Business Informatics in Formula 1

Author: Abderrahmane Chakroune
Business Informatics student at Saarland University

Author’s note

Writing this report has been a personal objective of mine and is more than just an academic project, it has been an experience that deepened my understanding of Business Informatics while allowing me to explore one of my greatest passions: Formula 1. Working on it helped me connect theory to practice, where data and decision-making meet the speed and precision of motorsport.

I hope readers can experience this same connection and interact with the project through the GitHub repository https://github.com/F1-BI-Project/F1-BI-Dashboards . There, you can explore the datasets and Python code for the dashboards, experiment with that code, and help develop new features that bring the analyses closer to real-world Formula 1 scenarios. My goal is for this work to grow beyond this report, as a collaborative space where curiosity, technology, and passion for racing come together.

Contents

1. INTRODUCTION

Real time analysis, Strategy optimization, Car development, Mechanical Performance, Fan experience…Formula 1 is one of the most data-intensive sports in the world, where decisions must be made under extreme time pressure and financial constraints. During a session (practice, qualifying or race) each car produces multiple gigabytes of data (also called telemetry), yet this raw data has little value unless transformed into actionable, useful insights.

Business informatics is understood to be the bridge between technology and business administration, and it offers a useful framework for analysing how Formula 1 teams convert the data and technical information into business decisions and short- and long-term success.

In this paper we explore how Business Informatics operates in Formula 1, highlighting the technology side, the business side, and most importantly, the bridge that connects the two.

2. BUSINESS INFORMATICS FRAMEWORK

The core pillars of business informatics are recognised as being computer science, business administration / economics, and business informatics itself, which bridges the gap between the two (computer science and business administration) by applying information technology to business processes and management. This interdisciplinary field focuses on creating and managing information systems and using data to improve an organization's operations, decision-making, and digital transformation.

First and foremost, it's important to understand what information systems are, as they are at the heart of business Informatics. They are a structured combination of people, processes, and technology used to collect, process, store, and distribute information. Don't just think of an information system as just software, it also includes the workflows, data, and decision rules that guide how information (data) is transformed into usable knowledge (decisions).

In everyday business, an example of an information system could be an ERP (Enterprise Resource Planning) system which integrates finance, logistics, HR, and production all into one platform.

In Formula 1 however, Information systems would be more "specialised"; so instead of one platform integrating many tools (like an ERP system), a team would use different platforms for different tasks: telemetry systems, simulation platforms, budget management tools…are then all specialized information systems, which transform raw data into actionable insights for race engineers and team managers.

Let’s now break down the three main pillars of business informatics:

A. Computer Science:

This pillar provides the technical foundation: programming, databases, algorithms, system architecture, cybersecurity, and much more. Without these, information systems cannot exist.

In business this would mean building reliable applications, secure databases, and scalable infrastructures.

In Formula 1, computer science supports data collection like telemetry from over 300 sensors on a car, ensures wireless transmissions from track to pit wall/ garage (and vice versa), and supports realistic simulation software.

B. Business Administration (or Economics):

This pillar focuses on the organisational and economic side: management, finance, accounting, controlling, logistics, marketing, and strategy. It defines the “Why” and “Where” the technology is applied.

In business this would include cost optimization, process improvement, and decision-making under resource constraints.

In Formula 1, business administration principles are visible in cost-cap compliance (set by the FIA), supply chain management (logistics) for moving thousands of parts globally, and balancing investment between long-term car development and short-term performance.

C. Business Informatics (The Bridge):

This is the interdisciplinary pillar, which integrates the other two: applying computer science (IT) directly to business needs. It covers system design, process modelling, decision-support tools, and data-driven strategies.

In business this could mean dashboards that link sales data to supply chain planning for example.

In Formula 1 business informatics is the bridge that turns raw telemetry into pit stop strategies (short-term implication), links financial planning to component wear rates, and connects logistics optimisation with performance targets under the FIA (fédération internationale de l’automobile) cost cap.

And so, in essence, Computer Science builds the tools, business administration defines the goals, and business informatics ensures the tools are applied effectively to achieve those goals, whether in a start-up, a multinational corporation, or in the high-stakes environment of Formula 1.

3. APPLICATION IN FORMULA 1 TEAMS

Evan Short, Team Leader of Trackside Electronics Systems at Mercedes AMG Petronas Formula 1 team once said in an interview:

"Taking the total amount of data generated over the weekend by the car, including video and all sorts of ancillary information, it's close to a terabyte or even a bit more per car. But if you look at the really exciting bits of data which are the live data streams generated by the car while it's running, we're looking at about 30 megabytes per lap of live data and two or three times more once the car is in the pits and we offload the data from it."

Therefore, I like to think of Formula 1 as the fastest laboratory in the world. Each car is like a moving data centre, generating multiple megabytes of data (telemetry) every lap, while every decision, whether technical, financial, or strategic, can make the difference between victory and defeat.

Business Informatics is at the heart of this ecosystem: it transforms mountains of raw technical data into actionable insights, guiding not only race engineers but also strategists, financial directors, and commercial managers.

- ### THE TECHNOLOGY SIDE: COMPUTER SCIENCE IN MOTION

Every Formula 1 car is equipped with more than 300 sensors, whose only role is to keep track of performance in real time: tire temperatures, brake wear, fuel consumption, engine health...and the list goes on. Understand that a single lap produces more information and data than an average small business generates in months. Not to forget that these data streams travel in milliseconds from car to pit wall/ garage and even all the way back to team headquarters which is most of the time thousands of kilometres away from the racetrack.

And this is where the computer science pillar of business informatics provides the backbone. IT Systems, databases, and cloud platforms ensure this data is received, stored, cleaned, and processed at extraordinary speed and precision. Machine Learning (ML) models simulate race outcomes, predict component failures, and could even anticipate other competitors' pit strategies and decisions, which would help get a competitive edge. Custom Dashboards and Tools, like McLaren applied's ATLAS platform, allow engineers to interact with the data in real time.

Keep in mind that without Business informatics, this mass of telemetry data received every lap would remain noise and numbers. With Business informatics, it becomes the material for intelligent decision making.

