AVIATION RISK INSIGHTS

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PROJECT OVERVIEW

Goal:
Identify the safest aircraft makes for business investment through data-driven analysis of aviation accidents.

Audience:
Company leadership and the new aviation division team.

Dataset:
National Transportation Safety Board data including event dates, locations, aircraft make, engine types, number of injuries, fatalities, and flight purposes [1962 to 2023]

BUSINESS UNDERSTANDING

Company expanding into **aviation sector**

Needs to assess **aircraft safety risks**

Goal: Identify **low-risk aircraft** for investment

Support informed decisions for **fleet acquisition**

DATA UNDERSTANDING

Dataset from National Transportation Safety Board

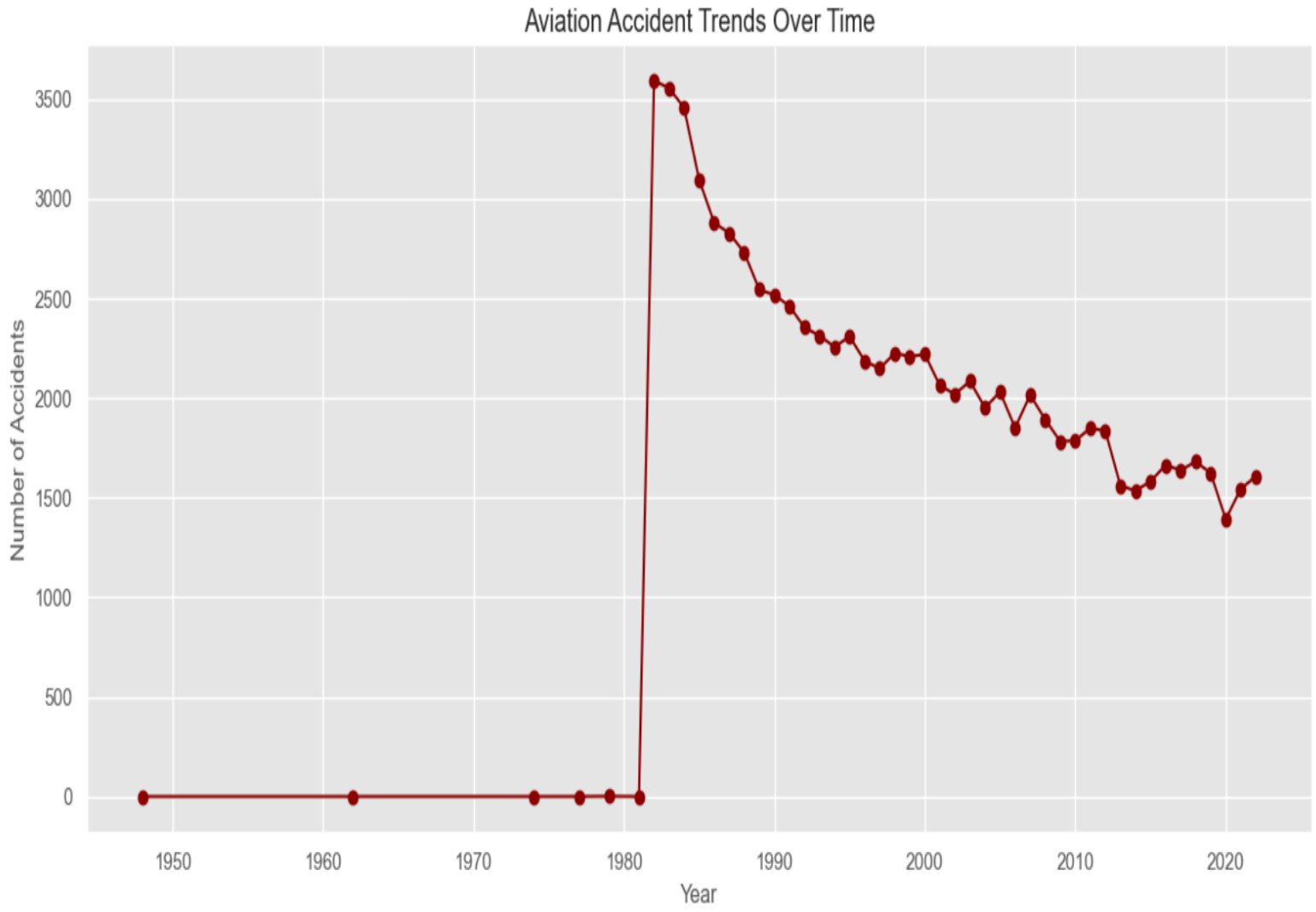
Includes:

