FORMULA ONE

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UTILITY | CONTEXT

DATA UTILITY

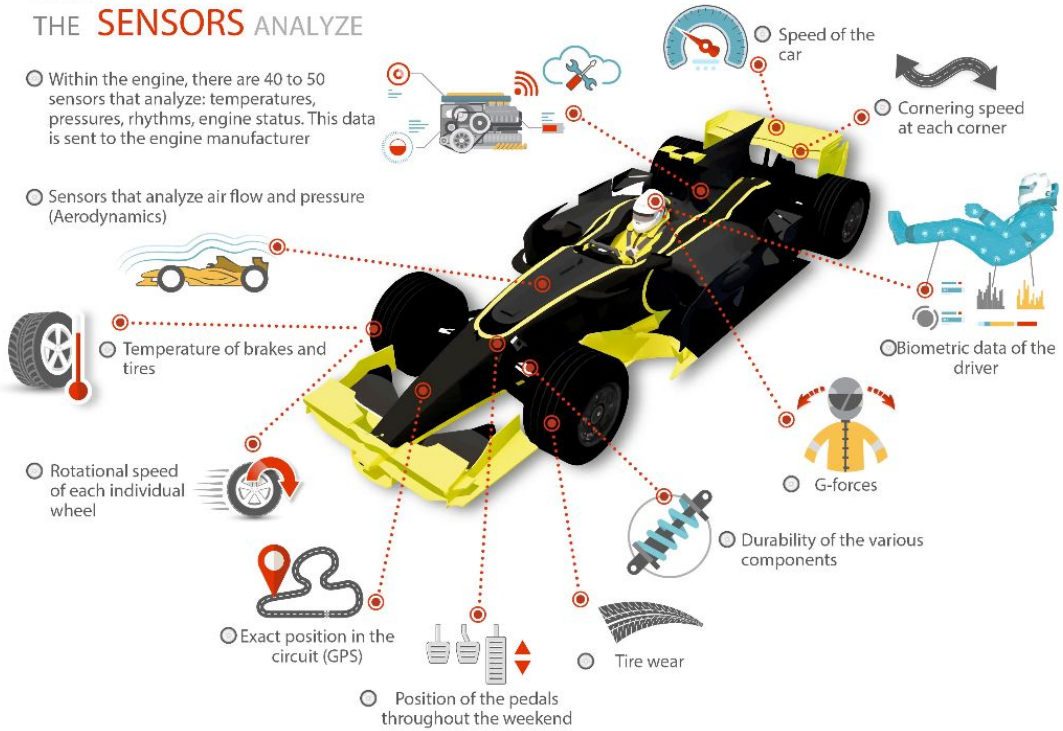
- F1 is a bata based industry
- "Moving PC's"
- Large analytics utility
  - Influences designs
  - Component set up
  - How they are driven
  - Strategy

FORMULA CAR MAKEUP

- 80,000 components (1)
- Sensors: 100 - 300 | 100,000 data points (1)
- Collect terabytes of data during a race (1)

UTILITY | CONTEXT

WHAT THE SENSORS ANALYZE



SENSORS

- Tire pressure, temperature and wear
- Fuel burn efficiency
- Lap times
- Brake temperatures
- Air flow
- Engine performance and health
- Driver responsiveness

UTILITY

Small increments and changes

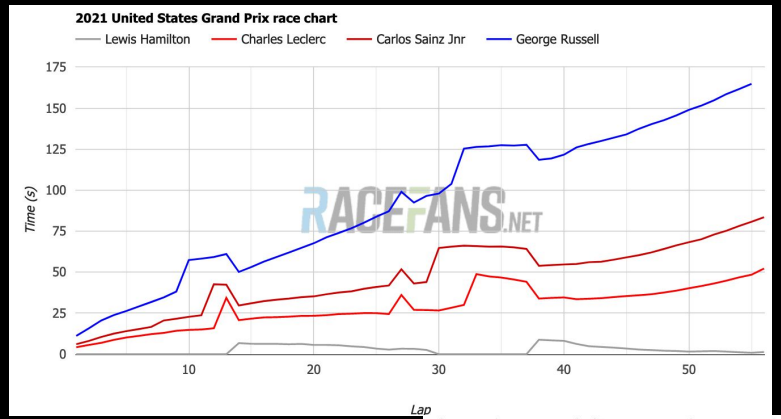
- Competitive advantages
- Pre
- Real-time
- Post