The business side: Management at 300km/h

"*If I have collected and analysed data from the car, where exactly does the business side come in?*" is probably what you are asking yourself.

Well data alone does not win races, nor does it make decisions, and this is where the business administration pillar comes into play: the translation of technical data into strategic and financial action.

During a race, strategists will have to decide whether to pit now or extend and pit later: a decision which at first seems like a sporting call, but since points directly affect prize money, sponsor visibility, and of course the championship standings, the decision is also a financial one. And under the FIA's (fédération internationale de l'automobile) cost cap rules, every technical choice carries budgetary consequences: *pushing an engine too far during a race might yield short-term gains but could also result in millions of euros of losses if it fails prematurely.* So telling a driver to "slow-down", might seem like a decision made to help during the race, but in fact, it is far more than that.

Operations and logistics are equally affected. Telemetry (data collected live from the car sensors) showing higher component failure rates in hot climates might lead the logistics team to adjust spare parts inventories on shipments, which would reduce both costs and delays.

And on the commercial side, race results directly influence fan engagement and sponsorship value. Therefore, a better performance means more TV Exposure, stronger visibility, and higher returns for commercial partners (Sponsors).

In this way, Business Informatics ensures that insights from the track flow easily and purposefully into organizational, financial, and marketing decisions.

The Bridge: Business Informatics in action

The true power of Business Informatics lies in its ability to connect these two worlds, by acting as the bridge between high-frequency technical data and long-term management strategy.

Consider the example of a damaged front wing:

- Technology side: Sensors detect that the front wing is slightly damaged and does not offer the correct amount of downforce to the car. Additionally, predictive models estimate a loss of around 0.3 seconds per lap due to the front wing damage.
- Business Informatics as the Bridge: A decision-support Dashboard presents scenarios to the race strategist:
  - *Pit now and change the front wing -> Chance of a podium increases by 12%, but spend 300,000 Euros for the new front wing.*
  - *Don't pit -> Lower podium chance, but preserve resources.*
- Business side: The engineer, strategist, team principal, and finance team weigh the trade-offs, balancing competitive performance with financial sustainability under the cost cap.

And so here, Business Informatics does not simply deliver numbers, it frames them in a way that decision-makers across the organisation can act upon. It translates raw data into risk, opportunity, and strategy.

- ***Short_Term vs. Long-Term implications:***

The bridge is not static; it operates across different timescales.

- Short-term: On race day, Business Informatics enables high-pressure, split-second decision-making. Dashboards transform raw telemetry into clear visuals (green, yellow, and red indicators for example) and probability metrics, so that strategists can react instantly. Therefore, a call to pit, a warning to slow down to protect the brakes, or a last-minute change to counter a rival team's strategy all rely on Business Informatics' ability to filter technical noise into actionable insights.
- Long-Term: Across a season, the same data (used during a race to make short-term decisions) is aggregated and analysed for strategic planning.
  Patterns in component wear inform R&D (Research and development) investment decisions, logistics data helps optimize transport schedules and reduce costs and fan engagement metrics tied to race results guide sponsorship negotiations and marketing campaigns.

It's important to understand that these two layers feed into one another. The data from a race weekend informs decisions about next season's priorities, while the financial and strategic constraints of the long-term shape what is possible in the high heat of competition.

- ***Business Informatics as the competitive edge:***

Finally, what makes Business Informatics indispensable in Formula 1 is not just the speed or quantity of its technology, but the continuity of its integration. Every second on Track, every euro spent, every fan interaction produces data, and business informatics ensures that none of it goes to waste: The computer science pillar captures, analyses, processes, and stores that data, the business administration pillar contextualises it, and the Business informatics bridge makes it decision-ready.

And in the end, a team's success is no longer just about building the fastest car. It is about creating a well-oiled smart organization, one where technology and business are fused through Business Informatics into a continuous cycle of learning, analysing, decision-making, and improvement. That is the true competitive edge.

4. CASE EXAMPLES: THE BRIDGE IN ACTION

Business Informatics in Formula 1 is most visible when technical data is transformed into actionable decisions for both racing performance and business management. In the following examples, I try to illustrate how the “bridge” operates in practice, supported by sample data, Python simulations, and interactive dashboards.

1. Pit stop optimisation:

Technology side (Data): Telemetry from car sensors records tire wear, tire temperature (for each tire and average temperature), lap times, and more. Predictive models would simulate tire degradation and expected lap time changes for each tire compound.

Business Side (Decision): Race strategists and engineers would then have to decide the optimal lap to pit, balancing track position, tire performance, and the likelihood of component failures.

Business Informatics as the Bridge: A decision-support dashboard integrates telemetry and predictive simulations. It would display metrics such as:
- Expected lap time loss if staying out
- Probability of tire failure
- Risk-reward scenarios for different strategies

Sample data: https://github.com/F1-BI-Project/F1-BI-Dashboards/blob/main/Dashboards_BIinF1/Data_samples/telemetry_30laps.txt

Lap: Lap number
FL_tire_temp_C: Front left tire temperature in Celsius
FR_tire_temp_C: Front right tire temperature in Celsius
RL_tire_temp_C: Rear left tire temperature in Celsius
RR_tire_temp_C: Rear right tire temperature in Celsius
Tire_wear_pc: Tire Wear percentage
Lap_Time_s: Lap time in seconds

Lap	FL_tire_temp_C	FR_tire_temp_C	RL_tire_temp_C	RR_tire_temp_C	Tire_wear_pt	Lap_time_s
1	85	84	80	81	5	89.567
2	88	87	82	83	8	89.350
3	90	89	83	84	10	89.420
4	92	91	85	86	13	89.650
5	94	92	86	87	15	89.880
6	96	94	88	89	19	90.123
7	97	95	89	90	23	90.353
8	98	96	90	91	25	90.432
9	99	97	91	92	28	90.681
10	100	98	92	93	32	89.842
11	101	99	93	94	33	88.003
12	102	100	94	95	36	88.114
13	102	101	94	96	39	91.325
14	103	101	95	97	44	91.423
15	104	102	96	97	46	91.632
16	104	102	96	98	50	90.789
17	105	103	97	98	53	91.867
18	105	103	97	99	54	92.027
19	106	104	98	99	59	92.143
20	106	104	98	100	60	92.387
21	106	104	98	100	64	92.499
22	107	105	99	101	66	92.599
23	107	105	99	101	71	91.679
24	107	105	99	101	74	92.798
25	108	106	100	102	77	92.813
26	108	106	100	102	80	92.912
27	108	106	101	102	82	92.999
28	109	107	101	103	84	92.623
29	109	107	103	104	87	93.298

SAMPLE DATA REPRESENTING THE TELEMETRY RECEIVED FROM CAR SENSORS DURING A SESSION FOR EACH LAP.

