

A decorative graphic on the left side of the slide. It consists of a blue parallelogram and a light green parallelogram, both tilted at an angle. The blue shape is in the foreground, and the green shape is partially behind it. They are set against a dark blue background with faint, lighter blue diagonal stripes.

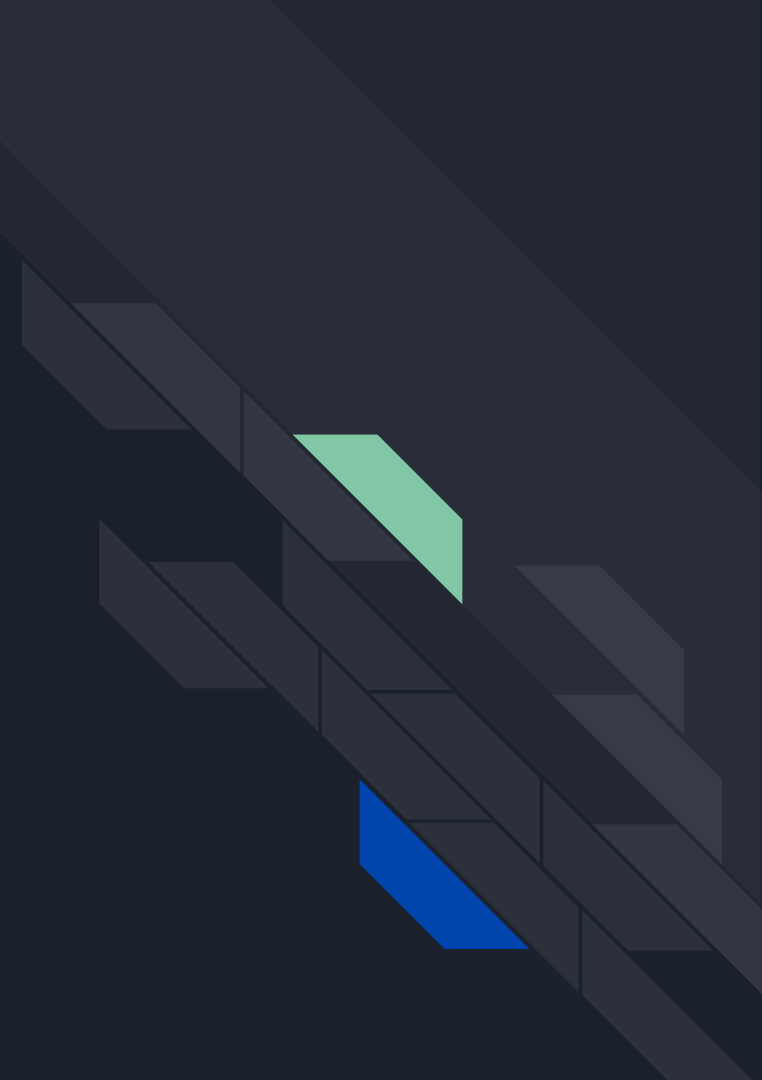
# Aviations With the Lowest Risk



# Why do businesses use aviation?

- Passenger Transportation
- Cargo Transportation
- Private Enterprises

Which three aircraft do we recommend that have the lowest risk for the company's endeavors?



A decorative graphic on the left side of the slide. It consists of a blue parallelogram and a light green parallelogram, both tilted at an angle. The blue shape is in the foreground, and the green shape is partially behind it. They are set against a dark blue background with subtle diagonal lines.

# About the Data



## Understanding the Data

Aviation crash information on over 8,000 makes and over 12,000 models dating back to 1948.

From Kaggle called “Aviation Accident Database & Synopses”



# Understanding the Data

Consists of:

- Aircraft Category, Make, and Model
- Damage Amount
- Number of People Injured and Uninjured
- Engine information (Type and Number of Engines)
- Phase of Flight
- Date
- And more...

