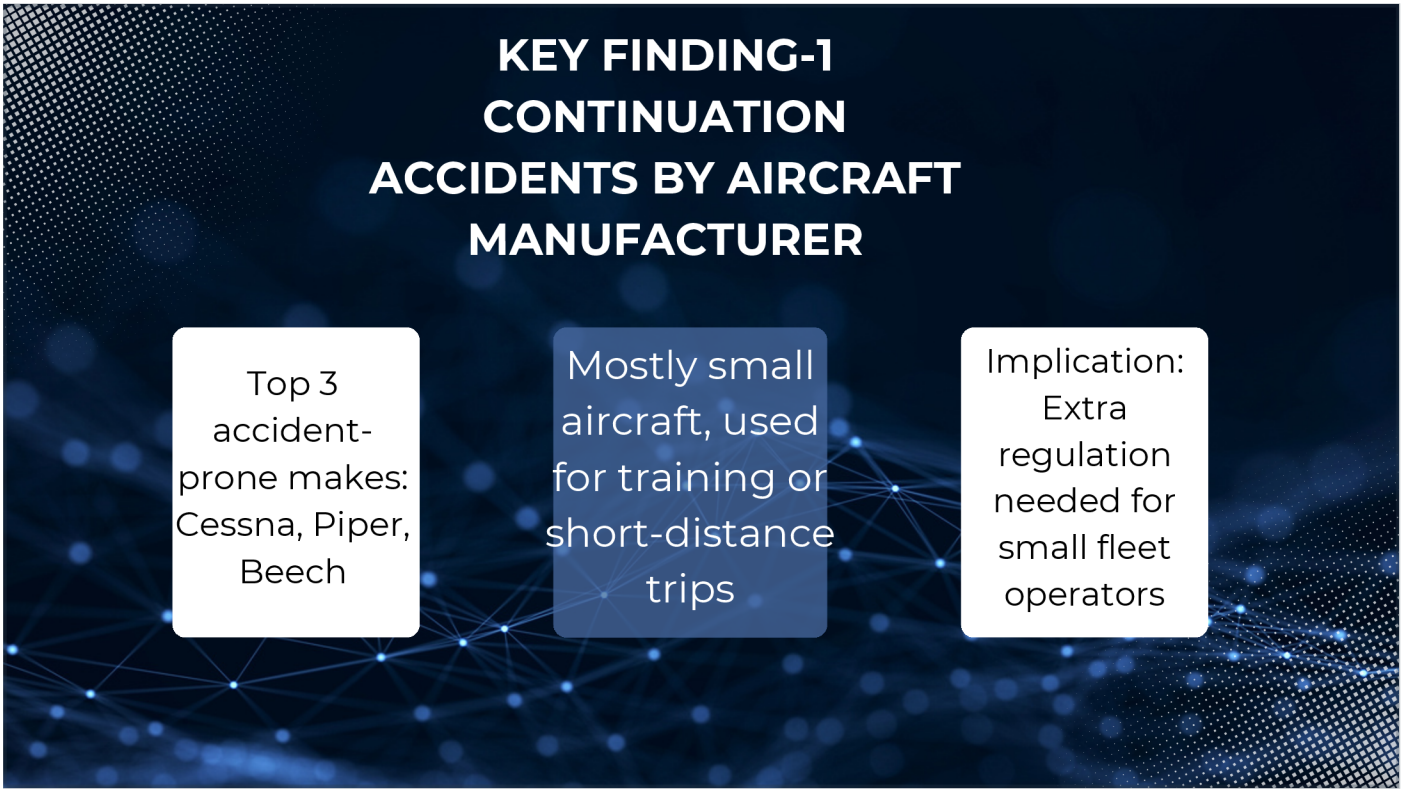
ABOUT THE DATA

Source: U.S. National Transportation Safety Board (NTSB)
• Size: Over 8,000 accident records
• Key features: Aircraft make, fatalities, year, location, and cause
• Cleaning: Removed missing values and standardized categories