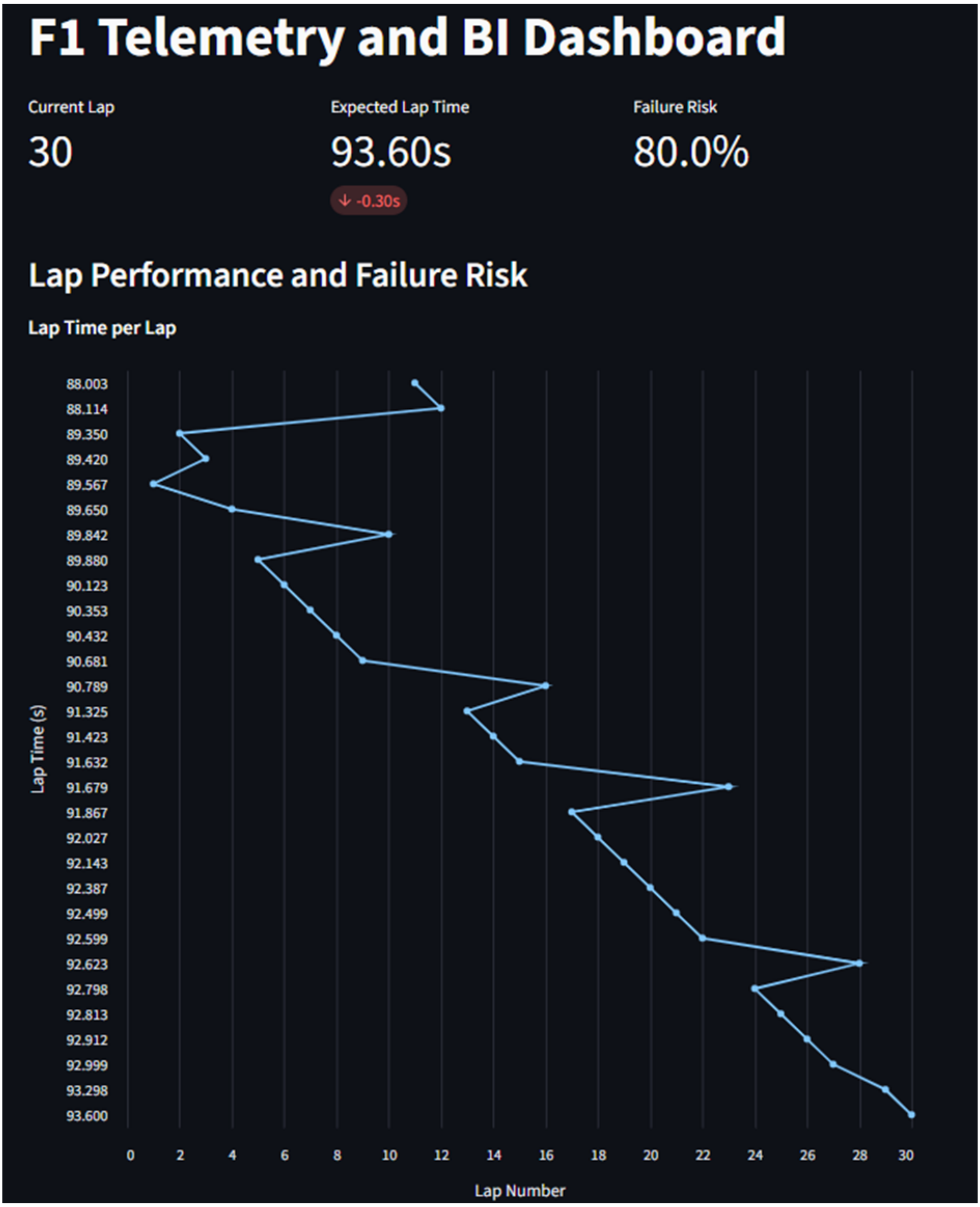


Figure 4.1.1: This picture shows the very top of the Telemetry Dashboard with “Current lap”, “Expected Lap Time”, and “Failure risk” as the three constantly changing variables, and a lap performance Chart.