# Data Analysis: 3 Categories for our Business Recommendation



# 1. Passenger Transport





# Does information of the engines have any correlation to the amount of makes that have crashed?

When analysing our data we came across the observation that there are different engine types and different amounts of engines that vary in different makes.

```
In [154]: df_airplane['number_of_engines'].value
```

```
Out[154]: 1.0    21176
          2.0    3515
          4.0     103
          3.0      58
          0.0       9
          6.0        1
          8.0        1
          Name: number_of_engines, dtype: int64
```

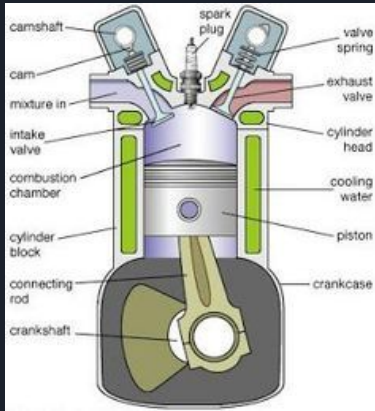
```
In [156]: df_airplane['engine_type'].value_counts()
```

```
Out[156]: Reciprocating    20715
          Turbo Prop      1366
          Turbo Fan       970
          Turbo Jet       158
          Unknown         153
          Geared Turbofan   12
          Turbo Shaft      11
          Electric         5
          UNK              1
          Name: engine_type, dtype: int64
```

When diving deeper into analysing these columns we can see that the most crashes in airplanes happened with a model that only had 1 engine. When we analyse the engine type we can see that most of these engines were the Reciprocating engine.

# Researching our Findings Regarding the Engines

The Reciprocating engine was developed in the 18th century and stopped being as largely used in 1994 when turboprops and jet engines took over in aviation. They also do not hold a lot of power because a reciprocating engine is only one combustion engine hence they can only power small planes. (i.e 20 people)



We decided to exclude the reciprocating engine and any makes with only 1 engine from our data to determine what to recommend.

# Researching our Findings Regarding the Engines

We can also see that there are crashes with 6 and 8 engines... those are not common and its unusual for a commercial passenger plane to have more than 4 engines. We also decided to exclude these engines.

```
In [154]: df_airplane['number_of_engines'].value
```

```
Out[154]: 1.0    21176  
          2.0    3515  
          4.0     103  
          3.0      58  
          0.0       9  
          6.0        1  
          8.0         1  
          Name: number_of_engines, dtype: int64
```



# Filtering by Number of Engines

To better determine which number of engines to recommend we created three new dataframes only containing information for the number of engines we are interested in that moment, example; `df_enginenum_two`, `df_enginenum_three`, and `df_enginenum_four`.

Then turning those dataframes into csv files so we can inspect the filtered data in Tableau.

This is a filter for planes with two engines and a new dataframe consisting of data only for planes with 2 engines:

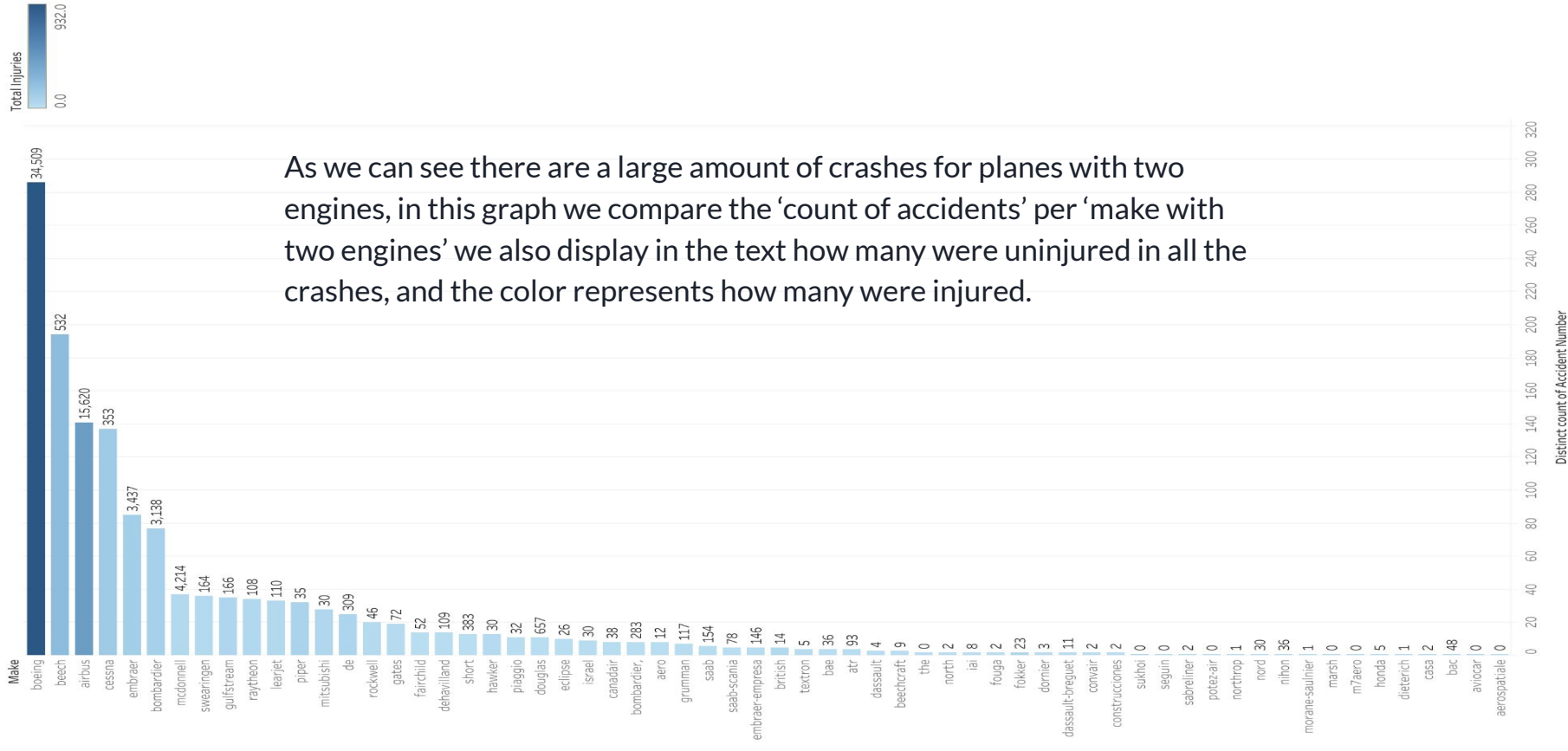
```
df_clean_airplanes_w_2_engines = df_clean_airplanes.loc[df_clean_airplanes['number_of_engines'] == 2.0]
```

