



Evolution of F1 Performance (1950–2024)



Team 9

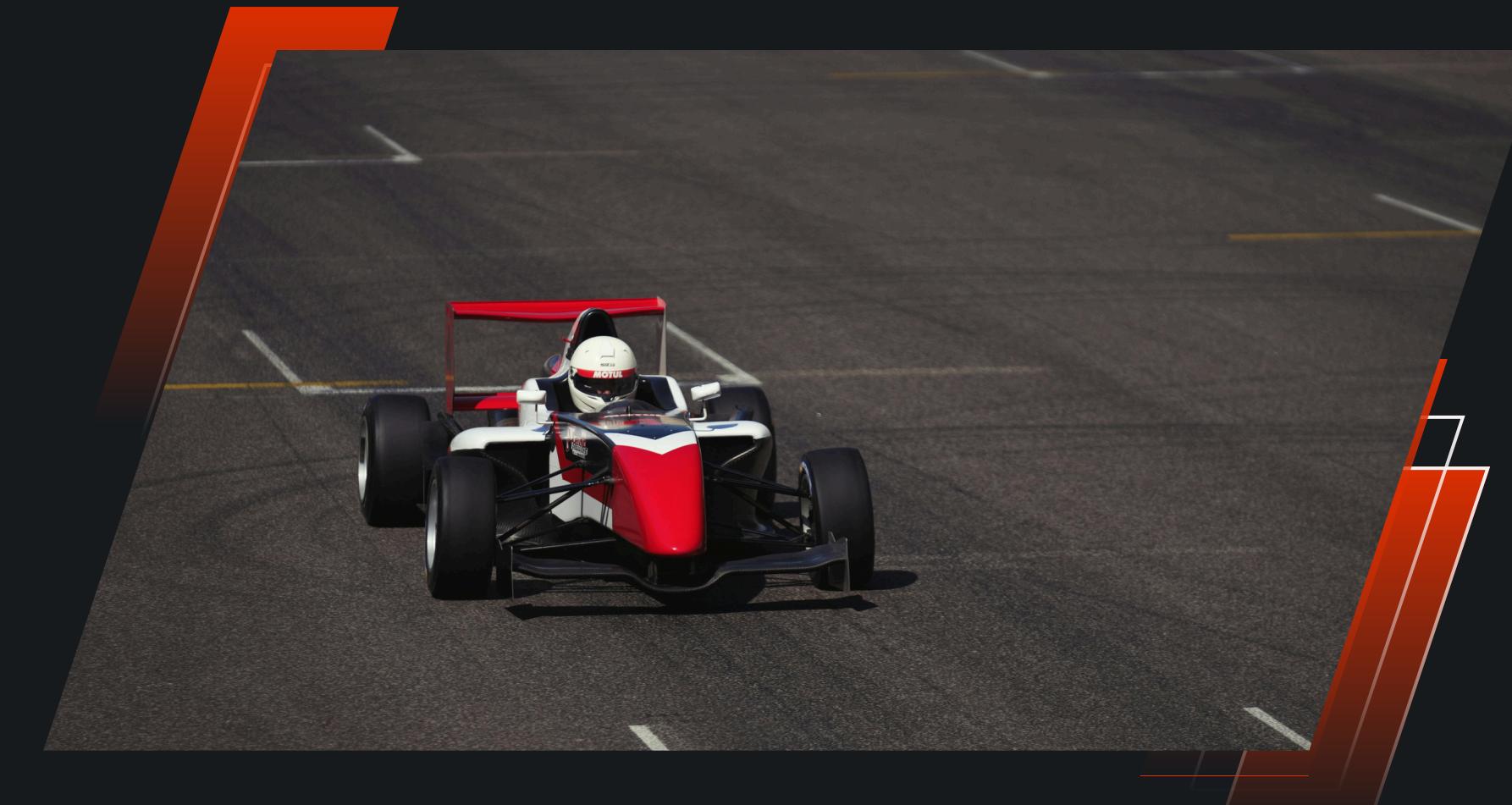
PRESENTED BY

Mika Ismayilli, Xinying (Charlotte) Wang, Riya Poojary,
TzuHsuan (Vina) Liu, Xiaoyan Wang, Zixuan (Casseay) Zhu



PROBLEM

- Many factors shape F1 performance, but their impact is unclear.
- These factors interact, making it hard to know what truly drives wins and points.