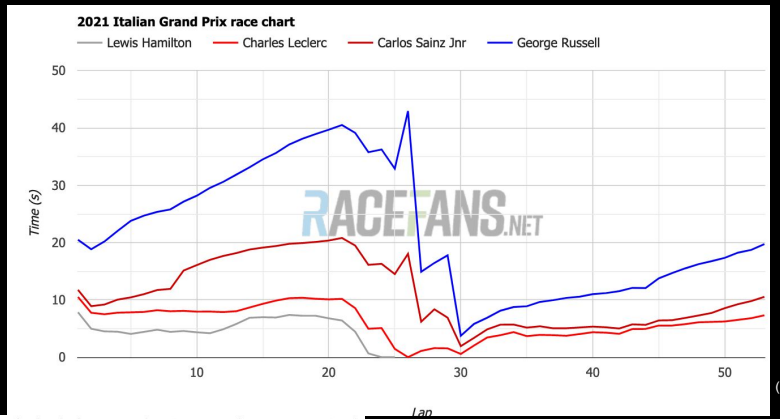
DATA

2021 GRAND PRIX FASTEST LAPS

2021 Grand Prix Fastest Laps				
Rank	Driver	Car	Fastest Lap	Gap
Ferrari				
6	Leclerc	Ferrari	1'25.319	0.507
3	Leclerc	Ferrari	1'39.303	0.818
8	Sainz Jr	Ferrari	1'25.559	0.747
9	Sainz Jr	Ferrari	1'40.377	1.892
Mercedes				
14	Hamilton	Mercedes	1'25.835	1.023
1	Hamilton	Mercedes	1'38.485	0
11	Russell	Mercedes	1'25.870	1.058
12	Russell	Mercedes	1'41.120	2.635

(3)