df to csv:

```
df_clean_airplanes_w_2_engines.to_csv('two_engine_planes.csv')
```

# Total Crashes for Makes with Two Engines

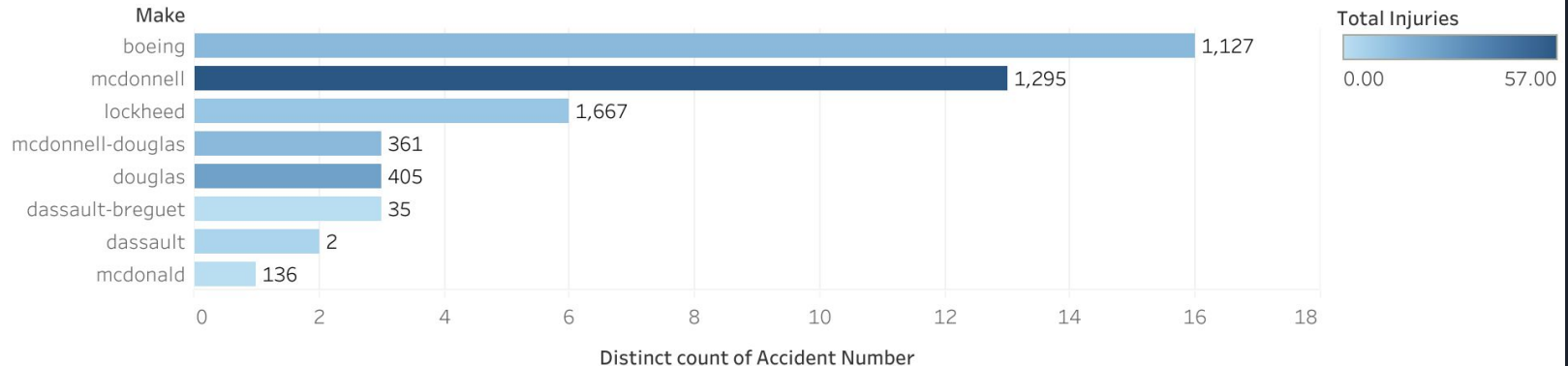
Plane makes with 2 engines and their crashes number also showing how many injured and uninjured



# Total Crashes for Makes with Three Engines

Now the planes with three engines have significantly less makes that crashed, we can also see that the amount of accidents for each make have also gone down with the total number of injured and uninjured