MOTIVATION

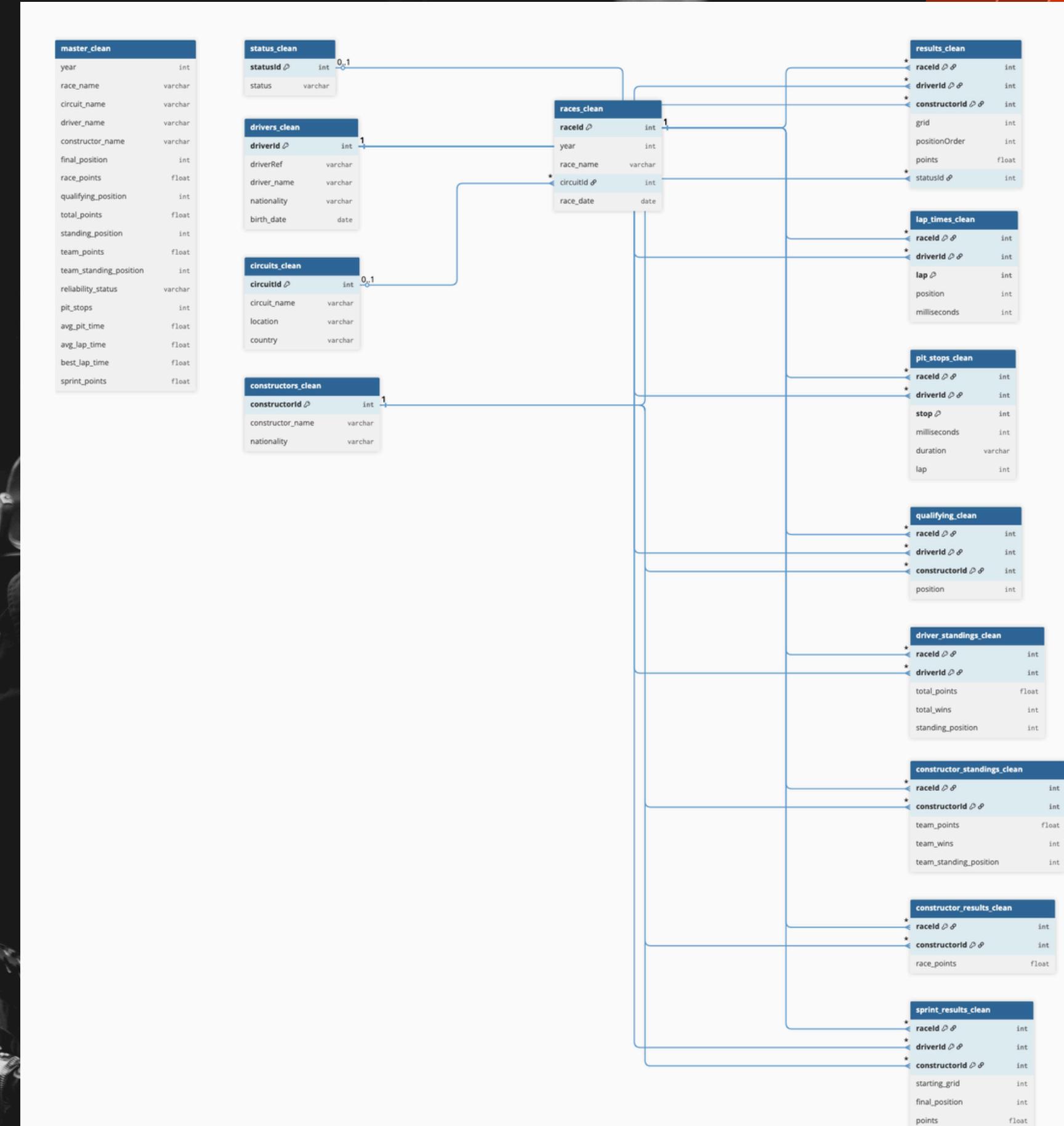
- F1 is highly data-driven, where tiny differences decide outcomes.
- Understanding key performance drivers helps teams improve strategy and results.