- Aircraft make & model
- Accident date & location
- Injury & fatality counts
- Flight purpose & engine type

Focus: Identify patterns in **accidents & risk factors**

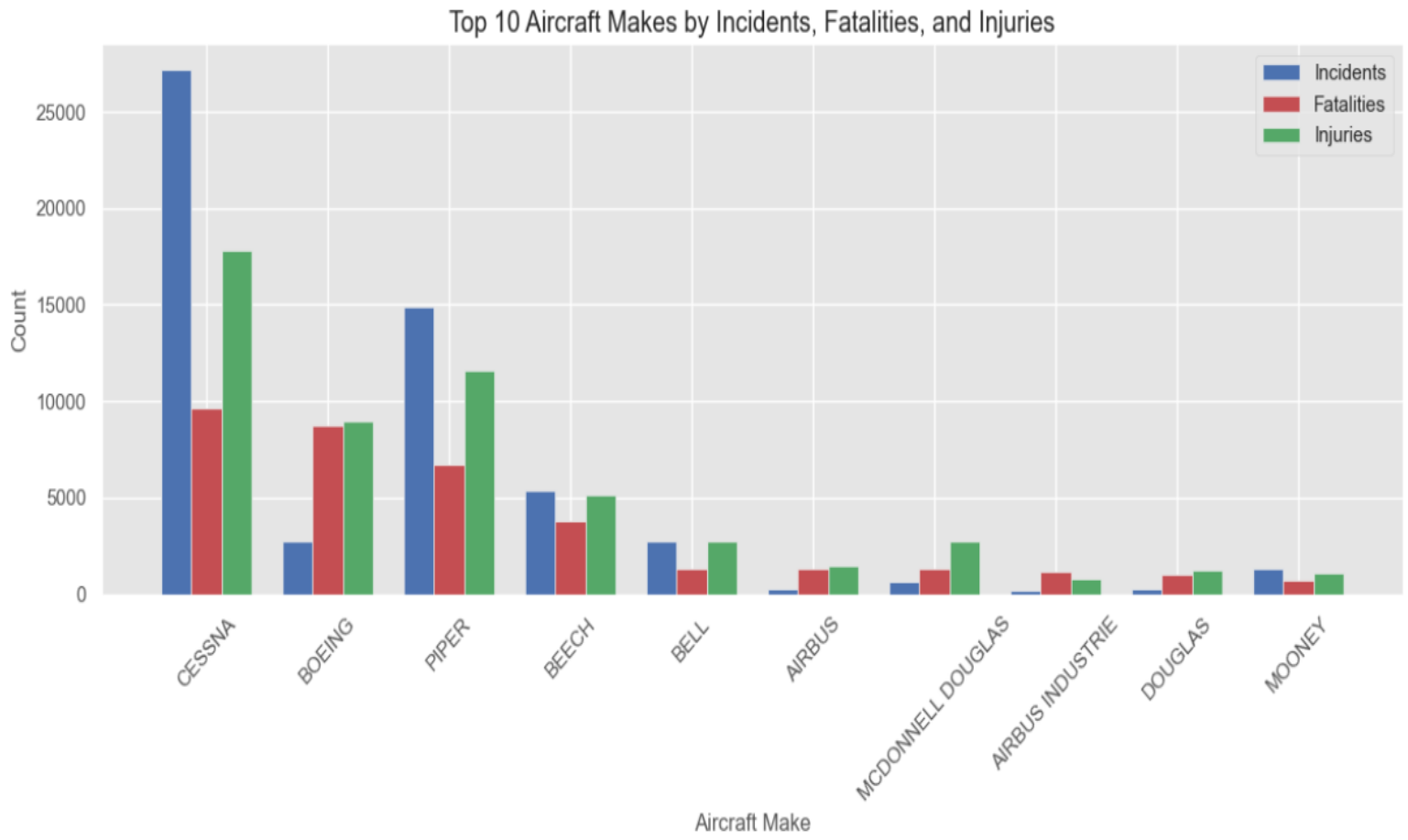
AVIATION ACCIDENT TRENDS OVER TIME

A sharp spike in 1982 likely reflects improved data reporting. Since then, accidents have