Project Overview: De-Risking Our Aviation Investment

Title: De-Risking Our Aviation Investment: A Data-Driven Approach to Aircraft Selection

Subtitle: Analysis of Historical Aviation Accident Data for Strategic Fleet Acquisition

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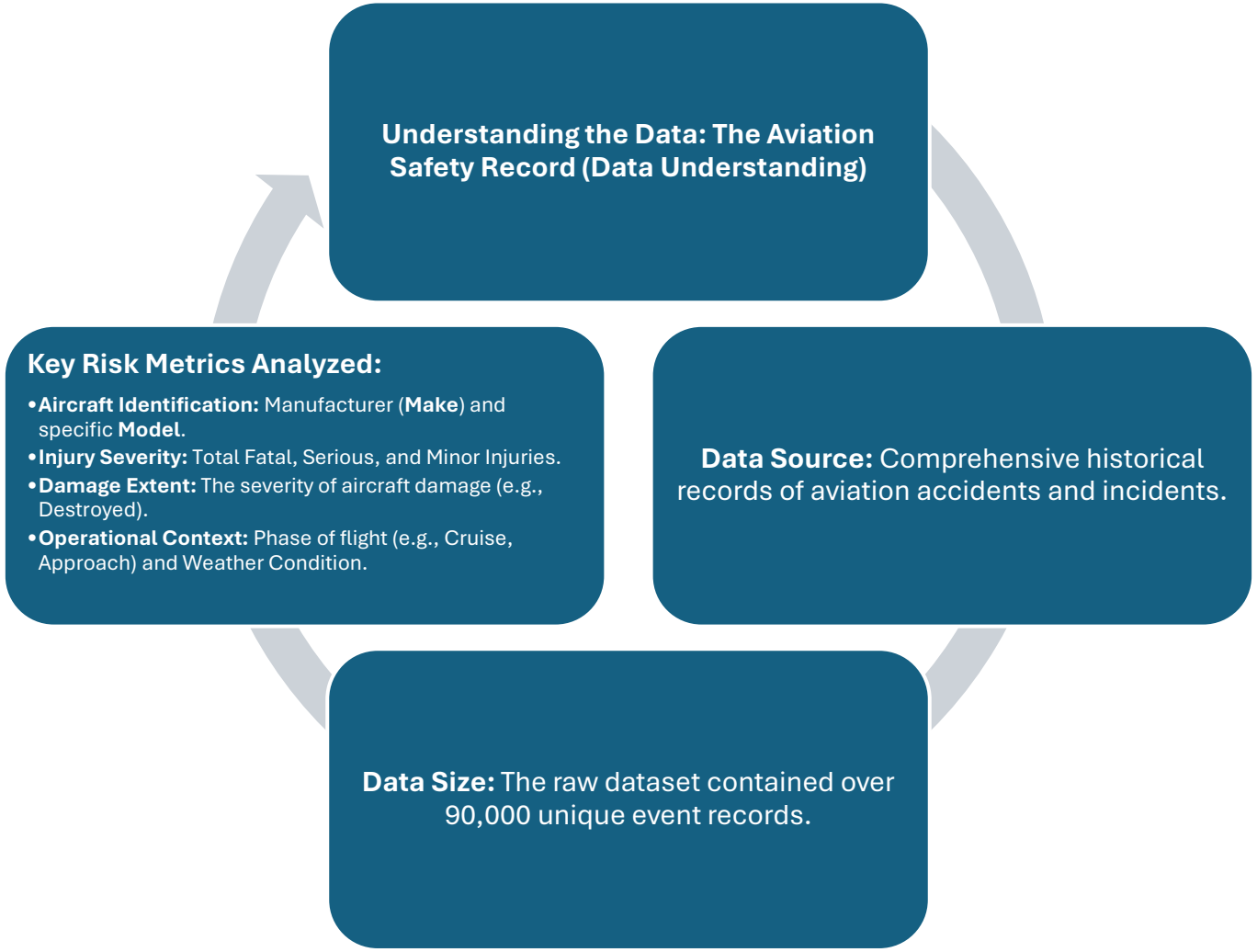
The Business Goal: Low-Risk Aircraft Acquisition (Business Understanding)