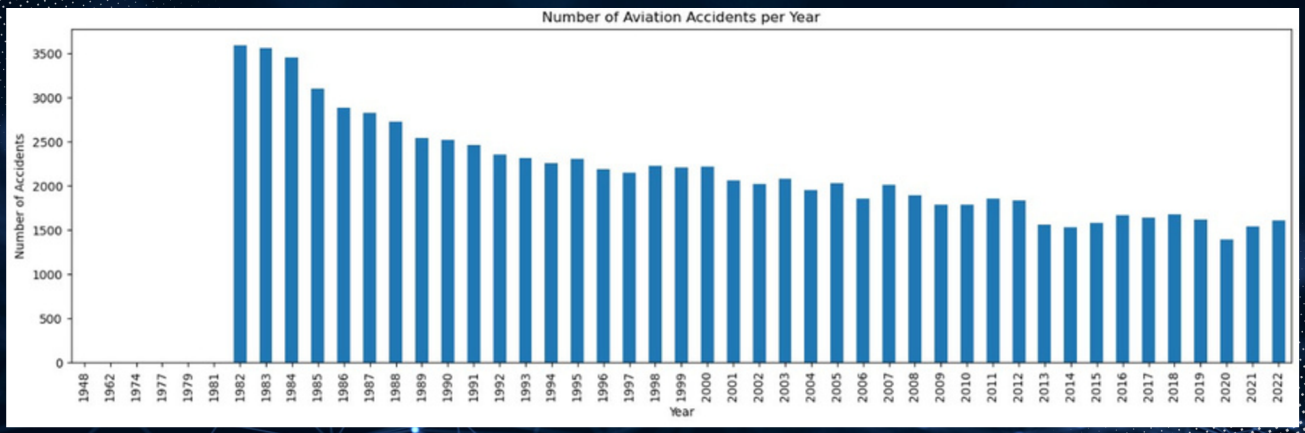
The dataset was quite rich, but required cleaning and wrangling to be usable. This included dropping incomplete records and normalizing fields like aircraft make and weather conditions.