declined steadily due to stronger regulations, better compliance, and major technological advances. **Modern aviation is far safer** today, but maintaining safety requires ongoing investment in equipment, training, and a strong safety culture.



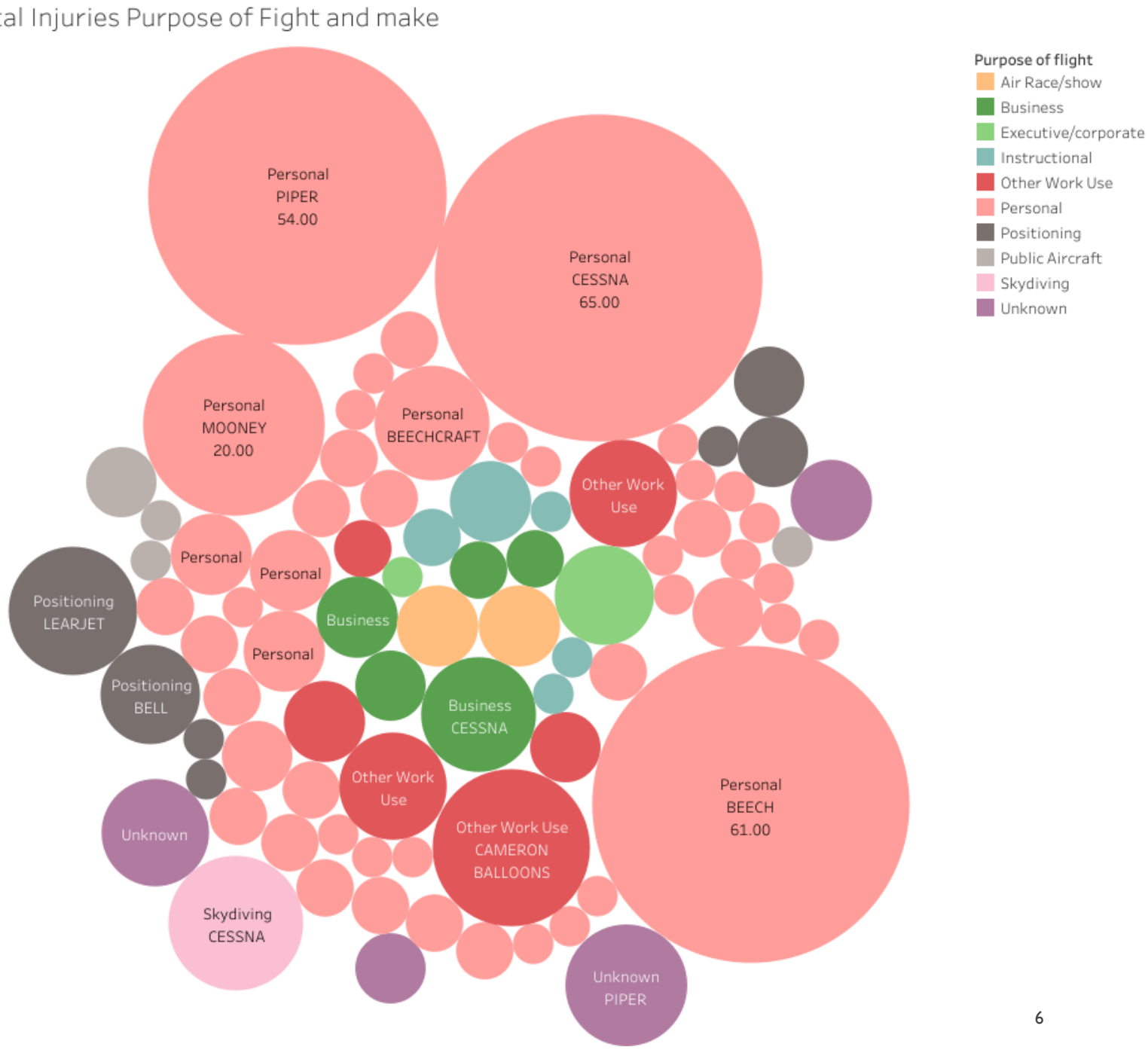
TOP 10 AIRCRAFT MAKES WITH HIGHEST INJURIES