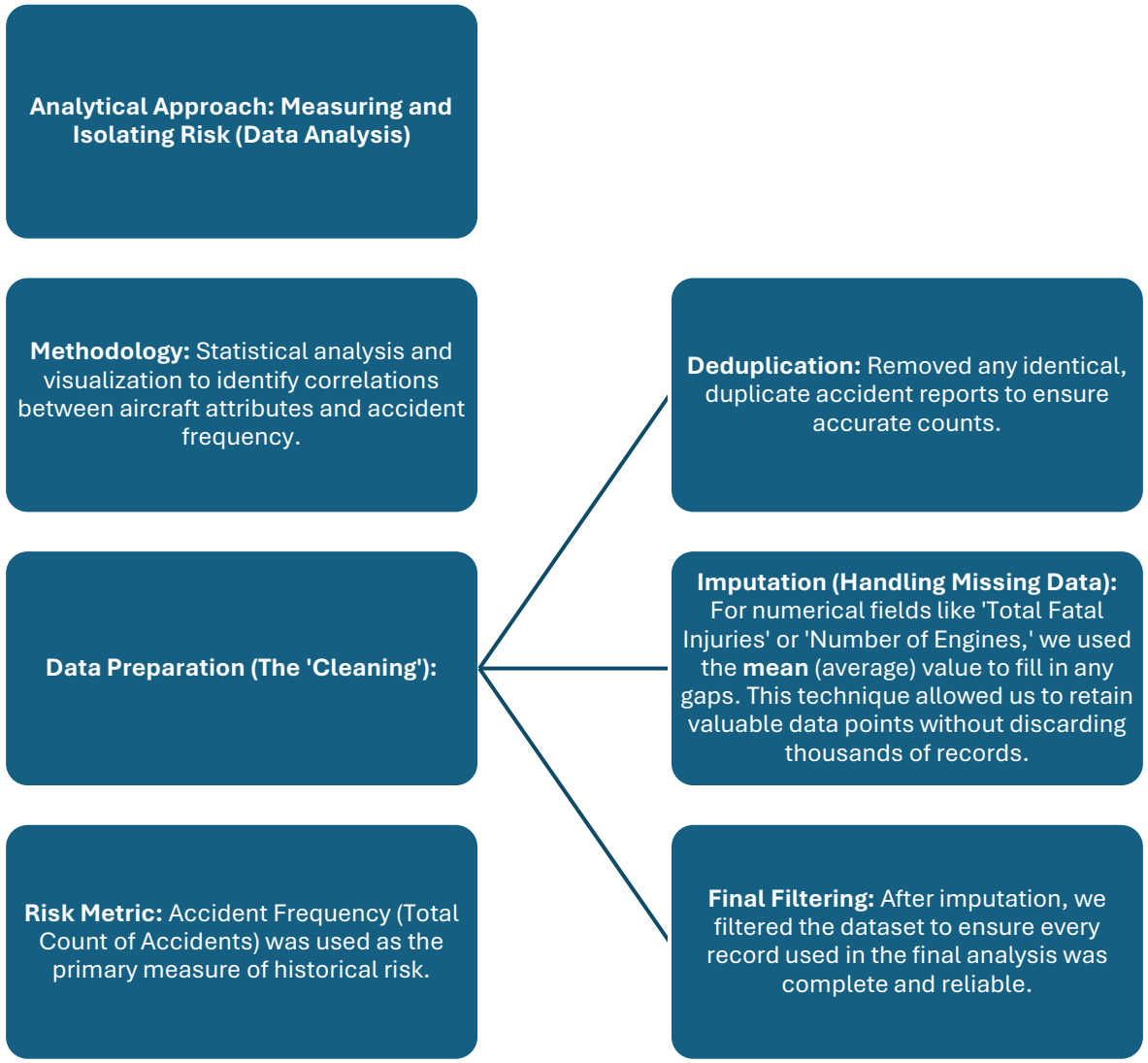
The Mandate: Our company is expanding its portfolio by entering the aviation industry (commercial and private enterprises).

The Challenge: We currently lack internal expertise regarding the potential risks associated with various aircraft types.

The Goal: Our primary objective is to use historical accident data to **identify the lowest-risk aircraft** available for purchase.

The Deliverable: Actionable, data-backed insights to guide the Head of the new Aviation Division in selecting the initial fleet.