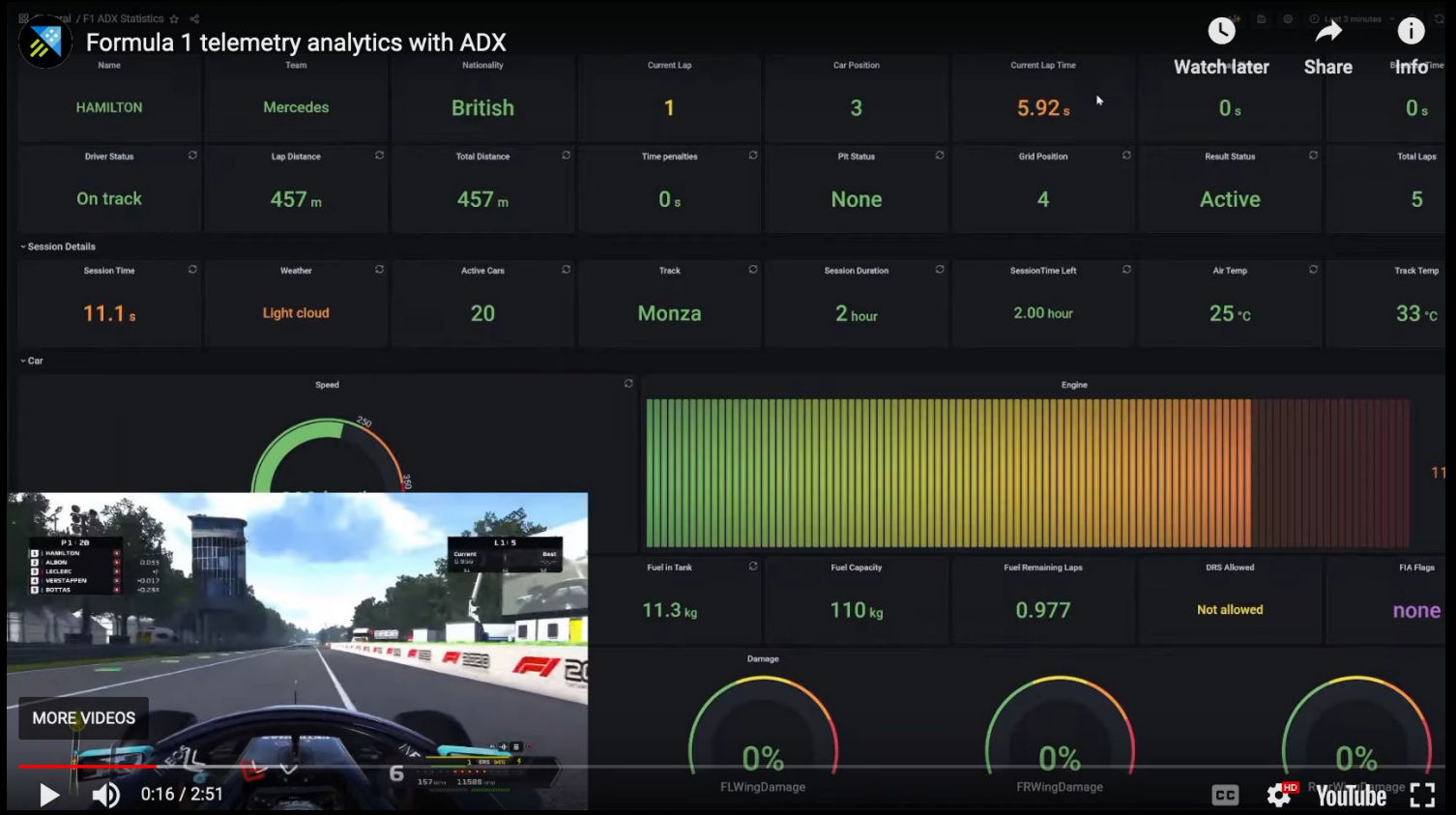


(3)

The gaps between each driver on every lap compared to the leader's average lap time. Very large gaps omitted.

ANALYTICS | VISUALIZATION

- **F1 TELEMETRY ANALYTICS**
  - Airflow
  - Downforce
  - Drag
  - Lap times
  - All correlations



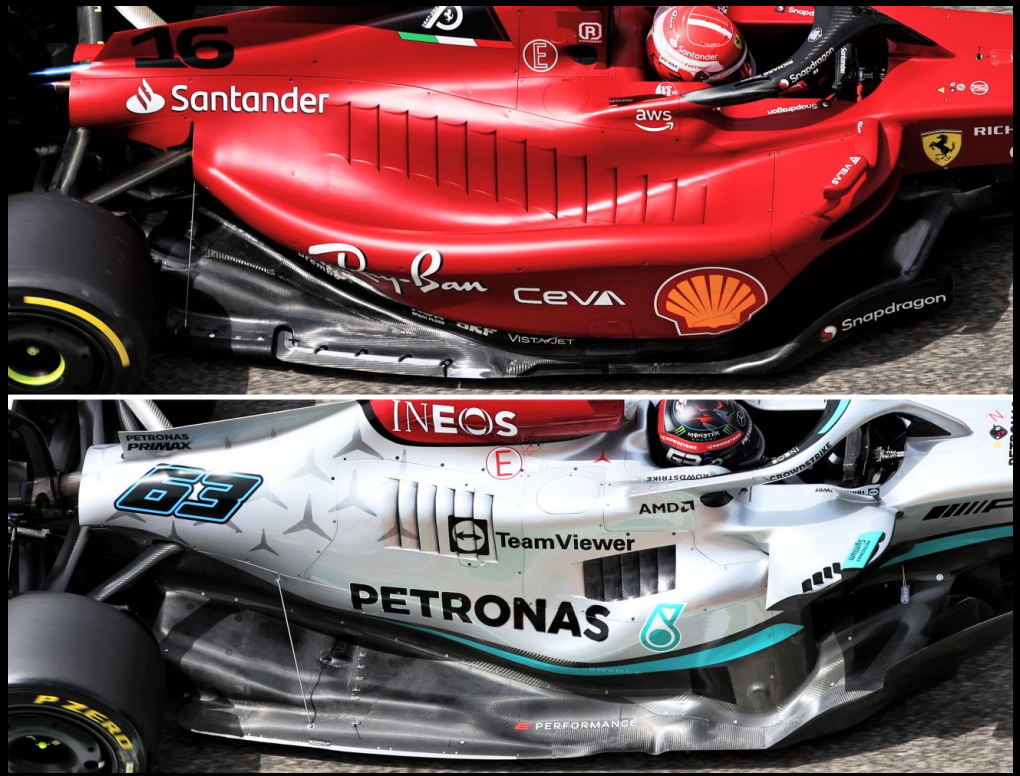
QUESTION

- Will innovating hardware improve aerodynamics leading to better lap times?

