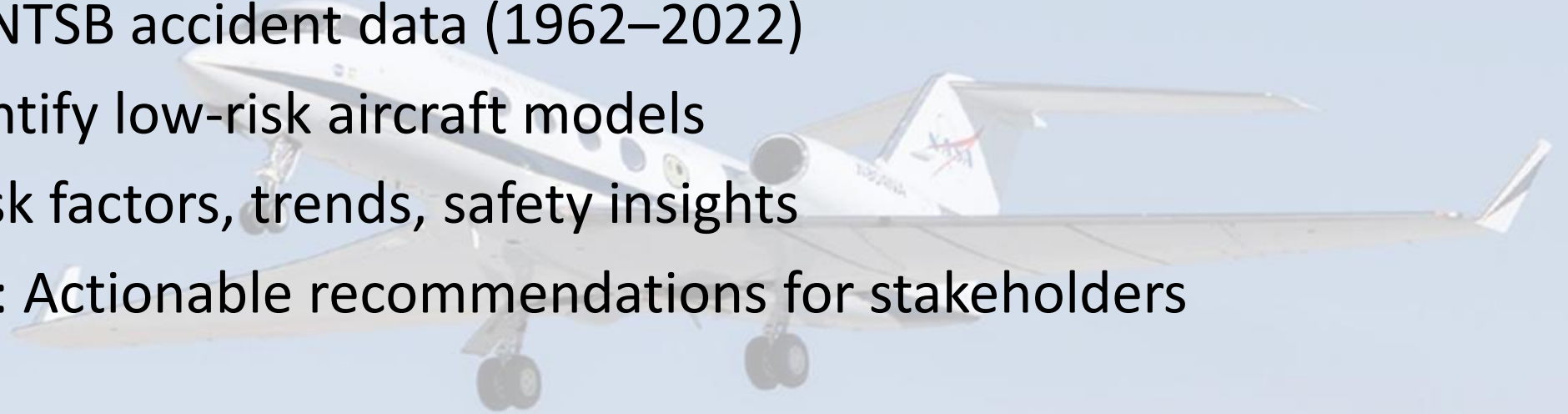


# Aviation Safety Analysis for Aircraft Acquisition

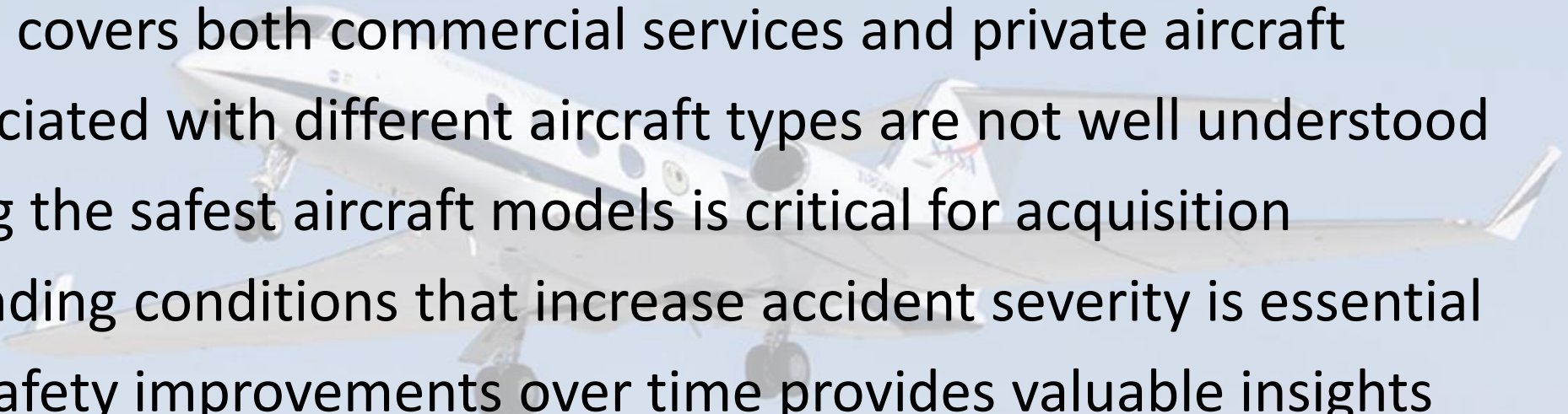


# Overview

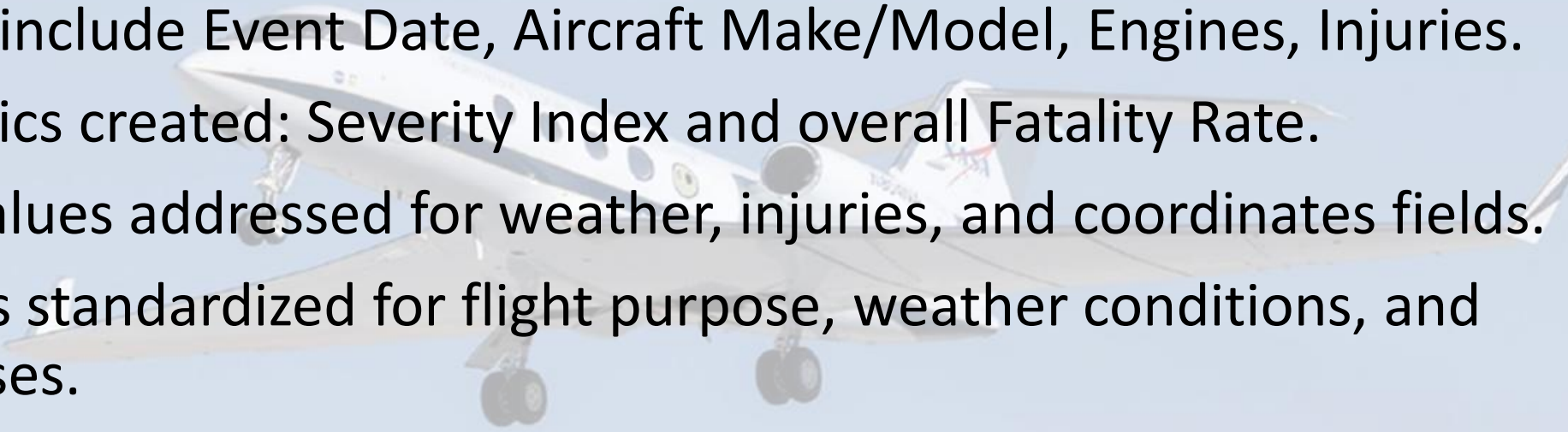
- Purpose: Guide aircraft purchase decisions
- Dataset: NTSB accident data (1962–2022)
- Goal: Identify low-risk aircraft models
- Focus: Risk factors, trends, safety insights
- Outcome: Actionable recommendations for stakeholders