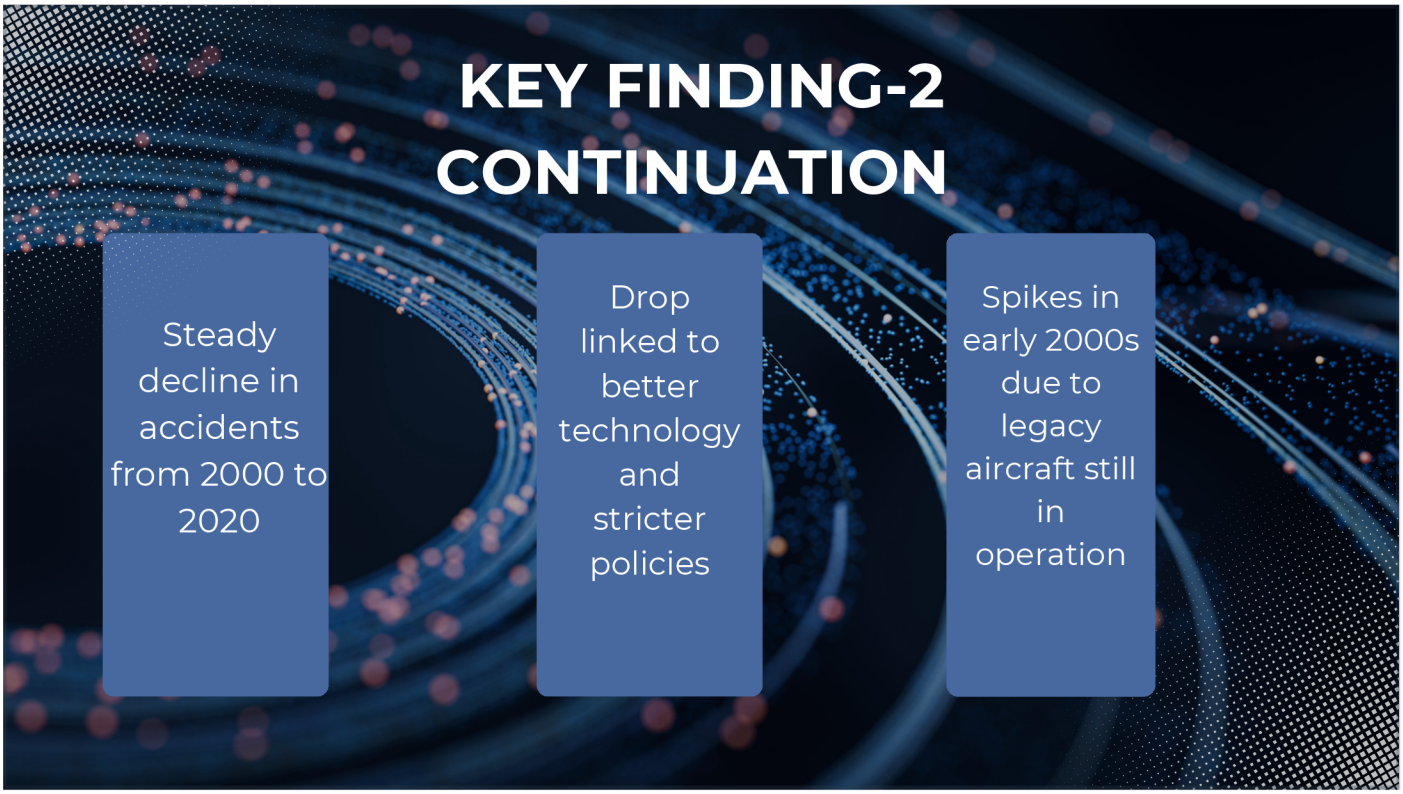
KEY FINDING-1



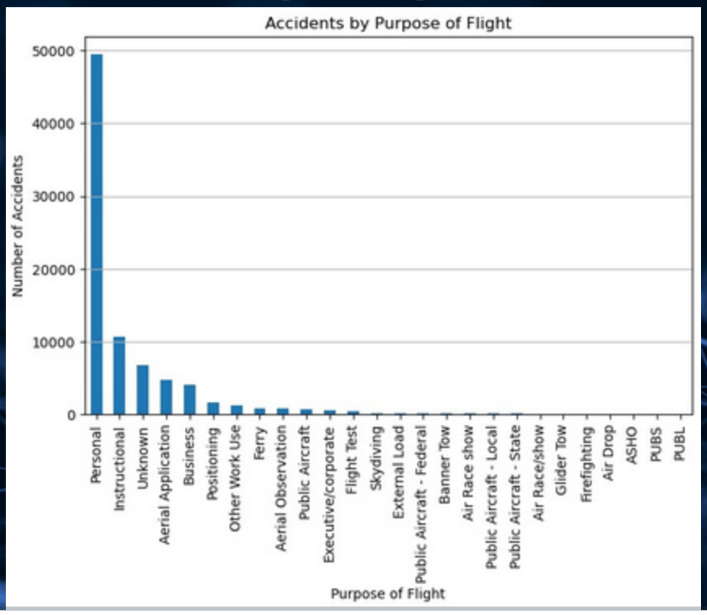

KEY FINDING-1
CONTINUATION
ACCIDENTS BY AIRCRAFT
MANUFACTURER
Top 3 accident-prone makes: Cessna, Piper, Beech
Mostly small aircraft, used for training or short-distance trips
Implication: Extra regulation needed for small fleet operators