INNOVATION

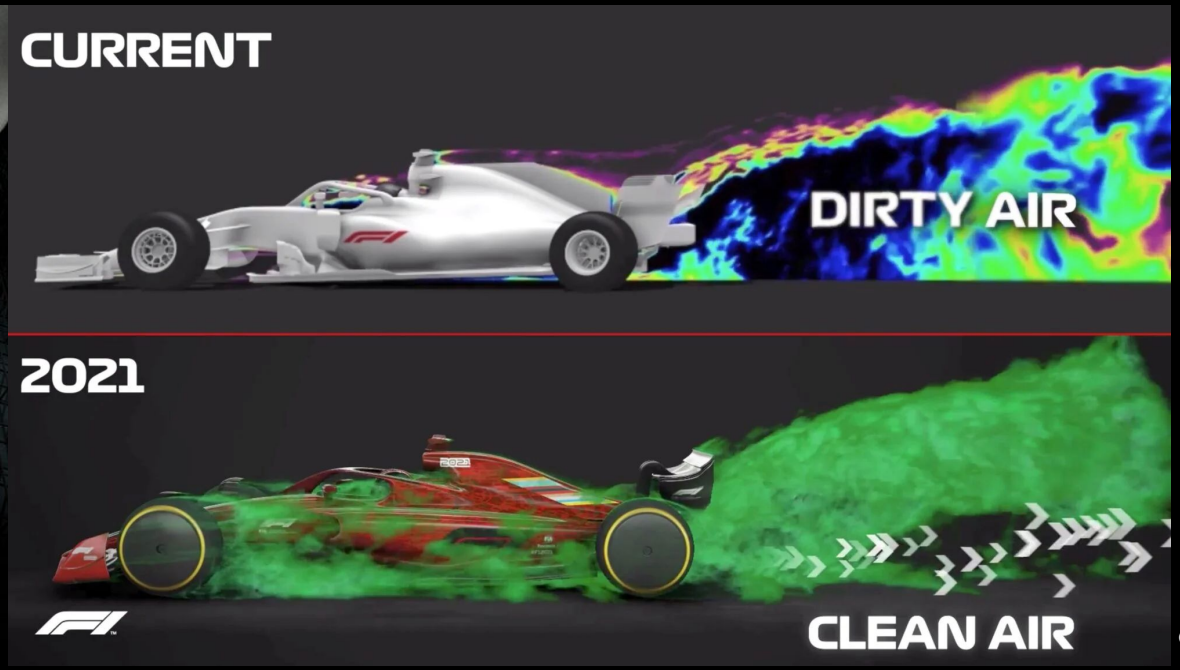
DIVERSITY IN CONCEPT

- Ferrari & Mercedes represent extremes of two different airflow management philosophies (5)



(5)