# Business Understanding

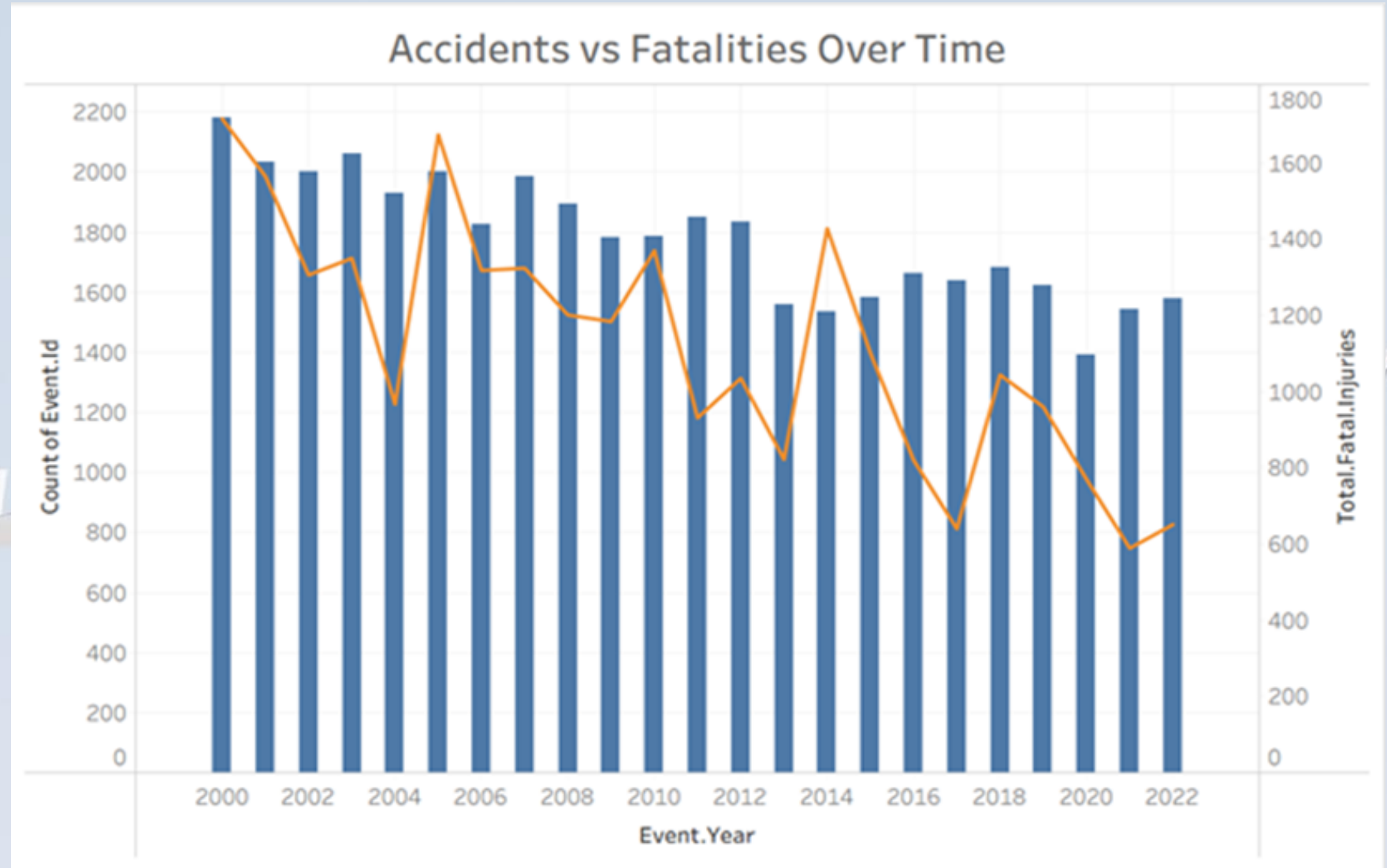
- Company is preparing to expand into aviation operations
  - Expansion covers both commercial services and private aircraft
  - Risks associated with different aircraft types are not well understood
  - Identifying the safest aircraft models is critical for acquisition
  - Understanding conditions that increase accident severity is essential
  - Tracking safety improvements over time provides valuable insights
- 

# Data Understanding

- Dataset contains ~88,000 records, filtered to 2000–2022 period.
  - Key fields include Event Date, Aircraft Make/Model, Engines, Injuries.
  - New metrics created: Severity Index and overall Fatality Rate.
  - Missing values addressed for weather, injuries, and coordinates fields.
  - Categories standardized for flight purpose, weather conditions, and flight phases.
  - Duplicates removed, irrelevant columns dropped for cleaner dataset.
- 

# Data Analysis – Accident Trends

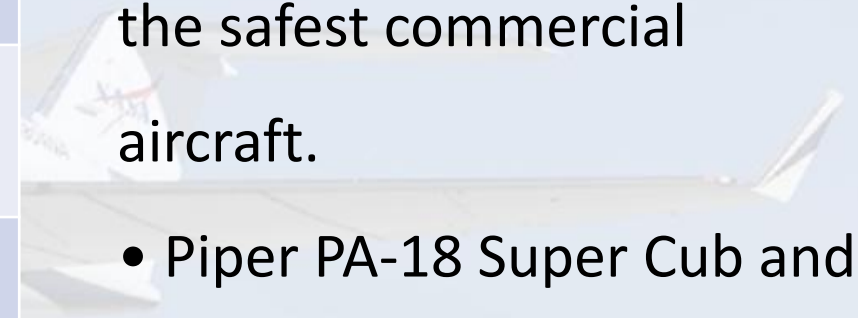
- Annual accidents remain relatively steady, but fatalities show a clear downward trend.