Understanding the Data: The Aviation Safety Record (Data Understanding)
Data Source: Comprehensive historical records of aviation accidents and incidents.
Data Size: The raw dataset contained over 90,000 unique event records.
Key Risk Metrics Analyzed:
•Aircraft Identification: Manufacturer (Make) and specific Model.
•Injury Severity: Total Fatal, Serious, and Minor Injuries.
•Damage Extent: The severity of aircraft damage (e.g., Destroyed).
•Operational Context: Phase of flight (e.g., Cruise, Approach) and Weather Condition.


Analytical Approach: Measuring and Isolating Risk (Data Analysis)
Methodology: Statistical analysis and visualization to identify correlations between aircraft attributes and accident frequency.
Data Preparation (The 'Cleaning'):
Risk Metric: Accident Frequency (Total Count of Accidents) was used as the primary measure of historical risk.
Deduplication: Removed any identical, duplicate accident reports to ensure accurate counts.
Imputation (Handling Missing Data): For numerical fields like 'Total Fatal Injuries' or 'Number of Engines,' we used the mean (average) value to fill in any gaps. This technique allowed us to retain valuable data points without discarding thousands of records.
Final Filtering: After imputation, we filtered the dataset to ensure every record used in the final analysis was complete and reliable.

Manufacturer Reliability

Visualization: Bar Chart: Total Accident Count by Top Aircraft Manufacturer (Make).

(Your analysis showed Cessna with the most accidents, followed by Piper and Beech.)

Insight: Historical data shows a clear divergence in risk profiles across manufacturers. Cessna aircraft have been involved in a significantly higher number of reported accidents compared to other major manufacturers.

Conversely, makes like Boeing demonstrate a much lower accident frequency in this dataset, indicating higher historical reliability.

Recommendation 1: Prioritize Proven Reliability

Recommendation: For commercial operations requiring high reliability and passenger capacity, prioritize models from manufacturers like **Boeing**.

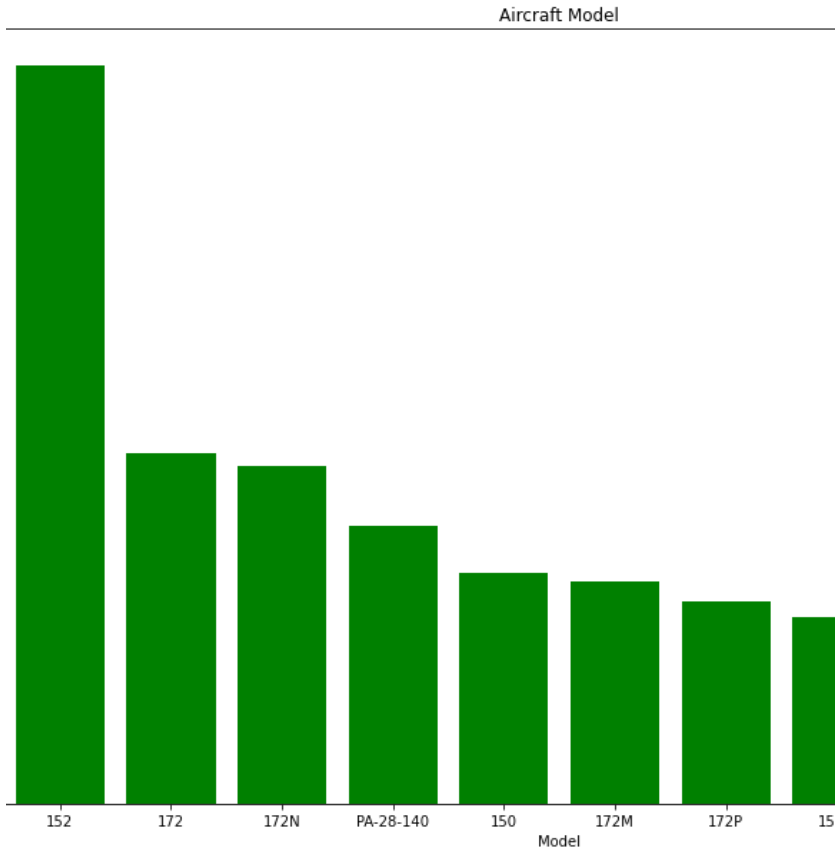
Action: To minimize initial risk exposure, the company should **avoid or heavily scrutinize the purchase of Cessna aircraft**, as they carry the highest historical risk profile in terms of accident count.

Result 2: Model-Specific Risk

Visualization: Bar Chart: Total Accident Count by Top Aircraft Model.