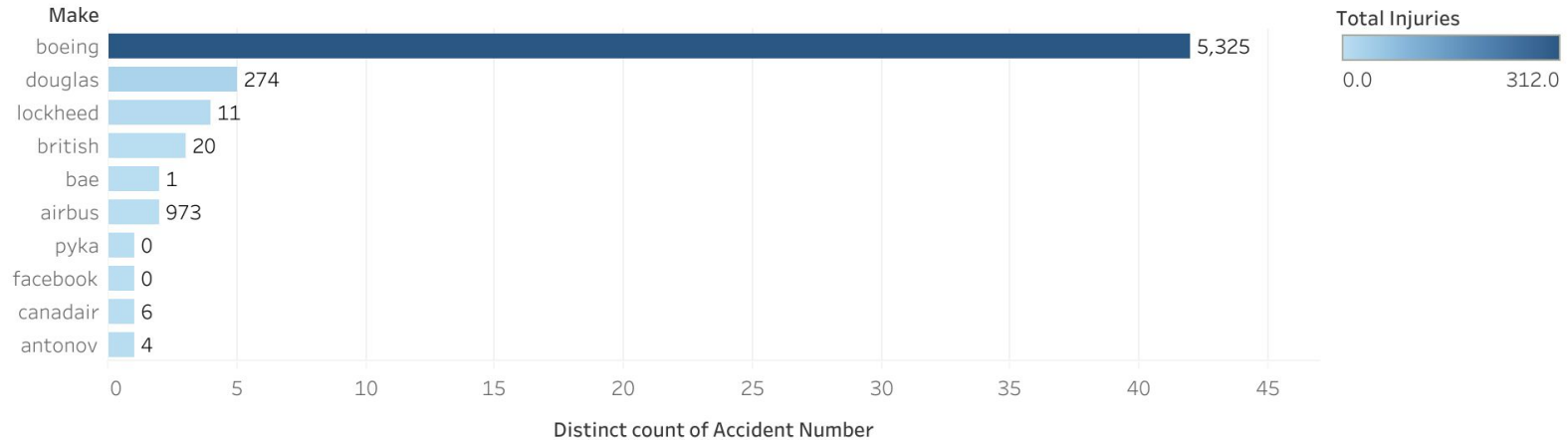
Plane makes with three engines displaying how many injured or uninjured in all crashes



# Total Crashes for Makes with Four Engines

As we can see the makes with four engines still crashed significantly less than the makes with two engines although, for example Boeing with four engines crashed slightly more than Boeing with three engines, and had slightly more injuries but more uninjured throughout the crashes.

Total Accidents of Plane Makes with Four Engines - Including Total Injured vs Uninjured



# Final Engine and Make Decisions for Passengers

After analysing the following graphs we have decided that a boeing make with 3 engines is the safest for passenger commercial planes because of accident to injury ratio, being the best out of the makes with 3 engines

Another possibility is that 4 engines could be used for cargo planes because of the more power they carry, because they are safe but slightly less safe than 3 engines.

three



four





## 2. Cargo Transport



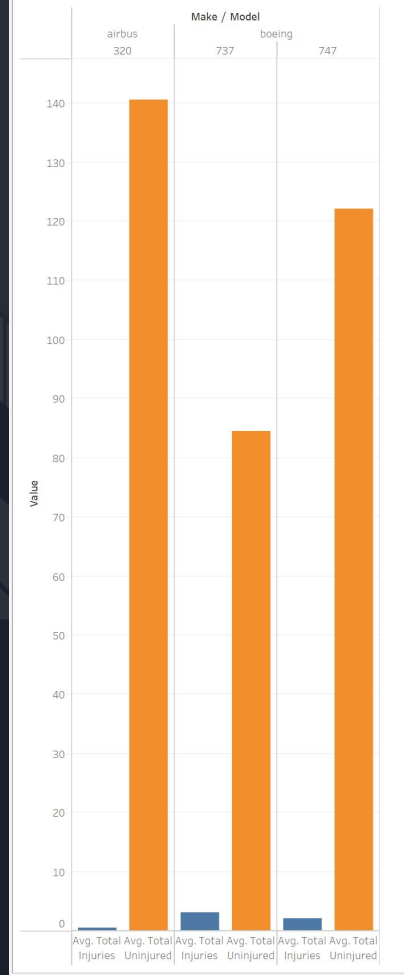
- 'Top-down' approach.
- Most carriers are converted passenger jets.
- Narrowed down to four options:
  - Boeing
    - 747
    - 737
  - Airbus
    - 320
    - 340



# Comparison Between the three planes.

- (340 not in data set)
- Compared average injuries to average total uninjured

1 Comparing Total Injuries To Total Uninjured



Decided to go with the Boeing 747



# Why the Boeing 747 over the Airbus 320?

- Same number of engines (4)
  - So we can't compare safety by engine number.
- Wide Body vs. Narrow Body
  - The Airbus 320 is a narrow body plane.
  - The wider body of the 747 provides more space!