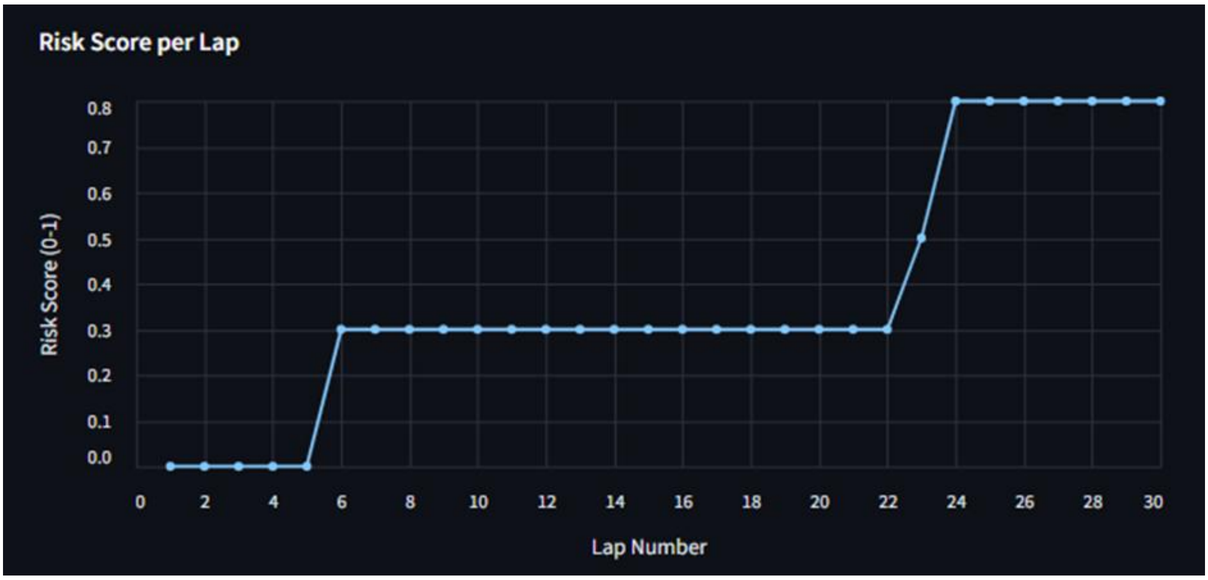


Figure 4.1.2: Chart showing the risk of failure per lap.

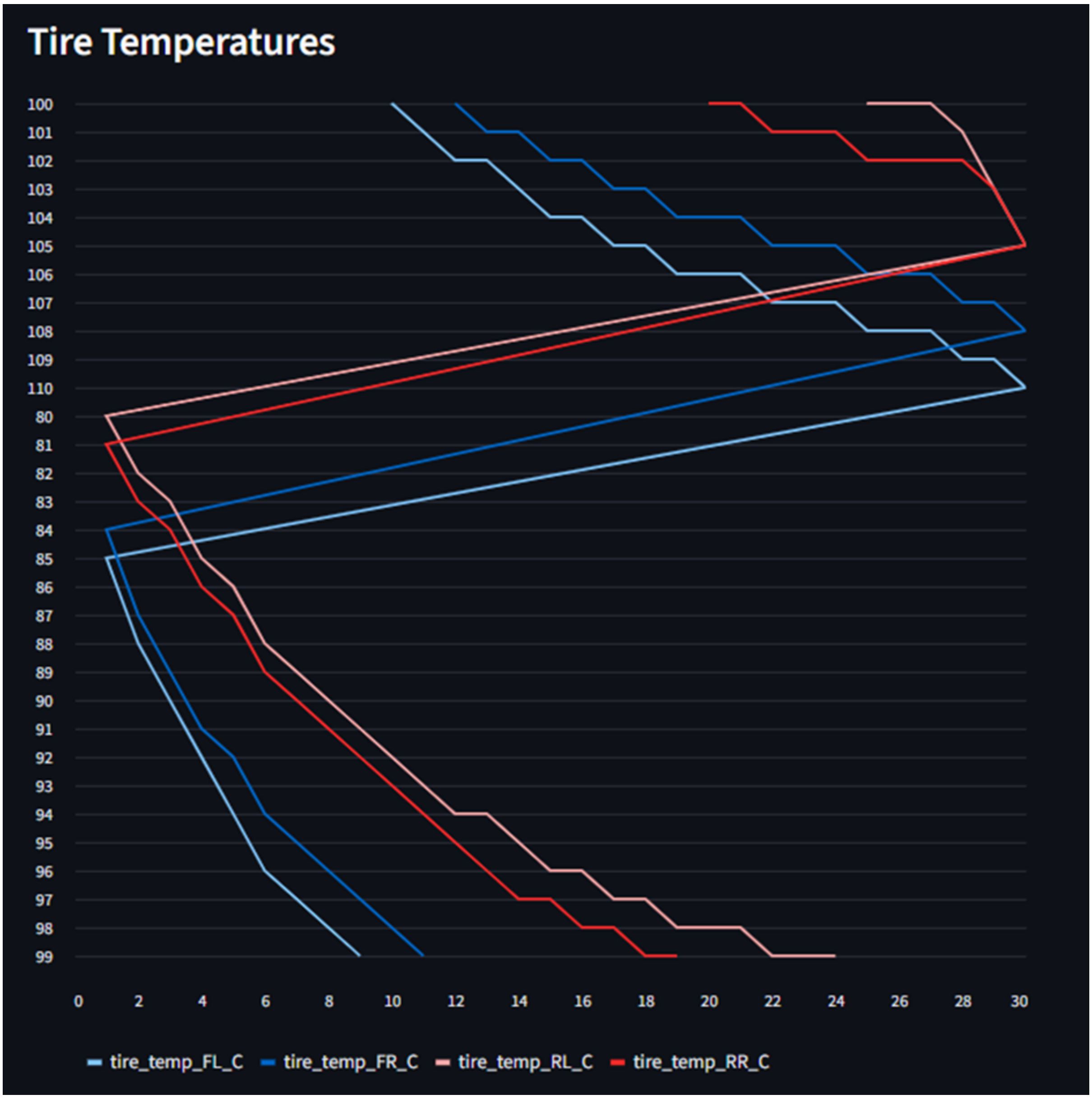
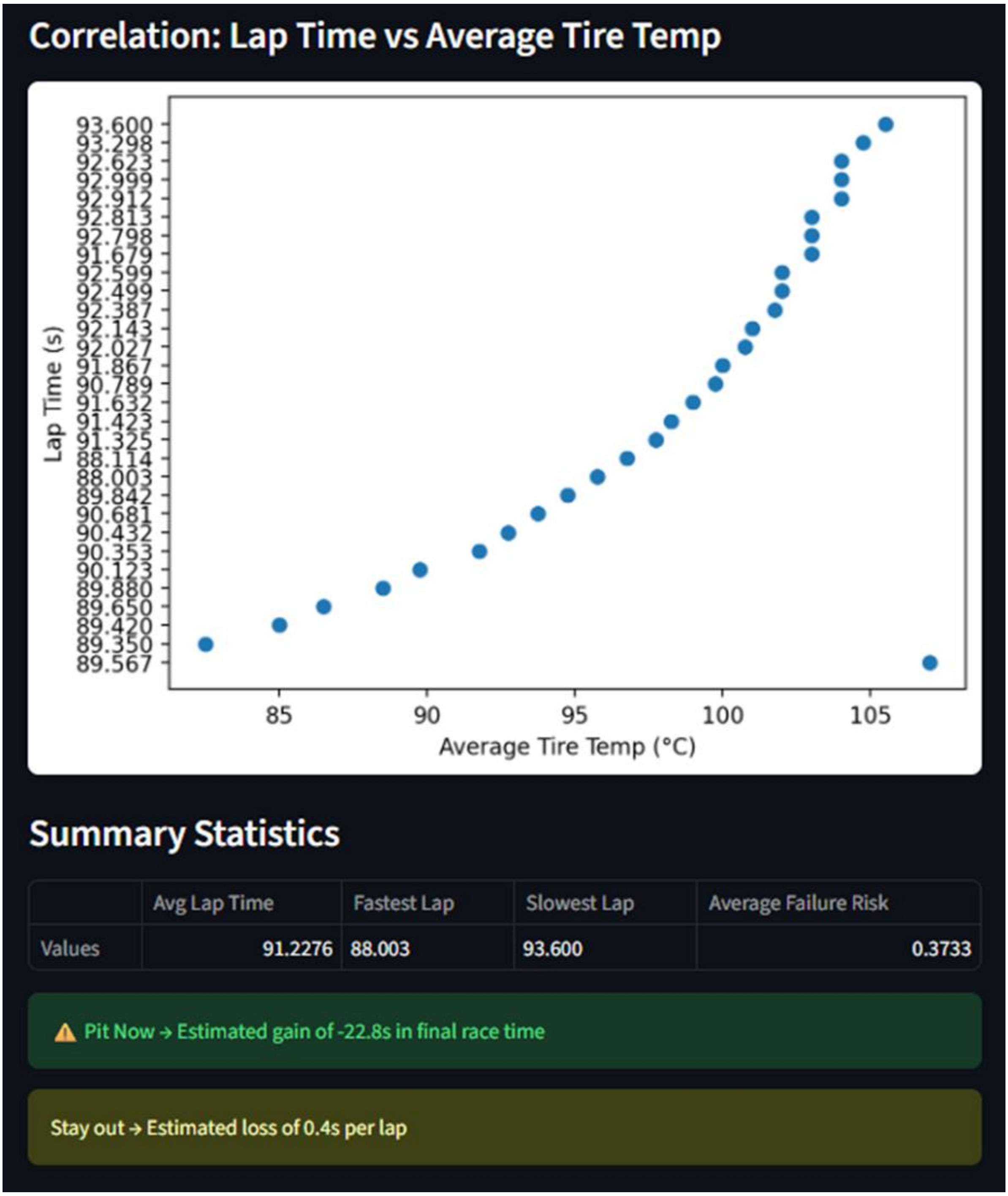


