AIRCRAFT EVENT ANALYSIS: IDENTIFYING LOW-RISK AIRCRAFT FOR BUSINESS EXPLORATION

A Data driven approach to supporting strategic decisions

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Overview

The primary goal of this project is to evaluate aviation risk to identify aircraft that are low-risk for the company to purchase and operate. By analyzing historical aviation event data, this analysis will provide actionable insights into aircraft safety, operational reliability, and risk factors associated with different aircraft models and flight operations.

Problem Statement

Understanding Aviation Risks

Context: Our company is diversifying its portfolio by expanding into the aviation industry, aiming to purchase and operate aircraft for commercial and private use.

Problem: Limited knowledge of potential risks in aircraft operations.

Key Question: Which aircraft types pose the lowest risk for our business?

Goal

Objective of the Analysis

- To identify aircraft makes and models with the lowest risk profiles.
- To provide actionable insights to support the selection of aircraft for purchase.
- To use the historical aviation event data to guide decisions.

Data Overview

Data Used for Analysis

Dataset Source: Historical aviation event data sourced from a published kaggle repository. The data source

Key Features:

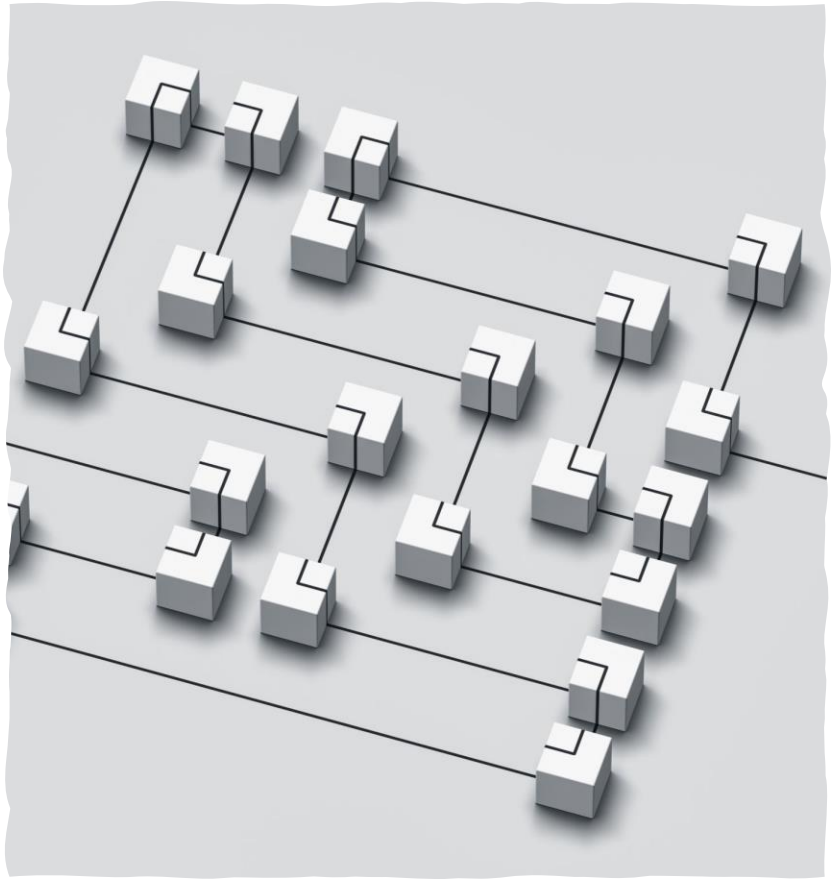
Aircraft Information: Make, model, purpose of flight.

Event Details: Date, location, weather, phase of flight.

Injury and Damage Data: Fatalities, injuries, severity, aircraft damage.

Data Cleaning: Missing value handling, duplicates removed, numerical fields aggregated.

Analysis Steps



Our Analytical Approach

In general, a couple of python libraries(pandas, seaborn, numpy, matplotlib) was used for the analysis and visualization part of this project. Tableu was also used to create more interactive visualizations.