## Plane Quick Facts

- Airbus (320-340)
  - 16 ton capacity
- Boeing 747 F (Freighter)
  - 107 ton capacity
  - Nose opens (really cool)



Also a very popular and reliable plane.

[Home](#) > [Analysis](#)

## The Global Cargo Workhorse: Why The Boeing 747F Is Winning

The Boeing 747F remains the aircraft of choice for major cargo providers globally.

BY JOANNA BAILEY    UPDATED SEP 18, 2022



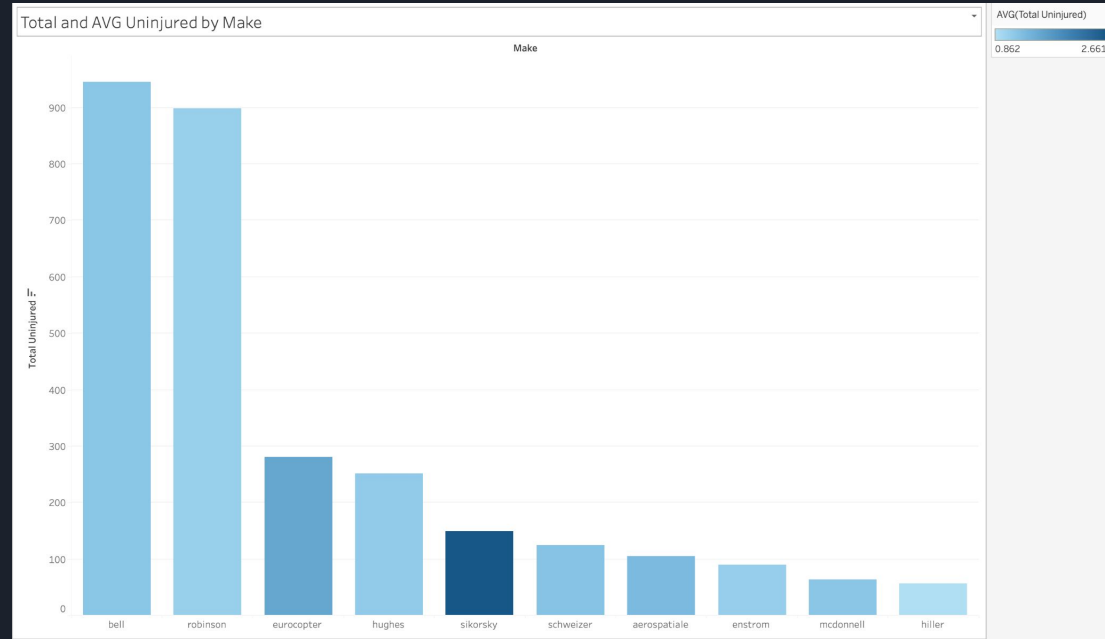
### 3. Private Enterprises (Helicopters)