KEY FINDING-2
ACCIDENT TRENDS OVER THE YEARS



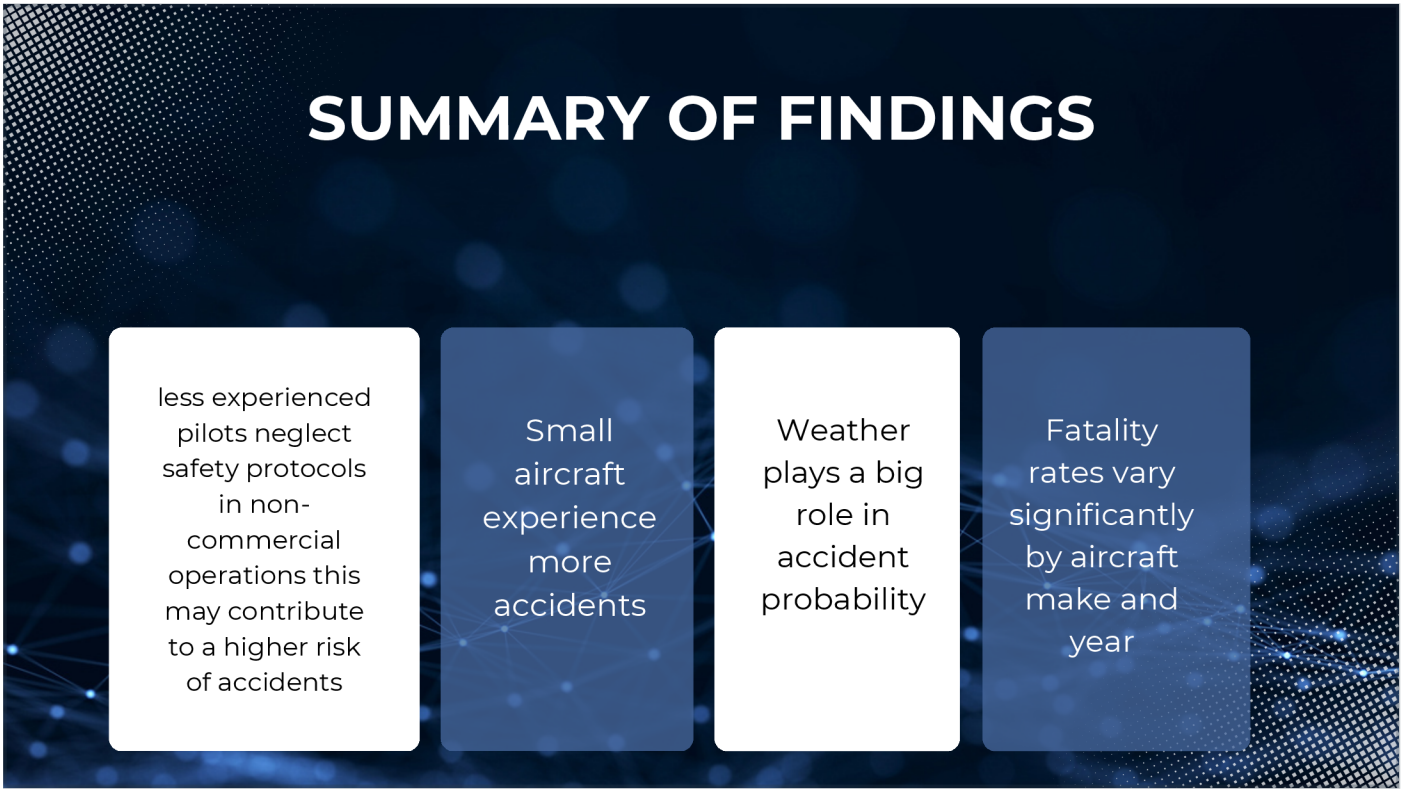

KEY FINDING-2 CONTINUATION
Steady decline in accidents from 2000 to 2020
Drop linked to better technology and stricter policies
Spikes in early 2000s due to legacy aircraft still in operation