INTRODUCTION

- Dataset comes from Kaggle: Formula 1 World Championship (1950–2024)
- Contains 14 relational tables (races, drivers, constructors, circuits, standings, qualifying, lap times, pit stops, etc.)
- Tables are connected using shared keys such as raceld, driverId, and constructorId
- ERD shows how all tables link together, each box represents a table – for example, races contains race information, drivers stores driver details, constructors represents teams,etc.)
- Build master table--tables are linked through key shared identifiers such as raceld, driverId, and constructorId.





DATA PREPARATIONS



STEP 1

Fix Missing/Invalid Values

- Removed duplicates; replaced "\N"/nulls appropriately.

STEP 3

Integrate into master_clean

- Joined all tables via raceId / driverId / constructorId + created metrics (avg lap, pit time, best lap).

Standardize Data Types

- Converted IDs & time fields → numeric/date; cleaned text formats.

STEP 2

Clean & Structure Sub-Tables

- Built *_clean tables for races, drivers, constructors, results, lap times, pit stops, qualifying, standings.

STEP 4



EXPLORATORY DATA ANALYSIS



1. Section 1: Qualifying Performance

- How the starting position affects the final results
- Link between grid placement and total points

Section 2: Fastest Laps & Racecraft

- Do fastest laps lead to better race outcomes?
- Drivers who consistently gain positions

3. Section 3: Reliability & Consistency

- Impact of DNF rates on championship points
- Do consistent finishes matter more than occasional wins?

Section 4: Circuit & Home Advantage

- How track type, layout, and climate affect results
- Performance at a driver's home Grand Prix

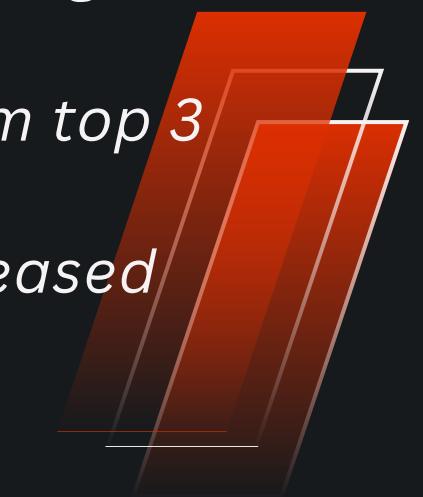


EDA FINDINGS



1. Speed & Qualifying Insights

- Strong 0.76 correlation between grid position and final result
- 50%+ of fastest laps come from top 3 starters
- Overall race speeds have increased over time



2. Season-Level Performance Drivers

- Top teams balance speed, reliability, and consistency
- Low DNF rates are strongly linked to high championship points
- Driver support within teams also influences outcomes



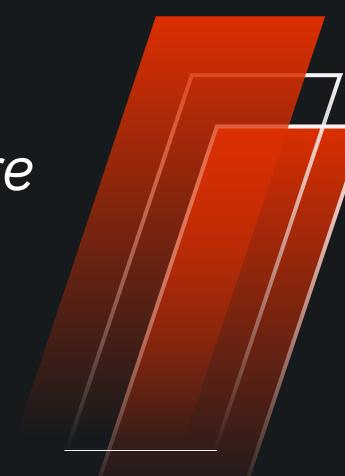
3. Technology & Pit Strategy Impact

- Fast, clean pit stops help maintain or gain positions
- Reliable hybrid engines improved speed without increasing race duration
- Strategy + reliability = stronger season results



4. Circuit Type Effects

- Permanent circuits = more predictable outcomes
- Street circuits = more randomness, more safety cars, more variation





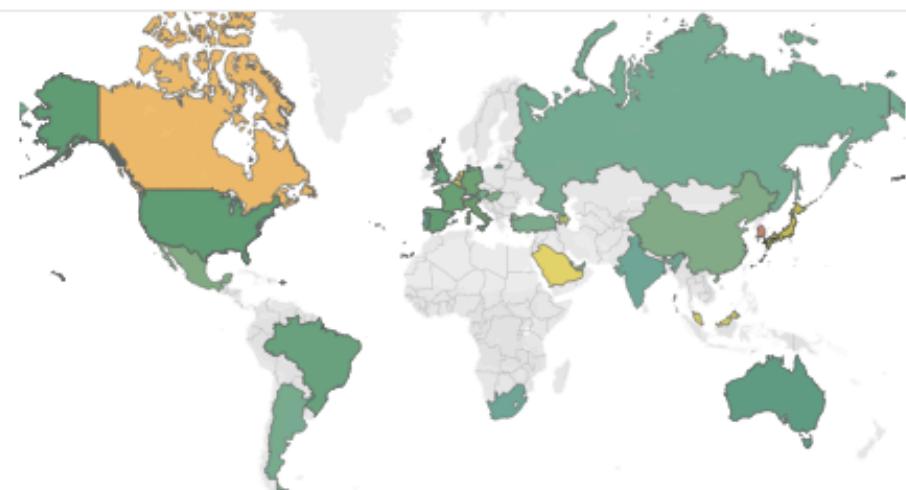
DASHBOARD 1

[LINK](#)