INNOVATION



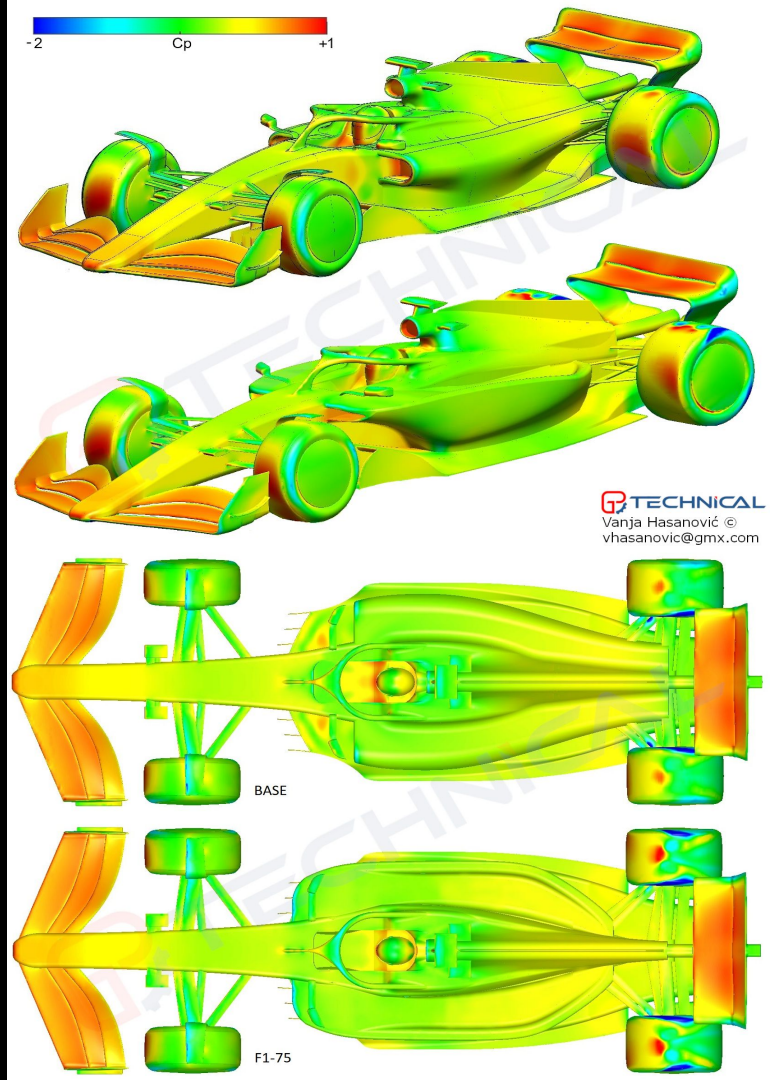
DOWNFORCE

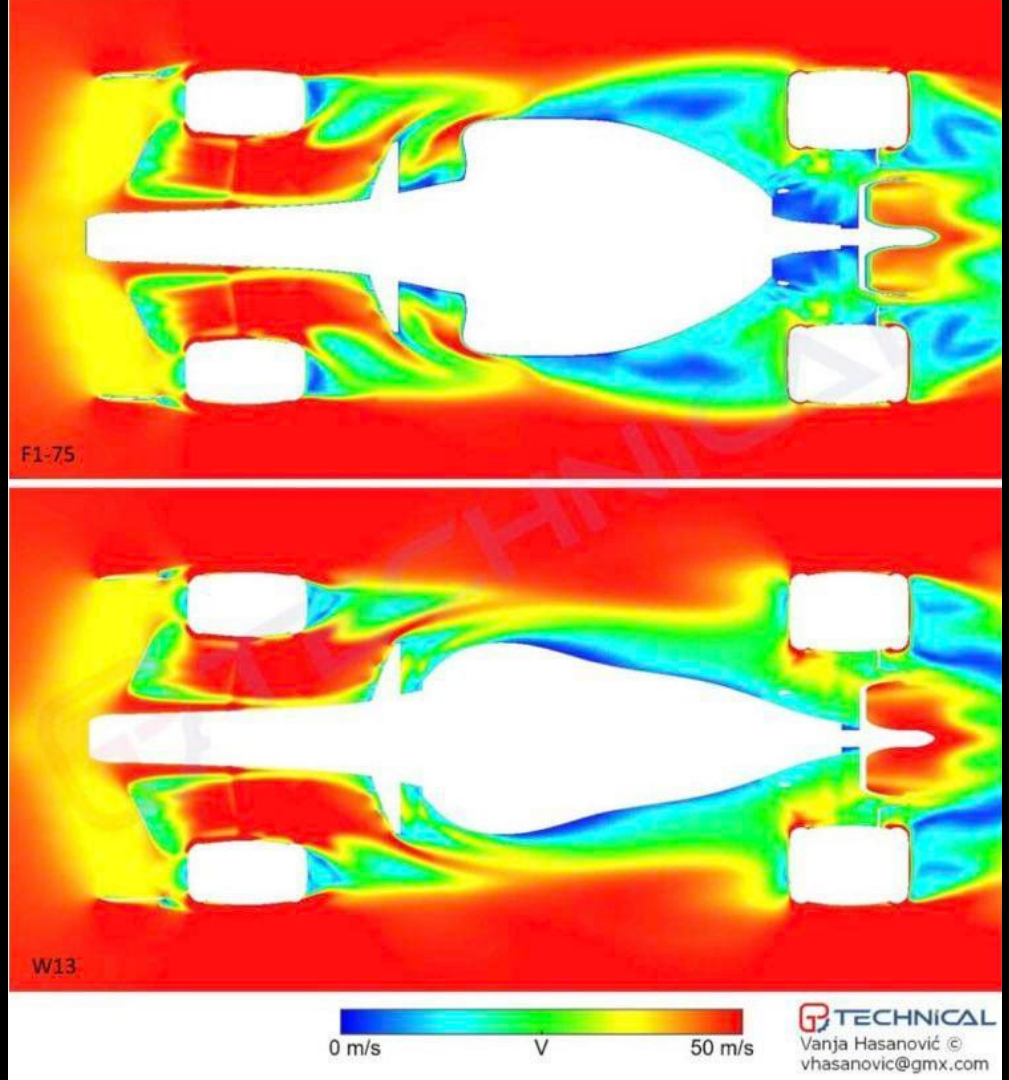
+ 35%

DOWNFORCE

+ 95%

(6)