Figure 4.1.3: Chart showing changes of the tire temperatures per lap.



	Avg Lap Time	Fastest Lap	Slowest Lap	Average Failure Risk
Values	91.2276	88.003	93.600	0.3733

Figure 4.1.4: Correlation chart showing the link between tire temperatures and lap times, as well as an example of a predictive model for decision-support.

So, you can see; by collecting and organizing telemetry data, we were able to build a functional dashboard that translates raw numbers into actionable insights. The sample data presented shows the kind of information feeding into a team's system: lap number, tire temperatures, tire wear, and lap times.

With the dashboard, these individual data points become visualized trends, metrics, and interactive elements that help teams make informed decisions. For instance, engineers can track risk scores per lap, and strategists can evaluate pit-stop options all at one glance.

And the previous dashboard snapshots illustrate how these datasets are transformed into clear, decision-support tools, bridging the gap between technical measurements and strategic business actions in a Formula 1 team.

For the full interactive Telemetry dashboard, run the following Python code with Streamlit on your computer:

https://github.com/F1-BI-Project/F1-BI-Dashboards/blob/main/Dashboards_BIinF1/Dashboard_code/Telemetry.py

Or you can directly interact with the Dashboard by clicking on the following link:

https://f1-bi-dashboards-telemetry.streamlit.app

2. Cost-Cap Management:

Technology Side (Data): Component Usage, cycles, reliability scores, and replacement costs are collected, stored, and analysed. Predictive models can estimate failure probability and expected cost if replaced now vs. Later.

Business Side (Decision): Team management must allocate budget under the FIA Cost Cap. They decide how to balance spending between different upgrades like engine components, and reliability improvements.

Business Informatics as the Bridge: A component Dashboard integrates data and visualises information like
-Reliability gauges for critical components
-Projected failure probabilities
-Cost-benefit analysis of replacing components now or later

Sample data: https://github.com/F1-BI-Project/F1-BI-Dashboards/blob/main/Dashboards_BIinF1/Data_samples/components_example_data.txt

Proj_fail_prob_next_race: Projected failure probability in the next race.

Component_id	Component_type	Cycles_used	Expected_life_cycles	Replacement_cost_EUR	Reliability_Score_0_1	Proj_fail_prob_next_race
CMP-101	Gearbox	56	100	400.000	0.851	0.575
CMP-102	Brake Disk	23	80	50.000	0.682	0.268
CMP-103	Floor	32	80	50.000	0.632	0.331
CMP-104	Front Wing	53	80	80.000	0.600	0.150
CMP-105	Suspension	38	80	50.000	0.600	0.425
CMP-106	Engine PU	33	100	2.000.000	0.698	0.407
CMP-107	Barge Board	24	80	40.000	0.708	0.247
CMP-108	Exhaust	50	80	50.000	0.600	0.509
CMP-109	Sidepod	28	80	50.000	0.641	0.308
CMP-110	Rear Wing	23	80	50.000	0.708	0.100