Cessna leads in all three categories, followed by Piper and Boeing. This suggests that while these makes are commonly used, they may also carry higher operational risk due to their incident history.



TOTAL INJURIES, PURPOSE OF FLIGHT & MAKE

Personal flights account for the highest number of injuries, with Cessna, Piper, and Beech aircraft being the most involved. Other significant injury counts are linked to "Other Work Use" and skydiving operations. In contrast, business and executive flights show relatively lower injury rates.



NUMBER OF ACCIDENTS BY ENGINE TYPES

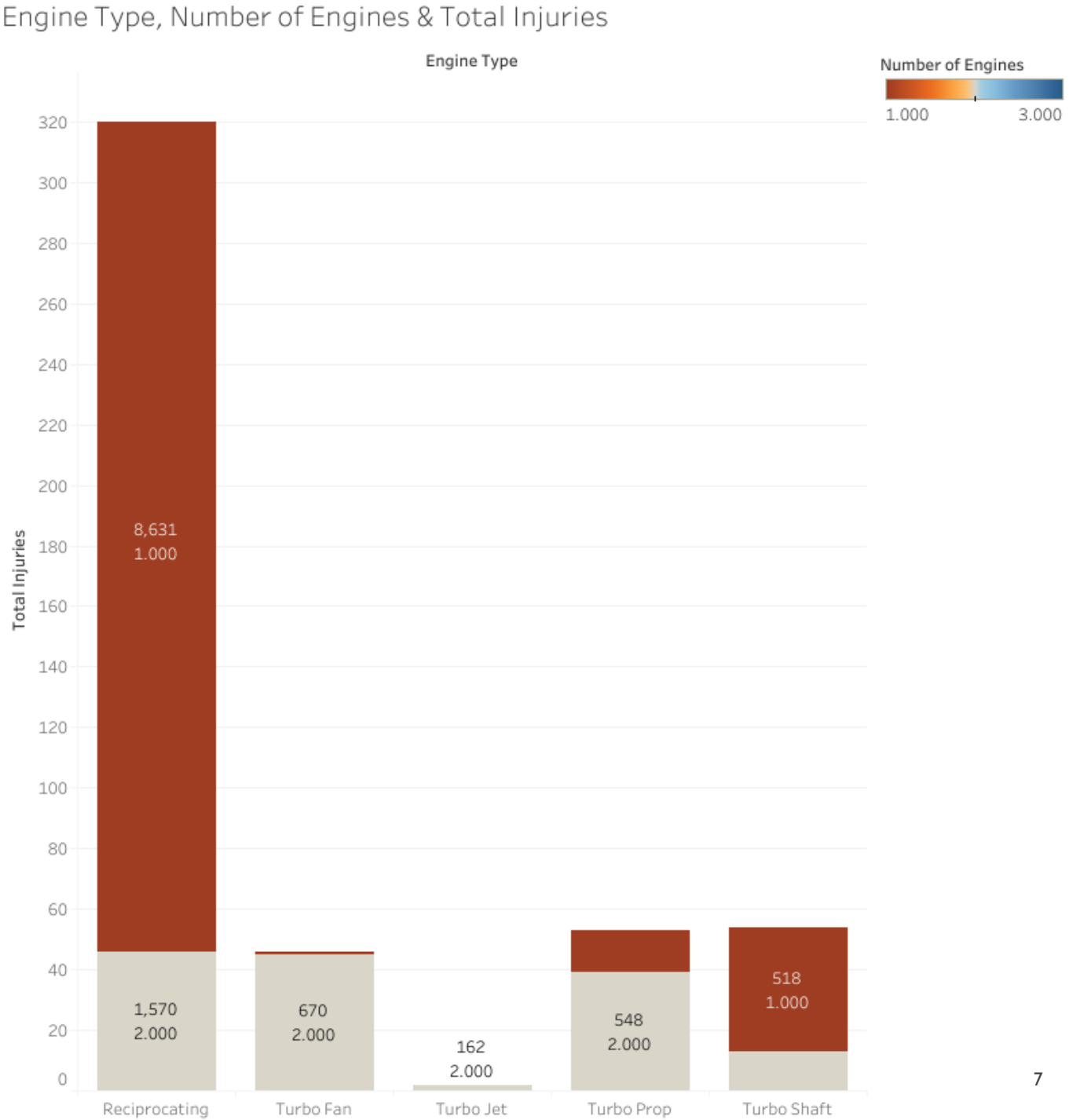
Reciprocating (1 engine): 8,631 injuries – highest risk in single-engine aircraft.