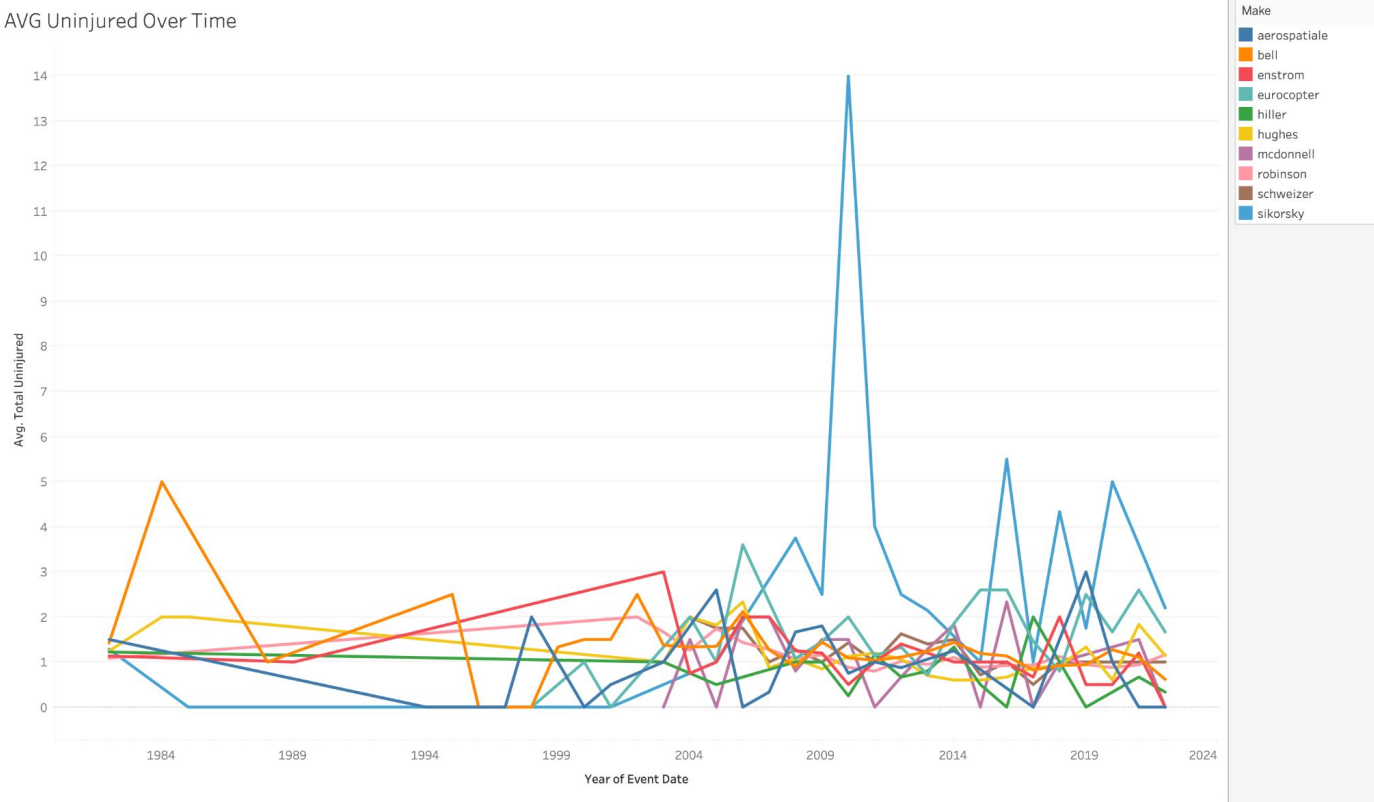
Which Helicopter Makes have the highest sum and average of uninjured passengers during a crash?

- Bell - sum
- Sikorsky - mean



# Average Uninjured Over Time by Make

AVG Uninjured Over Time



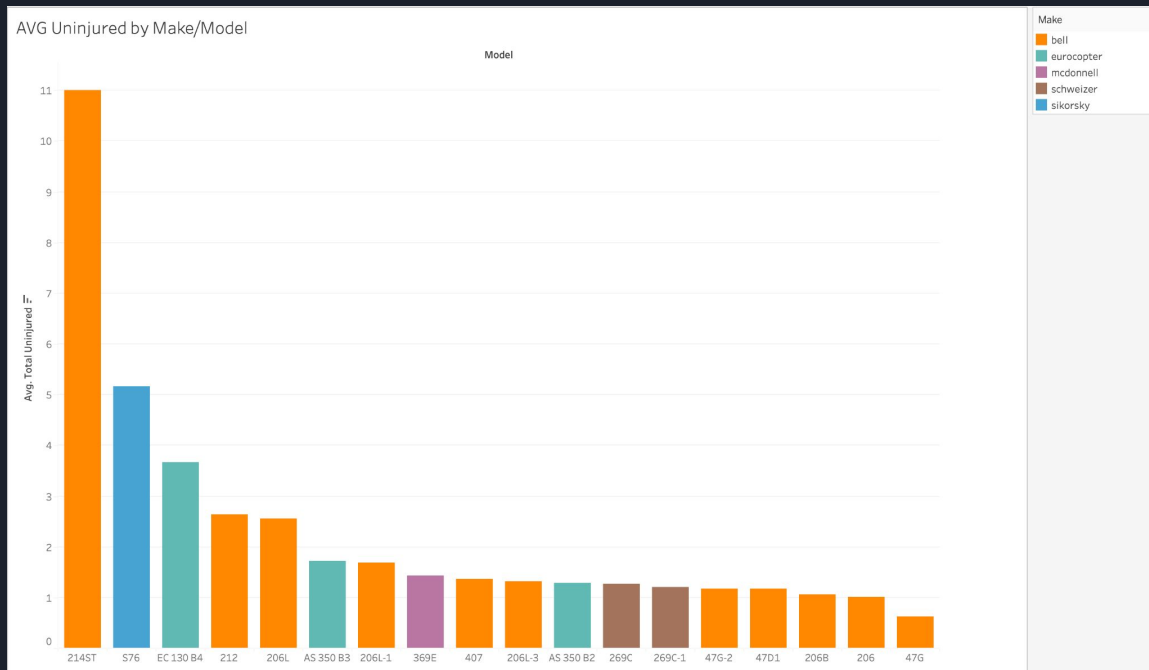
Sikorsky has the highest average of uninjured passengers over time within the last 10 or so years.