TABLE SHOWING TYPICAL SAMPLE DATA OF CAR COMPONENTS

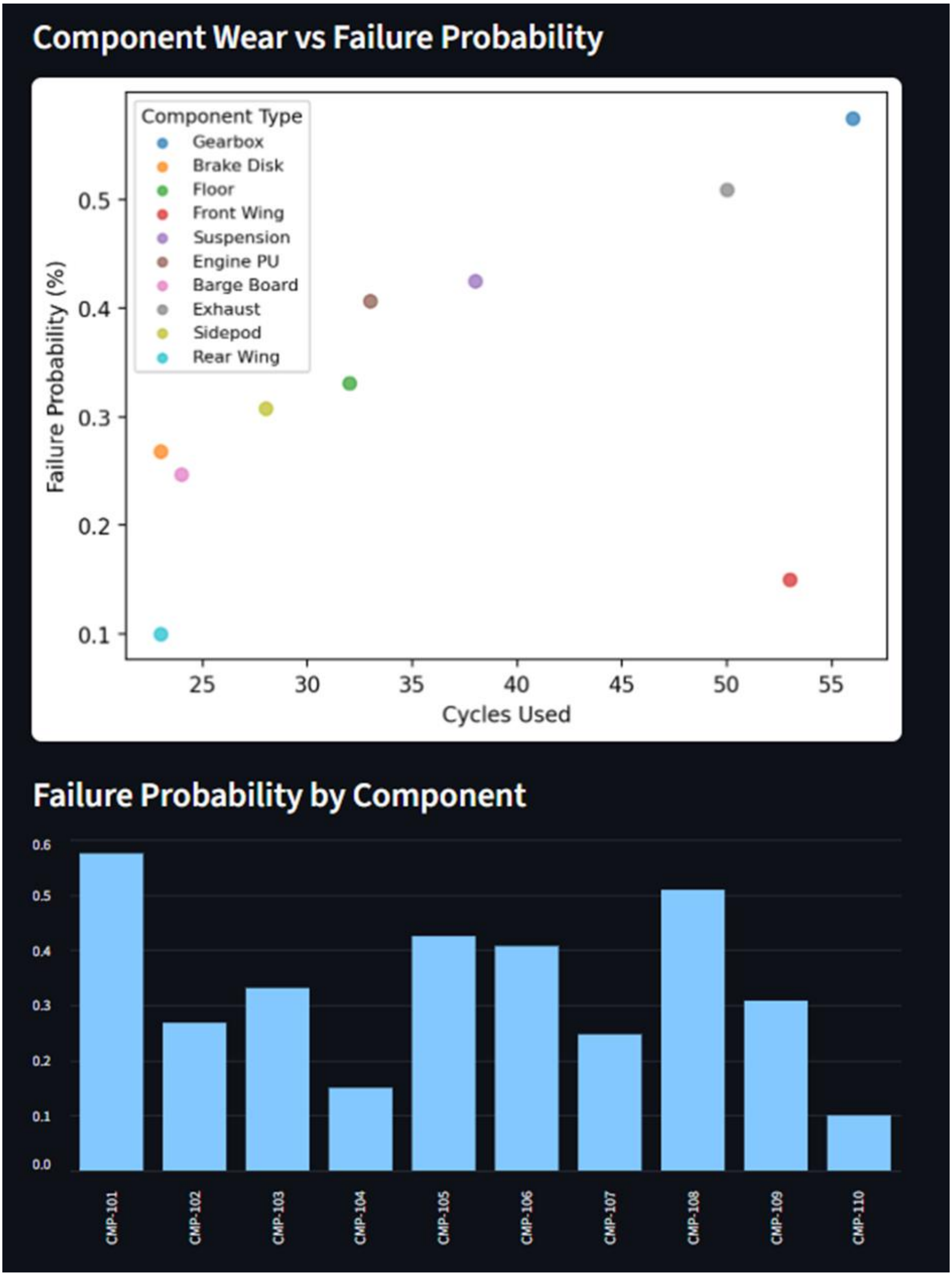


Figure 4.2.1: Chart showing the correlation between a component's cycles used and its failure probability, as well as a diagram showing the failure probability of each component.

Figure 4.2.2: Gauges showing the reliability score of each component.

Figure 4.2.3: Predictive part of the Component Dashboard showing the cost difference between a component replacement now vs. Later.

You see that by combining raw component data with predictive calculations, the dashboard transforms static numbers into helpful and actionable insights. This Dashboard would allow the team to visualize the current health of each component, anticipate potential failures, and compare the cost implications of replacing parts now vs. later. The interactive features, such as adjusting the number of laps to simulate, demonstrate how real-time data and predictive models inform short-term operational decisions, while aggregated trends support long-term budget and resource planning. In essence, the dashboard illustrates the core value of Business Informatics in Formula 1: bridging technical sensor data and analytics with strategic, business-oriented decision-making to optimize performance, reliability, and cost efficiency.

For the full interactive Component Dashboard, run the following Python code using Streamlit on your computer:

https://github.com/F1-BI-Project/F1-BI-Dashboards/blob/main/Dashboards_BIinF1/Dashboard_code/Component.py

Or you can directly interact with the Dashboard by clicking on the following link:

https://f1-bi-dashboards-components.streamlit.app

3. Logistics and Supply Chain:

Technology side (data): Shipment details such as origin, destination, ETA, status, delays, transport costs, and carriers are collected.

Business side (decision): Logistics managers must schedule spare parts transport efficiently, minimize costs, and reduce the risks of delays, which could impact operations.

Business Informatics as the Bridge: A shipment dashboard supports shipping data and could visualise:
- Delay distribution per shipment status
- Transport Cost vs. delay, with points coloured by carrier
- A summary table as drill-down details of individual shipments.

Sample data : https://github.com/F1-BI-Project/F1-BI-Dashboards/blob/main/Dashboards_BIinF1/Data_samples/shipments_example_data.txt

Shipment_id : Shipment identification number
Origin: Origin factory of the Shipment
Destination: Shipment destination
Carrier: Carrier being used for the Shipment
Delay_hours: Estimated hours of delay
Transport_Cost_EUR: Total Cost of the Shipment in Euro
Current_status: Current status of the Shipment

Shipment_id	Origin	Destination	Carrier	Delay_ hours	Transport_ Cost_EUR	Current_ Status
SHIP-201	Italy Factory	Austria	RaceLine	6	10.000	Delayed
SHIP-202	UK HQ	Belgium	RaceLine	6	12.500	Delayed
SHIP-203	Italy Factory	Monaco	SpeedCargo	0	15.000	In Transit
SHIP-204	France Paintshop	Italy	AirFast	24	26.000	Delayed
SHIP-205	Germany Supplier	Italy	RaceLine	24	10.000	Delayed
SHIP-206	Spain Warehouse	Belgium	TransMoto	0	9.000	In Transit
SHIP-207	Spain Warehouse	Monaco	RaceLine	12	45.000	Delayed
SHIP-208	Italy Factory	Monaco	DHL	0	19.000	In Transit
SHIP-209	Germany Supplier	Monaco	Transmoto	12	75.000	Delayed
SHIP-210	Italy Factory	Netherlands	DHL	12	22.000	Delayed

TABLE SHOWING TYPICAL SHIPMENT DATA FOR LOGISTICS

Figure 4.3.1: Total Shipments, average delay, maximum Transport cost, and most delayed carrier as top interactive variables, and a diagram showing the delay distribution by shipment status.