1. Data Exploration:

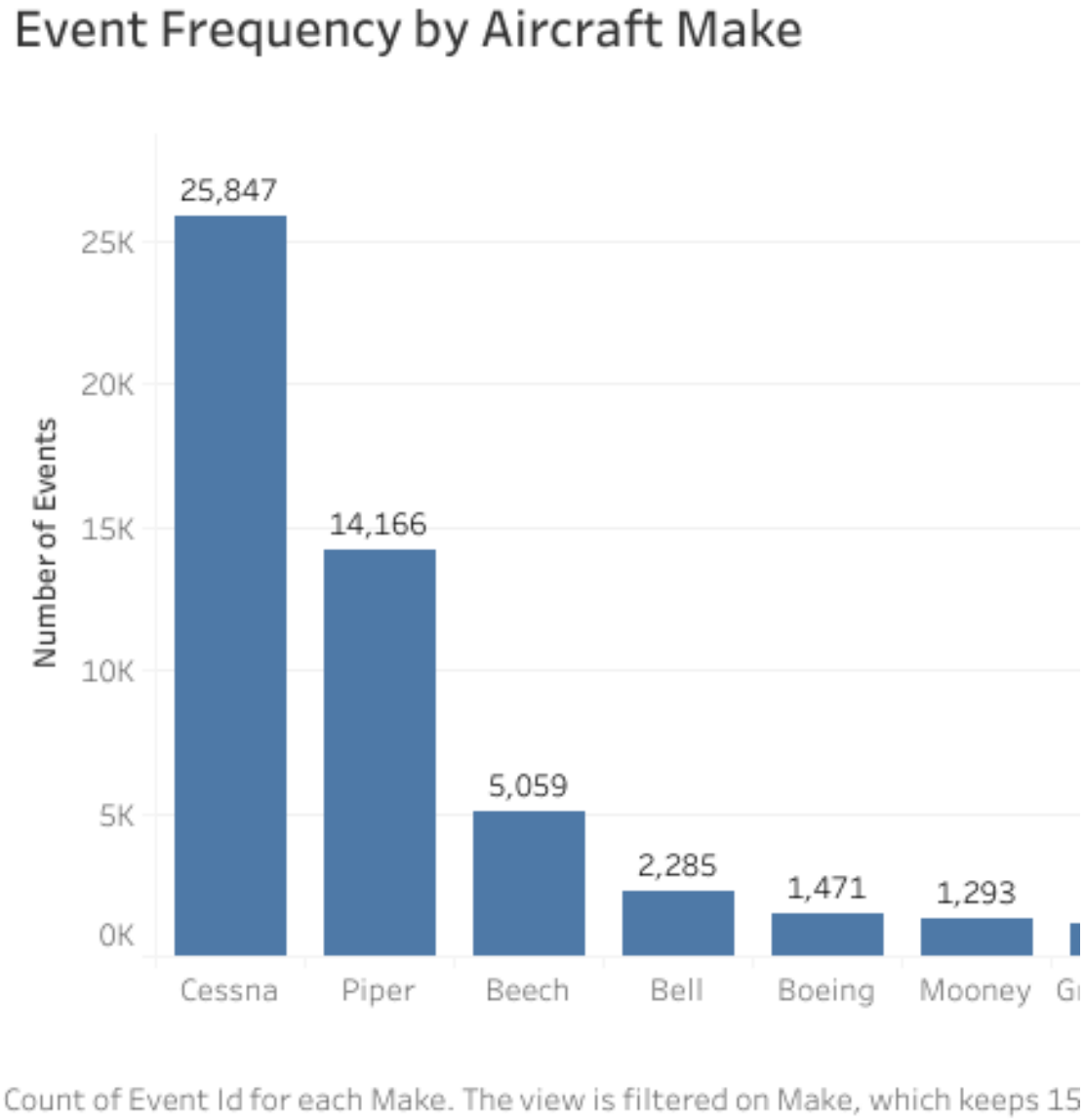
- Distribution of events by make, model, and purpose.
- Trends in event frequency over time.

2. Visualization:

- Bar charts for event frequency by make/model.
- Line charts for events per year.
- Heatmaps for correlations between flight phase, weather, and severity.