# What about Helicopter Models?

Since certain makes and models have more crash occurrences than others, I used the mean to show the ratio of uninjured passengers to the number of accidents.

Top 3 models with highest uninjured avg:

- Bell 214ST
- Sikorsky S76
- Eurocopter EC 130 B4



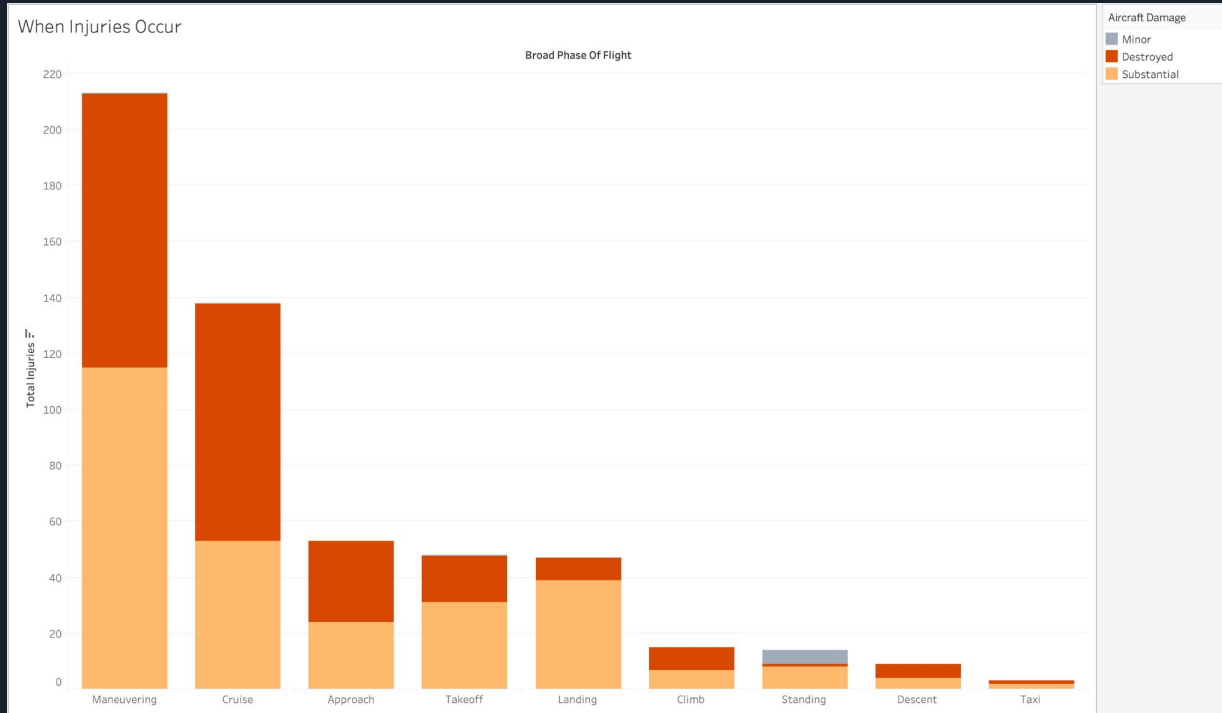
# So which Helicopter is the safest?

The Sikorsky S76 has a track record of having a very high average of uninjured passengers over time and has been trusted for transporting members of the British government. (wikipedia)

While the Bell 214ST has the highest mean of uninjured passengers, it ceased production in 1993.



# When Do Accidents Occur for Helicopters?



The most collective damage to aircrafts and people happen in the Maneuvering phase of flight.