# Data Analysis – Risk by Aircraft

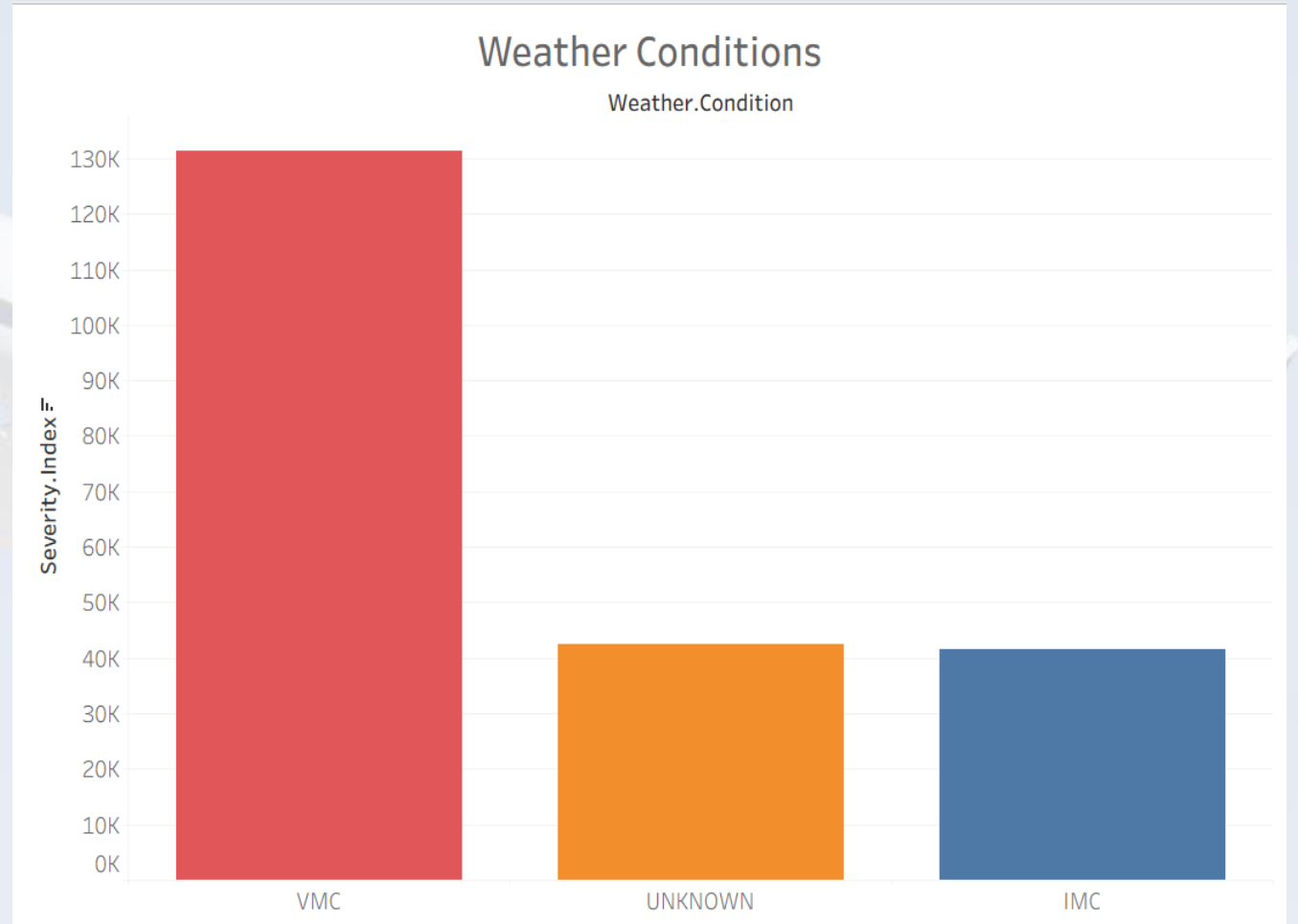
Model	Type	Accidents	Fatalities	Severity Index	Fatality Rate
Boeing 737-800	Commercial jet	32	0	0.1875	0.0000
Grumman G-164B Ag Cat	Agricultural	31	1	0.2581	0.0323
Eagle DW-1	Agricultural	39	1	0.3333	0.0256
Piper PA-18 Super Cub (160)	Light aircraft	31	1	0.3548	0.0323
Piper PA-12 Super Cruiser	Light aircraft	37	2	0.3784	0.0541
Embraer E175	Commercial jet	45	2	0.4222	0.0444

- Boeing 737-800 and Embraer E175 stand out as the safest commercial aircraft.
- Piper PA-18 Super Cub and Grumman G-164B show very low fatality rates among smaller aircraft.