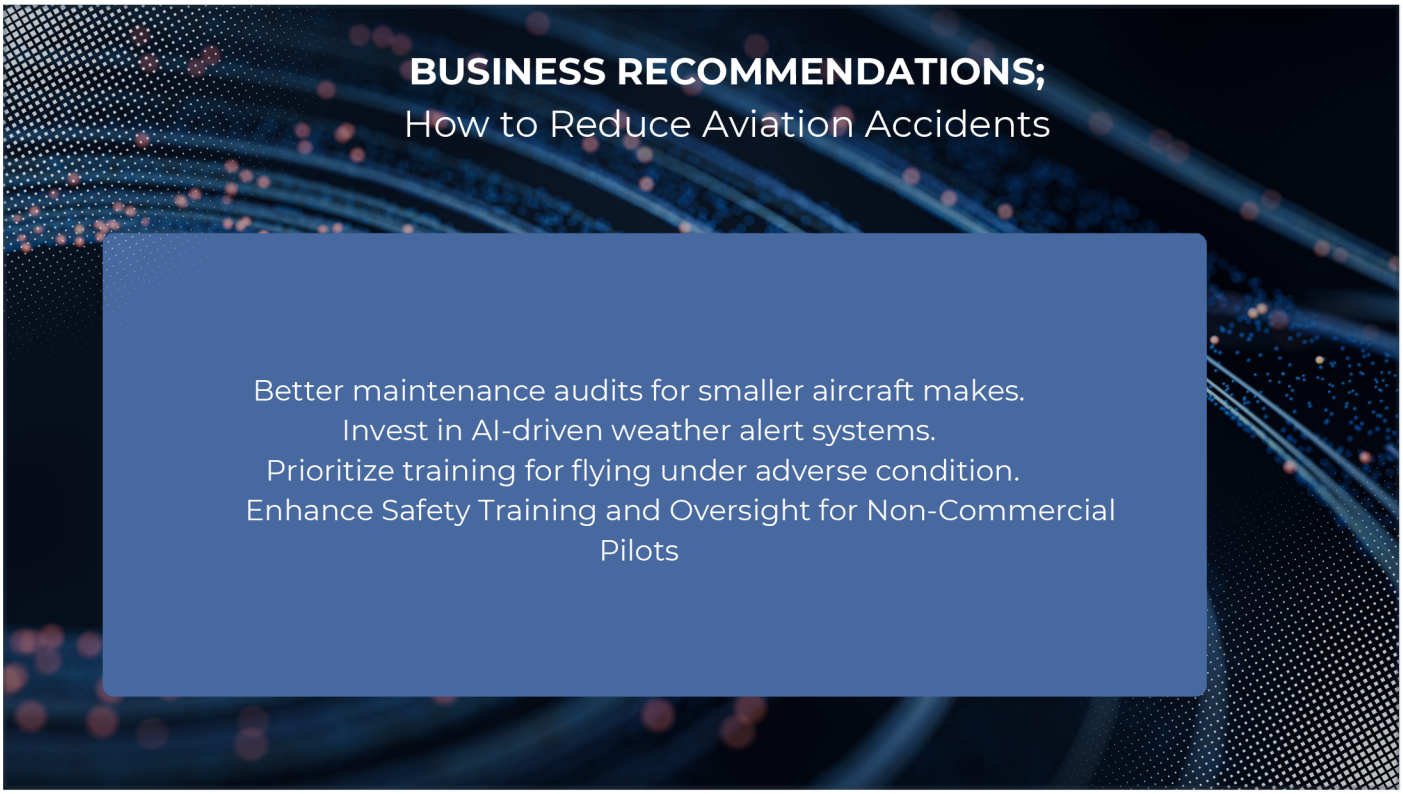
KEY FINDING-3
ACCIDENTS BY PURPOSE OF FLIGHT



KEY FINDING-3 CONTINUATION

My analysis revealed that a significant number of accidents occurred during personal and instructional flights. This suggests that less experienced pilots or relaxed safety protocols in non-commercial operations may contribute to a higher risk of accidents.


SUMMARY OF FINDINGS
less experienced pilots neglect safety protocols in non-commercial operations this may contribute to a higher risk of accidents
Small aircraft experience more accidents
Weather plays a big role in accident probability
Fatality rates vary significantly by aircraft make and year


BUSINESS RECOMMENDATIONS;
How to Reduce Aviation Accidents
Better maintenance audits for smaller aircraft makes.
Invest in AI-driven weather alert systems.
Prioritize training for flying under adverse condition.
Enhance Safety Training and Oversight for Non-Commercial Pilots

LIMITATIONS AND NEXT STEPS

- Geographic Limitation: The dataset is limited to the United States. Including data from other countries could provide a more comprehensive and globally relevant analysis.
- Missing Human Factors: Some important variables — such as pilot fatigue, stress levels, or training quality — are not captured, which limits our understanding of human-related causes.
- Potential Biases: Some accident reports may have incomplete or inconsistent entries, which could affect the accuracy of the findings.
- Limited Scope of Analysis: This project focused on descriptive analysis only. Advanced statistical models or causal analysis could reveal deeper insights.

- Incorporate international datasets to broaden the scope.
- Use machine learning techniques to predict accident likelihood and identify high-risk patterns early.
- Enrich the dataset with additional variables (e.g. weather, flight duration, pilot age) to improve accuracy and depth of insights


CONCLUSION
By identifying accident-prone aircraft types, flight purposes with higher risk, and trends in accident frequency over time, this project reveals clear opportunities for reducing aviation accidents.
The goal isn't just to understand the data it's to help prevent future accidents.