# Final Conclusions

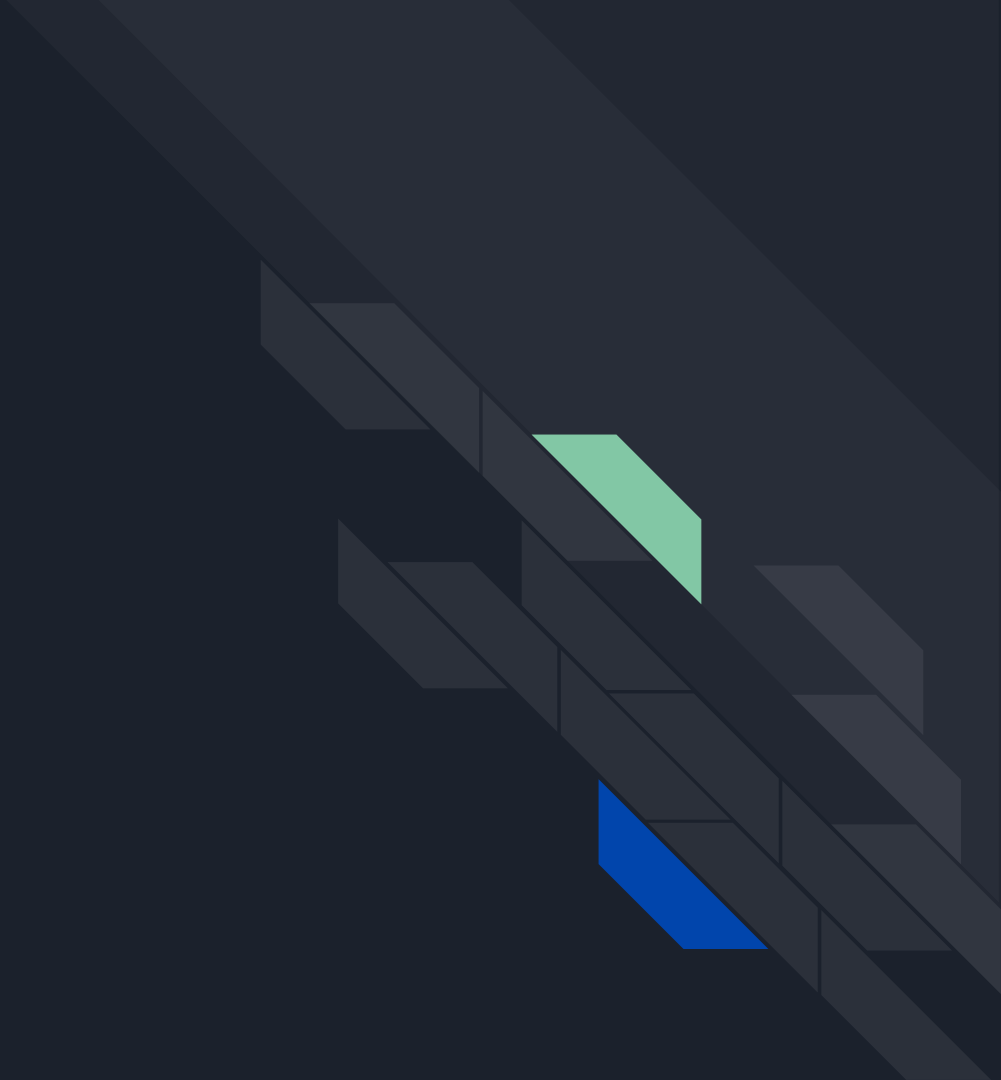


# Recommendations

Our main three business recommendations for the company inquiring are;

- To use a boeing make with three engine makes for passenger commercial planes
- Use the plane manufacturer Boeing 747 model for cargo transportation (has four engines)
- Use the Sikorsky S76 for private enterprises

Next Steps







## Next Steps

This data examines when there is a crash. It does not account for the number of times it does not crash. Because of the lack of crashes, the number of uninjured people may be low.



## Next Steps

- Exploring other datasets that pertain to the safety of each recommendation
- Research and locate aircraft dealers for purchase
- Consult with marketing team for logo and design ideas

# Questions?

Contact info:

*Kaelyn Isaac Parris*

[kaelyn\\_parris@protonmail.com](mailto:kaelyn_parris@protonmail.com)

<https://www.linkedin.com/in/kaelyn-parris-6aab41269/>

*Jonathan Brown*

[jonnie.brown4@gmail.com](mailto:jonnie.brown4@gmail.com)

<https://www.linkedin.com/in/jonnie-brown-13246a121/>

*Alex Karadjov*

[alex.karadjov@icloud.com](mailto:alex.karadjov@icloud.com)

[Alexandria Karadjov | LinkedIn](#)