-2
Cp
+1
TECHNICAL
Vanja Hasanović ©
vhasanovic@gmx.com
BASE
F1-75


F1-75
W13
0 m/s
V
50 m/s
TECHNICAL
Vanja Hasanović ©
vhasanovic@gmx.com

INNOVATION APPLICATION

ANALYTICS | QUESTIONS

- Insights
- Designs and Improvements
- Applications

DAVQ CHAIN

ANALYTICS

- Nuanced changes may develop as new results from are collected
- May revolutionize designs & new component relationships
- Aero & computational fluid dynamic (CFD) simulations

VISUALIZATION

- I do not see this having an impact on visualization

QUESTION

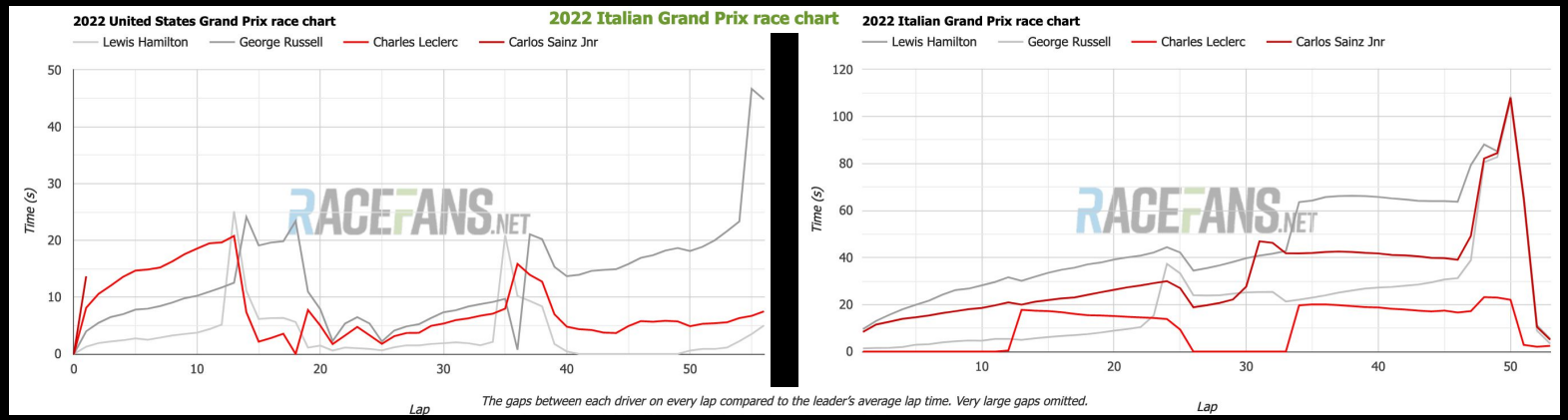
- Will hardware innovation improve aerodynamics leading to better lap times?
- Will bleeding/ leading edge unprecedented design improve performance?
- How can we improve or adapt the new designs?

DATA CHAIN

- **2022 GRAND PRIX FASTEST LAPS**
- **DATA**
  - Overall data still the same
  - New data on aerodynamics changes
  - New data on how components interact

2022 Grand Prix Fastest Laps					
Rank	Driver	Car	Fastest Lap	Gap	vs. 2021
Ferrari					
6	Leclerc	Ferrari	1'24.336	0.306	-0.983
3	Leclerc	Ferrari	1'39.731	0.943	0.428
8	Sainz Jr	Ferrari	1'24.420	0.39	-1.139
9	Sainz Jr	Ferrari	1'55.016	16.228	14.639
Mercedes					
14	Hamilton	Mercedes	1'24.434	0.404	-1.401
1	Hamilton	Mercedes	1'39.830	1.042	1.345
11	Russell	Mercedes	1'25.288	1.258	-0.582
12	Russell	Mercedes	1'38.788	0	-2.332

(3)



The gaps between each driver on every lap compared to the leader's average lap time. Very large gaps omitted.