3. Insights:

- Focus on aircraft types with high safety records and low incidents.



Observations

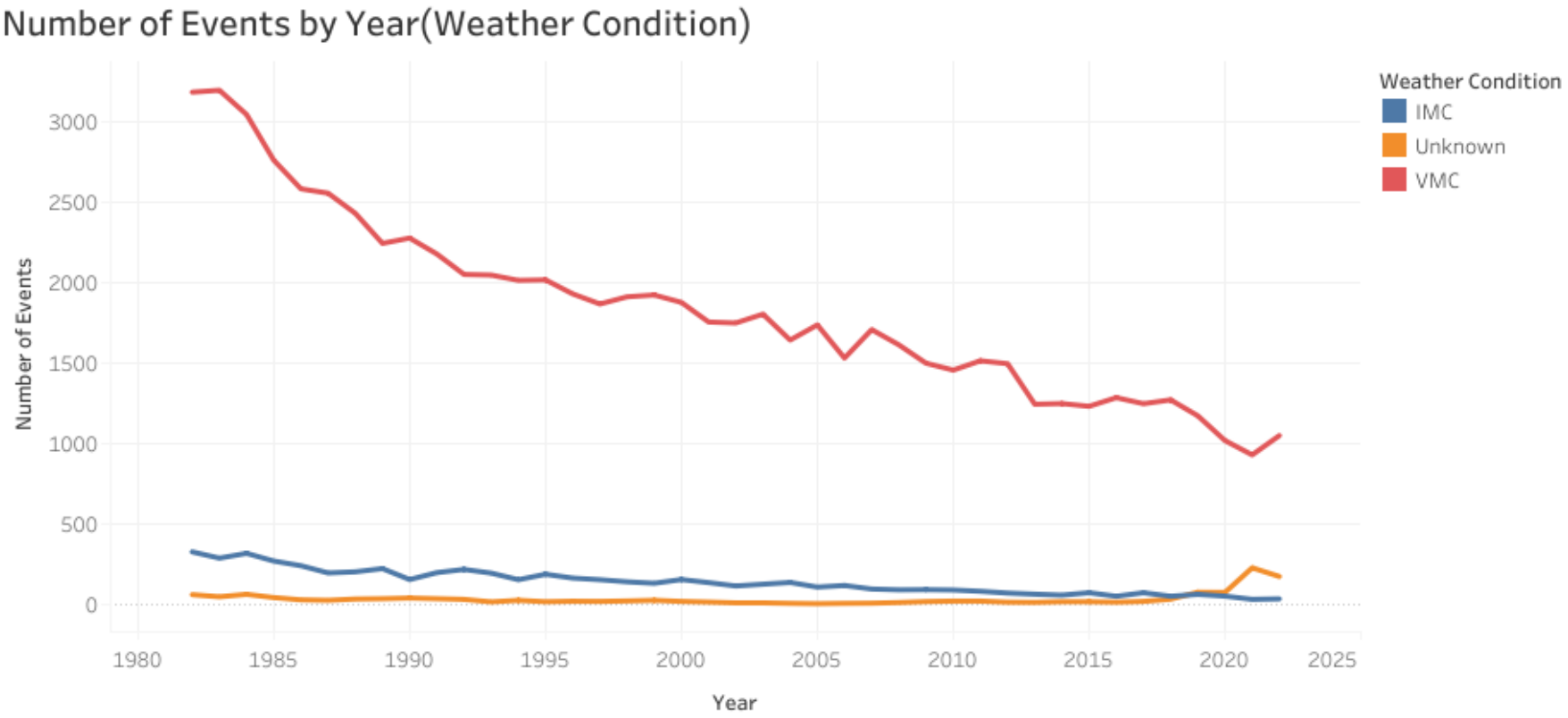
- ***Key Findings***
- **Most Common Aircraft**
- Top 15 aircraft makes account for 68.44% of the number of incidents.

Observations

Key Findings continuation

Event Trends

- The number of incidents reduce across years but are more under VMC(visual meteorological conditions) weather conditions.