Location Across Circuits



onStreetMap



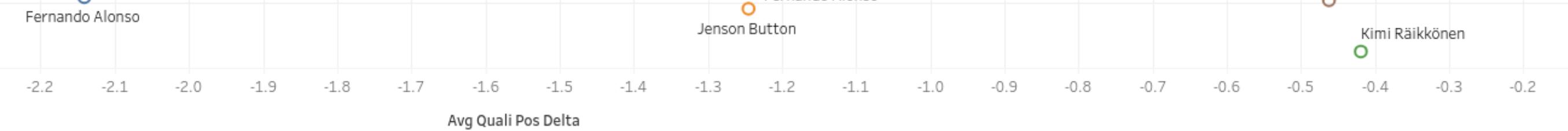
40.8

Delta vs Avg Final Pos Delta



- Ferrari
- Lotus F1
- Racing Point

- Renault
- Tyrrell
- Williams

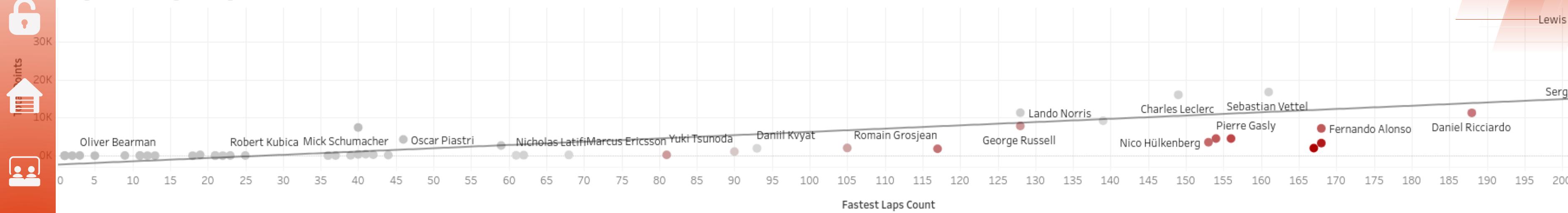




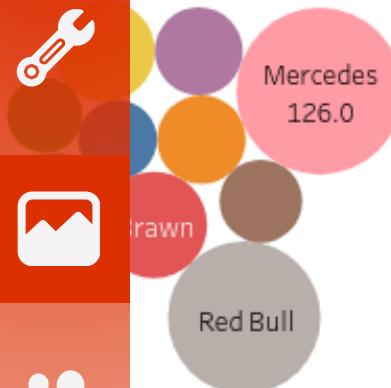
DASHBOARD 2

[LINK](#)

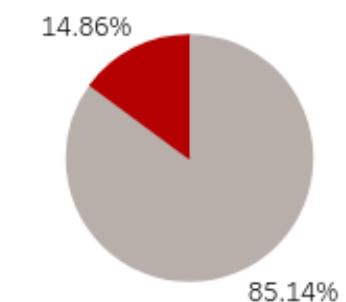
Fastest Laps Vs Championship Success



Age Points per Season by F1 Constructor



Fast Lap Vs Podium Finish





Conclusion

CIRCUITS & RACE RISK

- Traditional circuits → more stable race duration and points.
- Street circuits (e.g., Monaco, Baku) → higher variability and more unpredictable outcomes.
- Recommendation: On normal circuits, use safer strategies to secure points. On street circuits, you can take more risks and try bold strategies because the results are more unpredictable.

QUALIFYING & SPEED

- Strong link between grid position and final result : starting at the front gives a big advantage
- Recommendation: Put a lot of focus on qualifying. Set up the car and choose tyres to be fast over one lap, even if the race setup is not perfect.



F1 success is not about speed alone—it's the combination of environment × speed × consistency
× teamwork × reliability.





Thank You!
Q & A