# Operational/Environmental Factors

- Accidents in poor weather show higher severity
- Approach and landing phases carry the greatest risk
- Instrument conditions (IMC) strongly increase accident severity
- Visual conditions (VMC) are linked to safer outcomes
- Commercial operations show lower risk than general aviation



# KPI (2000–2022)

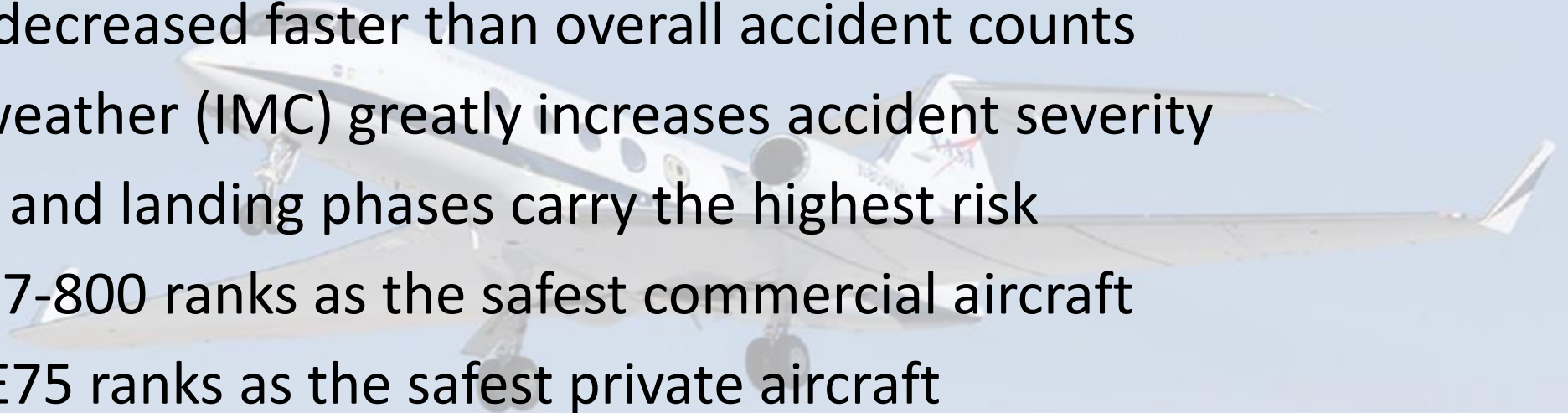
Avg Severity Index	Total Accidents (2000–2022)	Fatality Rate (%)	Safest Commercial Aircraft (2000–2022)	Safest Private Aircraft (2000–2022)
2.45	40,972	55.2%	Make-.. BOEING 737-800 #####	Make-.. BOEING E75 #####

- Total accidents analyzed: 40,972
- Average severity index: 2.45
- Overall fatality rate: 55.2%
- Safest commercial aircraft: Boeing 737-800
- Safest private aircraft: Embraer E75



# Key Findings

- Accident and fatality rates have declined since 2000
- Fatalities decreased faster than overall accident counts
- Adverse weather (IMC) greatly increases accident severity
- Approach and landing phases carry the highest risk
- Boeing 737-800 ranks as the safest commercial aircraft
- Embraer E75 ranks as the safest private aircraft



# Recommendations

- Prioritize acquisition of Boeing 737-800 for commercial operations due to lowest severity index and zero fatality rate.
- Select Embraer E75 or equivalent small jets for private operations, offering low risk with manageable accident counts.
- Favor commercial operations over general aviation, as accidents in commercial aircraft show consistently lower fatality proportions.