(3)

ADOPTION | VALUE PROPOSITION

ORGANIZATIONAL CULTURE

- Leading edge of innovation, technology, and advancement
- Focus
  - Design
  - Build
  - Race
  - Repeat

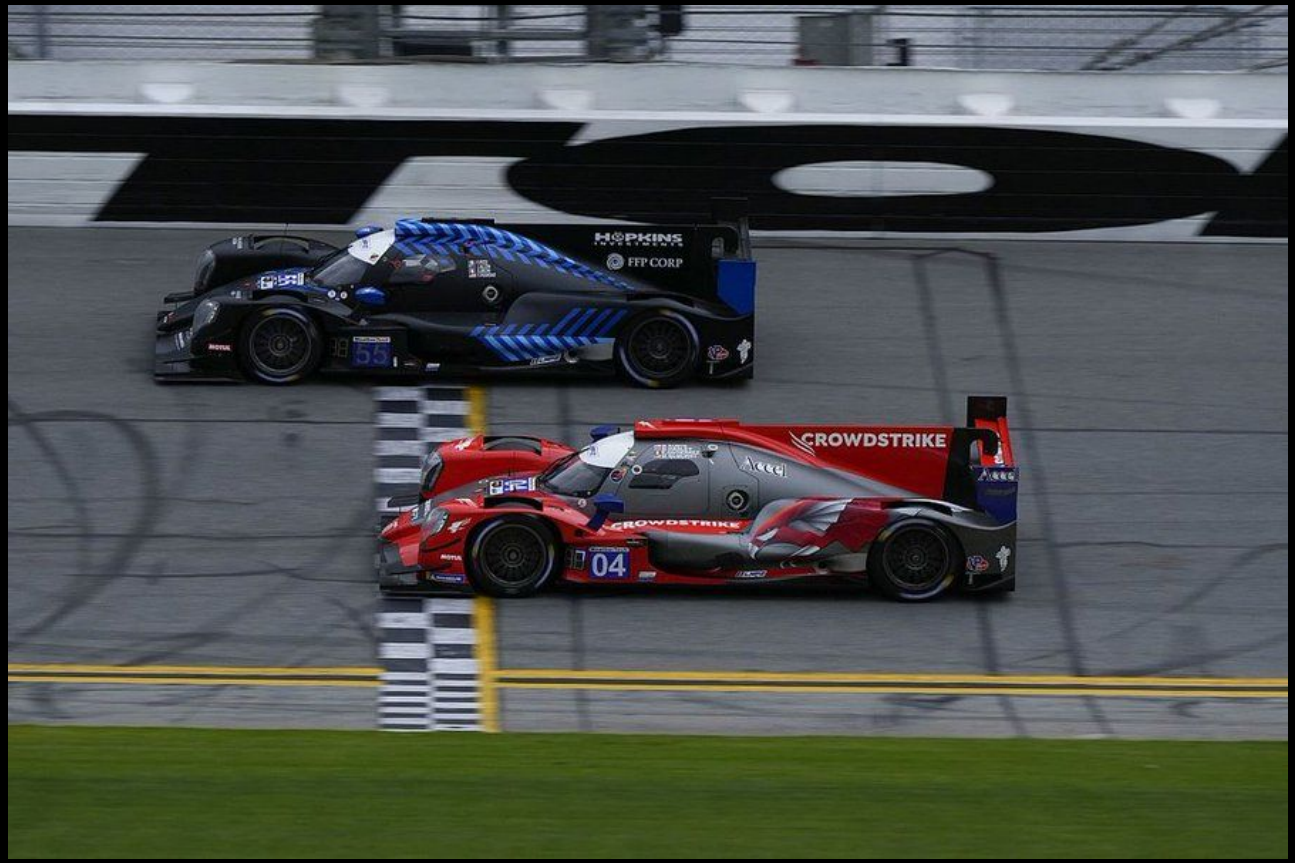
VALUE

- Improved aerodynamics
- Decreasing Lap times
- Faster car and better performance
- Winning Championships

F1 Team Culture

"When a bold chance is taken, and the outcome isn't what you expected, how can you work the problem without losing focus or straying from the master plan?

Don't deviate from a winning strategy: an obsession with being a data-centric and analytics-driven organization" [2]



IMPACT ○ 0.016s difference

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