Reciprocating (2 engines): 1,570 injuries – still high but significantly lower than single-engine.

Turbo Fan & Turbo Jet (2 engines): Low injuries – 670 and 162 respectively; commercial use is safer.

Turbo Prop (2 engines): 548 injuries – moderate incidents in twin-engine propeller planes.

Turbo Shaft (1 engine): 518 injuries – mostly helicopters, moderate injury count.



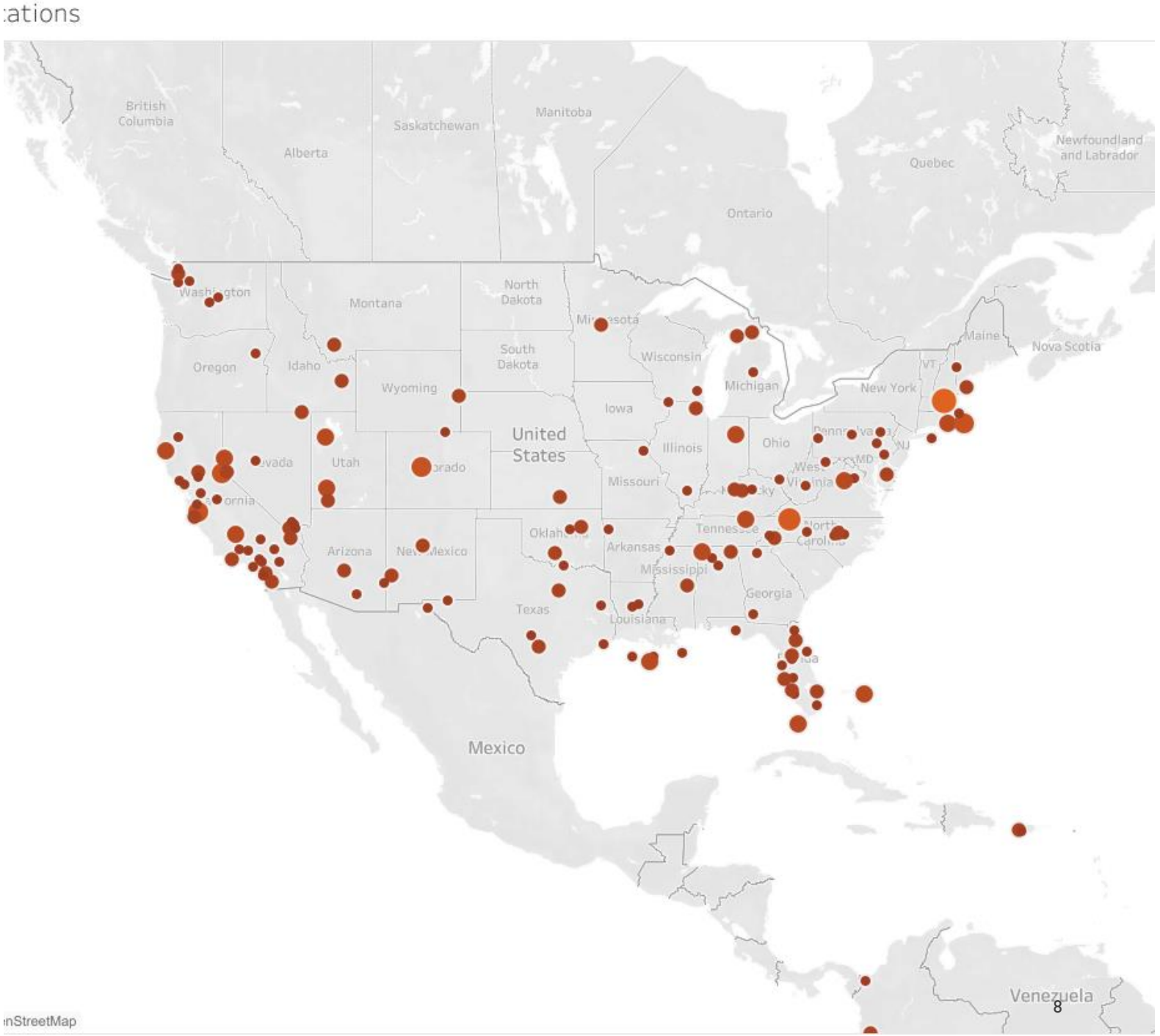
GEOGRAPHIC ACCIDENT DISTRIBUTION

Most fatal aviation accidents occur in the United States.

Hotspots: California, Florida, Texas, New York, Arizona.

Larger circles = more fatalities (up to 25).

Other regions show fewer incidents due to lower traffic or limited data



TOP 10 AIRCRAFT WITH FEW INCIDENTS

These aircraft models show **incident occurrences without serious consequences**, suggesting effective safety features, crew response, or favorable incident conditions. It highlights that not all incidents lead to harm, especially with robust aviation safety systems in place.

Aircraft	Total_Incidents	Total_Fatalities	Total_Injuries
AGUSTAWESTLAND AW139	5	0.0	0.0
AIRBUS A220	5	0.0	0.0
AIRBUS INDUSTRIE A319-111	5	0.0	0.0
BEECH 99A	5	0.0	0.0
BOEING 727-233	5	0.0	0.0
BOEING B737	5	0.0	0.0
BOEING B75-N1	5	0.0	0.0
BOMBARDIER CL-600	5	0.0	0.0
BOMBARDIER CL600 2D24	5	0.0	0.0
DASSAULT DA-20	5	0.0	0.0
DIAMOND DA 40	5	0.0	0.0
DOUGLAS DC-8-71	5	0.0	0.0