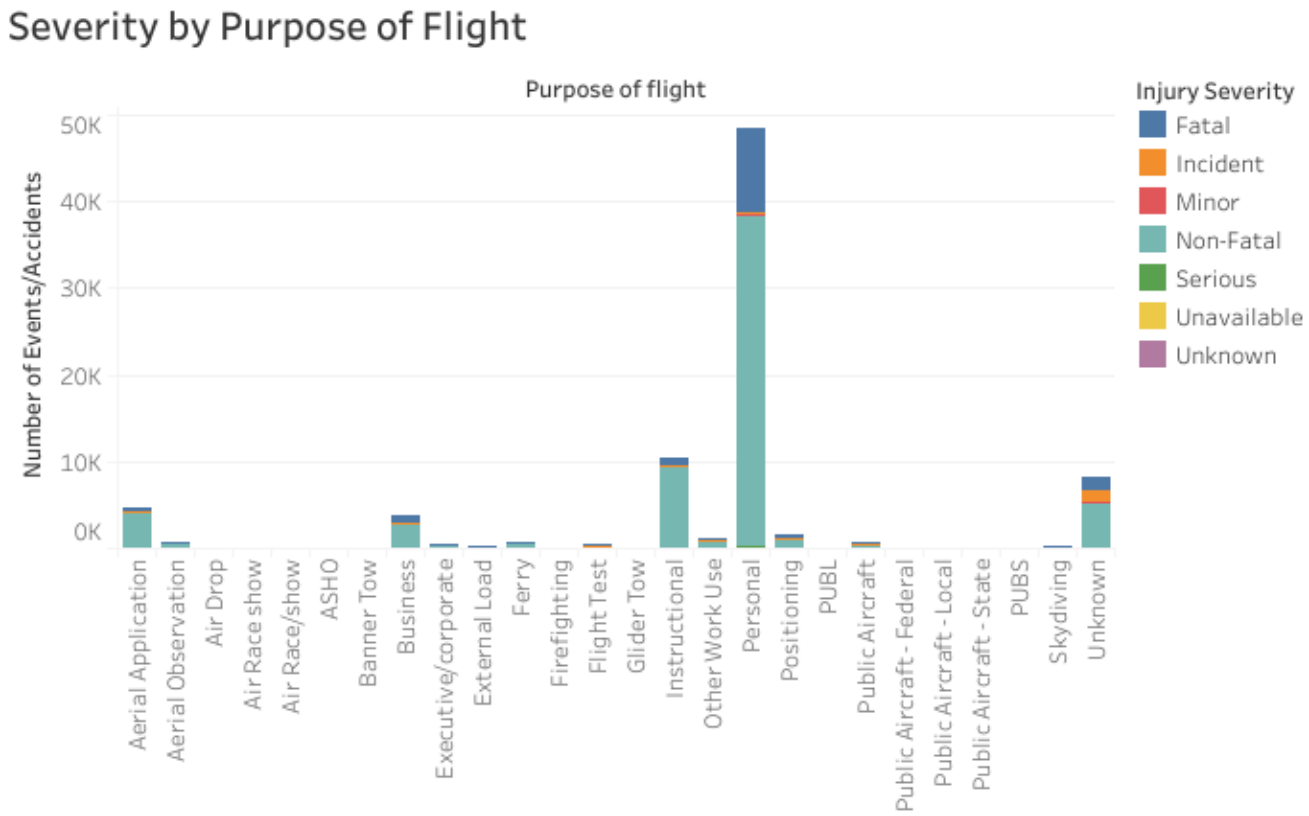


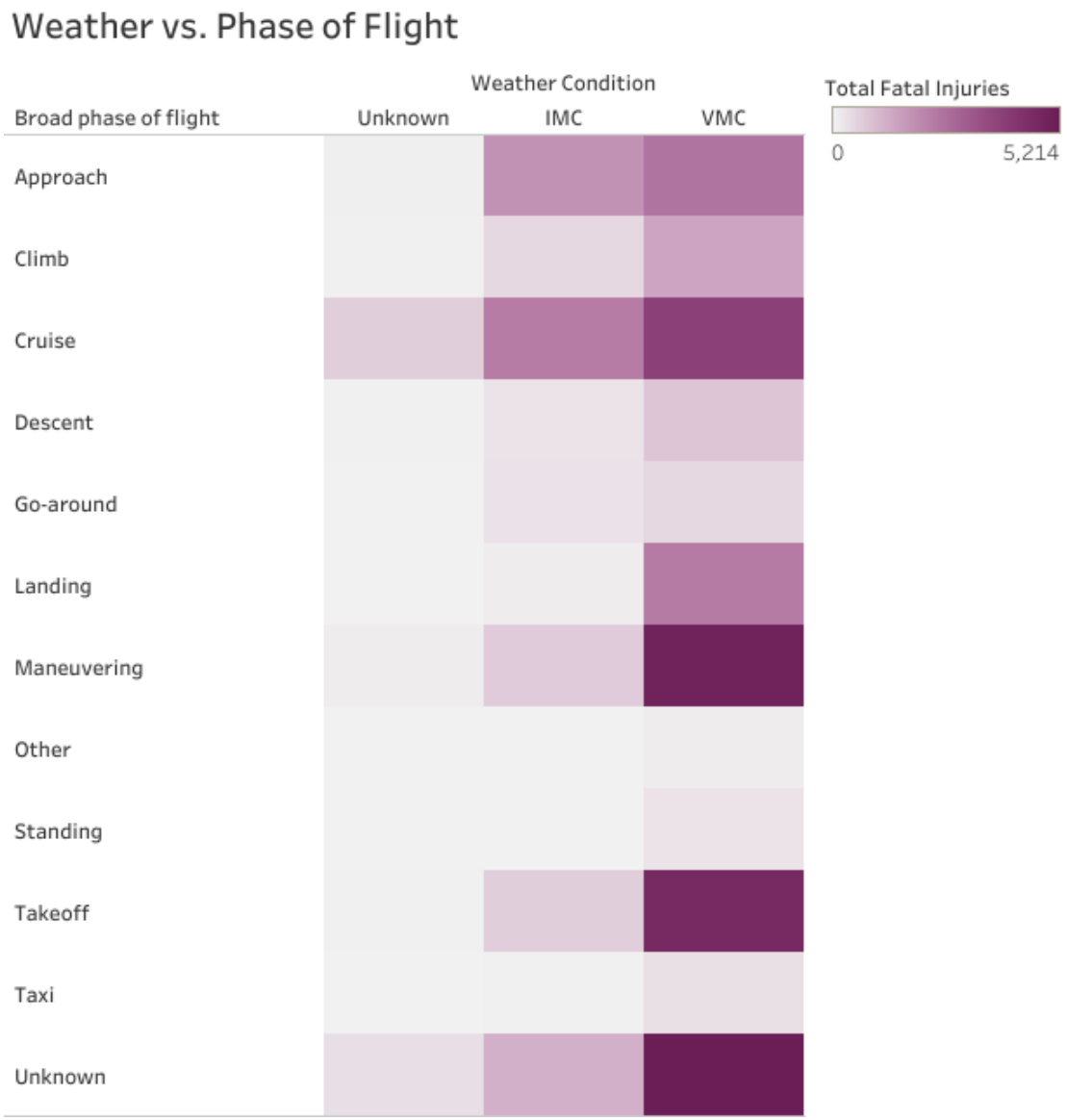
Observations

Key Findings continuation

Purpose of Flight

- Personal flights show more incidents compared to business or commercial flights.