Shipment Details

shipment_id	origin	destination	carrier	delay_hours	transport_cost_EUR	current_status
SHIP-201	Italy Factory	Austria	RaceLine	6	10000	Delayed
SHIP-202	UK HQ	Belgium	RaceLine	6	12500	Delayed
SHIP-203	Italy Factory	Monaco	SpeedCargo	0	15000	In Transit
SHIP-204	France Paintshop	Italy	AirFast	24	26000	Delayed
SHIP-205	Germany Supplier	Italy	RaceLine	24	10000	Delayed
SHIP-206	Spain Warehouse	Belgium	TransMoto	0	9000	In Transit
SHIP-207	Spain Warehouse	Monaco	RaceLine	12	45000	Delayed
SHIP-208	Italy Factory	Monaco	DHL	0	19000	In Transit
SHIP-209	Germany Supplier	Monaco	TransMoto	12	75000	Delayed
SHIP-210	Italy Factory	Netherlands	DHL	12	22000	Delayed

Figure 4.3.2: Overview of the data as a table.

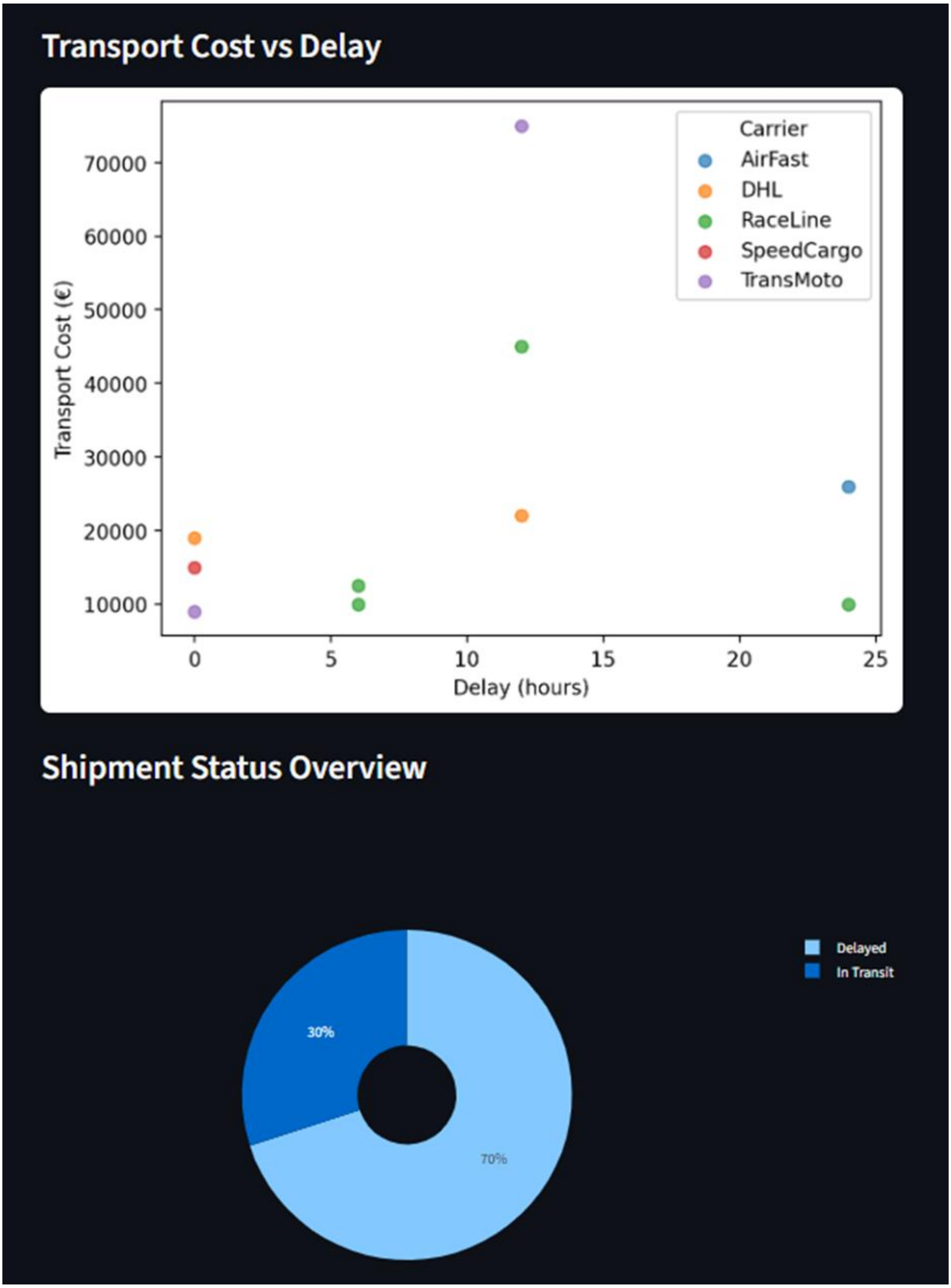


Figure 4.3.3: Chart showing the correlation between a shipment's cost and its delay, as well as a shipment status overview diagram.