HELIO H-395	5	0.0	0.0
HUGHES 300C	5	0.0	0.0
MAULE M-4-210	5	0.0	0.0
MAULE M-6	5	0.0	0.0
MAULE M-7-260C	5	0.0	0.0
NORTH AMERICAN NA-265-40	5	0.0	0.0
PIPER PA 28R	5	0.0	0.0
PIPER PA 34	5	0.0	0.0

CONCLUSION

- The aviation industry has made significant strides in safety due to stringent regulations and technological improvements, resulting in a steady decline in accidents over the years. However, risk varies considerably across aircraft types, engine configurations, and operational purposes.
- **Single-engine reciprocating aircraft (e.g., Cessna, Piper)** pose the highest risk due to their accident and injury history, particularly in personal and recreational flights.
- **Twin-engine and jet-powered aircraft** have significantly lower incident rates, making them more reliable for commercial and executive purposes.
- Geographic hotspots in the U.S. such as California, Florida, and Texas highlight where additional operational vigilance and localized safety measures may be required.

RECOMMENDATIONS

1

Prioritize Twin-Engine Turboprops or Jets Focus on acquiring **twin-engine turbojets or turbofans**, which have a low accident record and are ideal for commercial and business travel.

2

Avoid Single-Engine Reciprocating Aircraft: Minimize or avoid investment in single-engine aircraft like Cessna and Piper for commercial operations due to their higher injury rates.