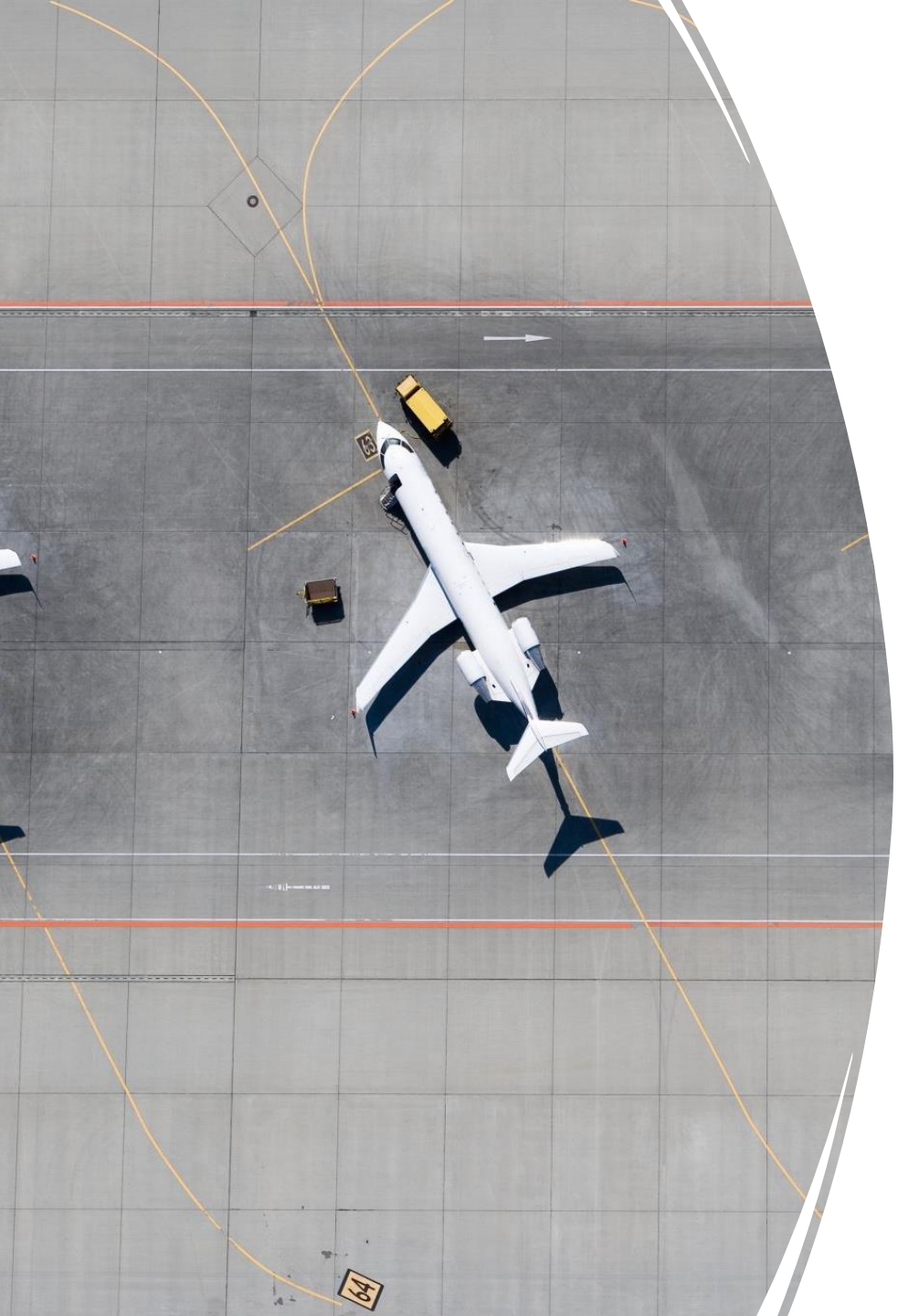


Observations

Key Findings continuation

Severity Patterns

- Higher fatalities during Maneuvering and Takeoff flight phases and VMC weather conditions.



Recommendations

Recommendations to Stakeholders

Aircraft Selection

- Focus on makes/models with lower incident rates and less severe outcomes . Avoid models with high and severe incidents like Cessna and Piper.

Safety Protocols

- Invest in training for critical flight phases (e.g., takeoff, landing).

Weather Preparedness

- Enhance pilot training for VMC(visual meteorological conditions).

Data Monitoring

- Establish a system that will continually monitor and evaluate the aviation risks over time.

Conclusion

- Data-driven insights help mitigate risks in aircraft selection and operation.
- Prioritizing safety-focused decisions will support long-term business success in aviation.
- A foundation for ongoing analysis to adapt to future challenges.


The End