Insight: The risk assessment must be drilled down to the model level. The **Cessna 152** and **Cessna 172** models, often used for training and private flight, represent the highest accident frequency of all models in the data.

Conversely, the Piper PA-28-180 is an example of a model that showed a highly reliable record with the least number of accidents.



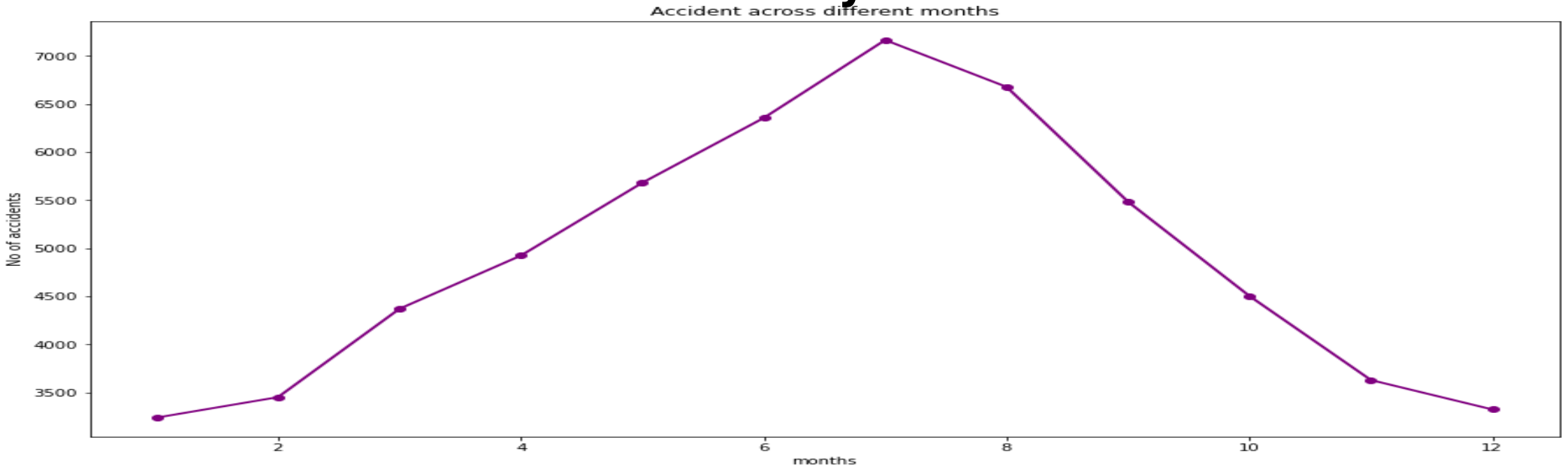
Recommendation 2: Focus on Low-Risk Models for Private Fleet

Recommendation: For the private enterprise fleet, focus on models with historically low accident rates, such as the **Piper PA-28-180**.

Action: Formally place high-risk models, especially the **Cessna 152 and 172**, on a restricted purchase list. Any potential purchase of these models would require extensive due diligence regarding recent safety upgrades and intended operational use.

• Seasonal Risk Assessment

- **Visualization: Aviation Accidents by Month of the Year.**



- **Insight:** Accident data shows a distinct seasonal pattern, with the **number of incidents peaking during the summer months** (June, July, August). This is likely correlated with a higher volume of commercial and recreational flights operating during this period.

Recommendation 3: Implement Seasonal Safety Protocols

Recommendation: Implement **enhanced operational caution and safety protocols during the summer season.**

Action: This is an operational, not purchasing, recommendation. It could involve:

- Mandatory summer refresher briefings for pilots.
- Increased staffing for maintenance and oversight from late spring to early fall.
- Scheduling maintenance outside of the peak summer season to ensure maximum fleet readiness during the highest-risk months.

Next Steps

Cost Integration: Integrate the identified low-risk models with detailed financial data, including acquisition costs, estimated maintenance, and operating expenses, to determine the final *most profitable* purchase list.

Risk Mitigation Analysis: Conduct a follow-up analysis on the recommended low-risk models to determine the primary *cause* of their few reported incidents (e.g., mechanical failure vs. environmental factors) to inform targeted preventative maintenance programs.

Geographic Review: Filter this risk analysis to focus specifically on the countries or regions where the new division plans to launch operations.

Thank You

Thank You: Thank you for your time and attention.

Questions: I welcome any questions from the team.

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