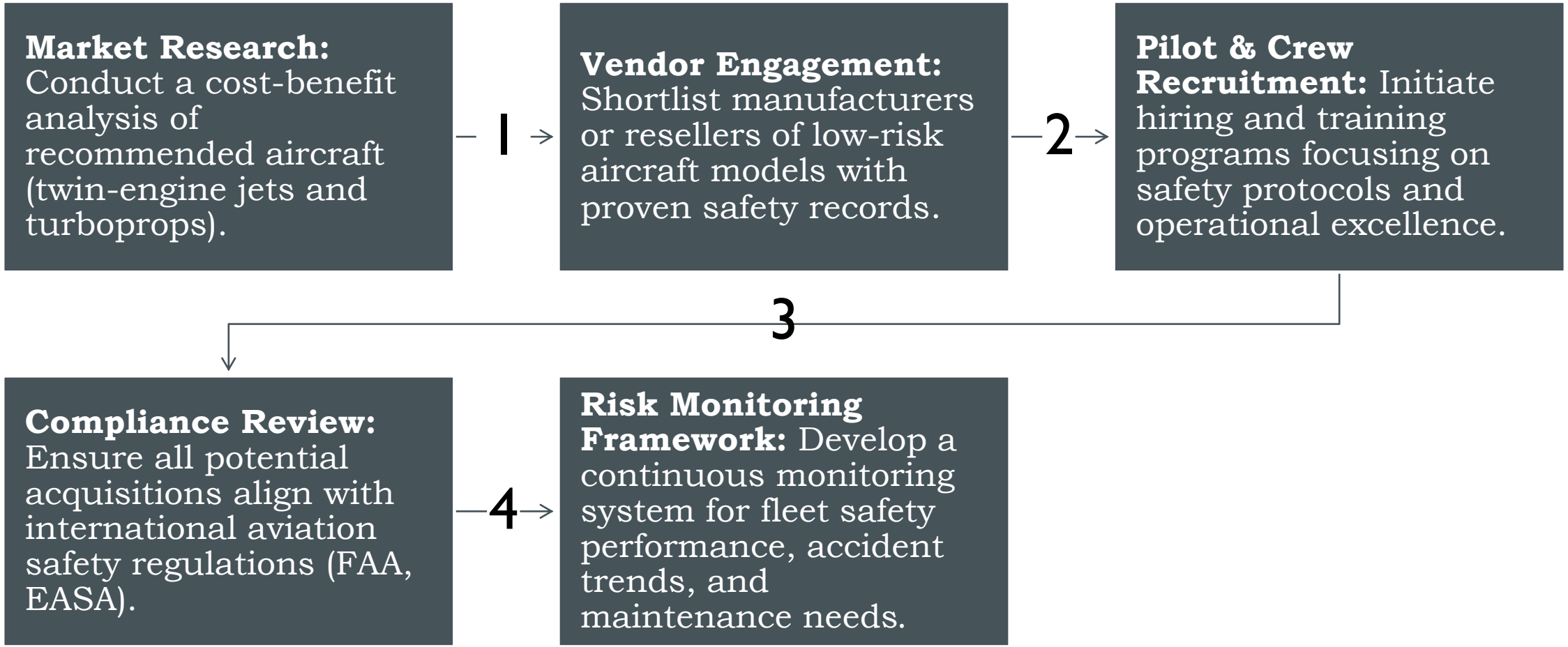
3

Implement a Strong Safety Culture: Invest in **advanced pilot training, maintenance protocols, and safety management systems (SMS)** to mitigate operational risks.

4

Leverage Aircraft with Strong Safety Records: Target models highlighted in the "Top 10 Aircraft with Few Incidents" category as initial fleet choices.

NEXT STEPS


Market Research: Conduct a cost-benefit analysis of recommended aircraft (twin-engine jets and turboprops).
1
Vendor Engagement: Shortlist manufacturers or resellers of low-risk aircraft models with proven safety records.
2
Pilot & Crew Recruitment: Initiate hiring and training programs focusing on safety protocols and operational excellence.
3
Compliance Review: Ensure all potential acquisitions align with international aviation safety regulations (FAA, EASA).
4
Risk Monitoring Framework: Develop a continuous monitoring system for fleet safety performance, accident trends, and maintenance needs.

QUESTIONS

THANK YOU

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Website

1. git@github.com:godfreyosundwa254/Phase-1-Project.git
2. https://public.tableau.com/shared/Y6PPJ97PN?:display_count=n&:origin=viz_share_link