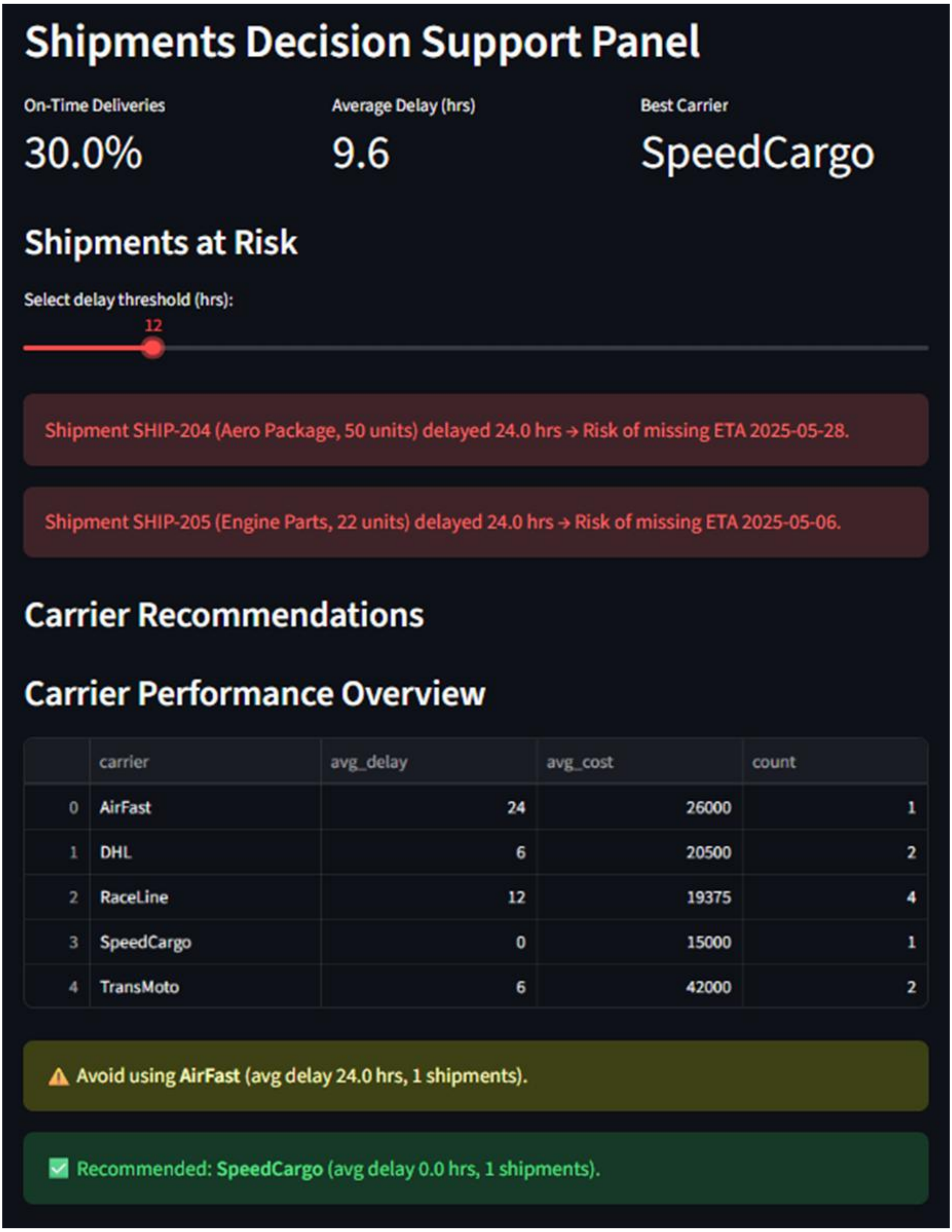


Figure 4.3.4: Predictive part of the dashboard for decision-support showing the shipments at risk based on a delay-hours Threshold. As well as a carrier recommendation, based on the Carriers' performances.

The shipments dashboard highlights how Business Informatics extends beyond the car itself and into the broader operational ecosystem of Formula 1. By monitoring delays, costs, and carrier performance in a single interface, managers may quickly identify inefficiencies and risks on time that would otherwise remain hidden in raw logistics data, or at least hard to recognise. The ability to track transport reliability in real time and analyse long-term trends enables teams to anticipate delays, optimize shipping routes, and allocate resources more effectively. This would help ensure that critical parts arrive at the right place, at the right time, and at the right cost, minimizing operational risks and keeping the performance on race weekends intact. Once again, we see how Business Informatics transforms fragmented, technical data, just numbers really, into a clear decision-support tool that improves both efficiency and competitiveness.

For the full Shipments and logistics dashboard, run the following Python code with Streamlit on your computer:

https://github.com/F1-BI-Project/F1-BI-Dashboards/blob/main/Dashboards_BIinF1/Dashboard_code/Shipments.py

Or you can directly interact with the Dashboard by clicking on the following link:

https://f1-bi-dashboards-shipments.streamlit.app

In summary, the three dashboards (telemetry, component reliability, and shipments) illustrate how Business Informatics transforms numbers from sensors and other information sources into actionable business insights. In Formula 1, milliseconds on track, component lifecycles, and logistics delays all lead to decisions that shape performance and competitiveness. What we have seen is not just data visualization, but decision support: pit-stop recommendations derived from the telemetry data and Dashboard, cost–risk analysis for component replacement, and carrier evaluations for logistics planning.
Of course, these were tiny random sample data to help us understand and have an idea of how things work. In the real world there are a lot more pieces to take into consideration, which makes decision-making far more complicated. But after all, I believe that the previous case examples, as simple and shallow as they are, do offer helpful insights that demonstrate the bridging role of Business Informatics in Formula 1, converting data into knowledge, and knowledge into strategy.

This ability to link short-term operations with long-term planning underlines why BI is not merely supportive in F1, but essential to sustaining both sporting success and business viability.

5. CHALLENGES IN APPLYING BUSINESS INFORMATICS IN FORMULA 1

While in the previous sections we highlighted how Business Informatics can help teams make better and faster decisions on and off the track, implementing these systems in real life can prove to be significantly more challenging. One can even say that the high-stakes environment of Formula 1 is defined by both the complexity and the consequences of any shortcomings, which means teams must be extremely careful in how they design and use their BI systems.

a) Protecting sensitive data:

This comes as no surprise, but in Formula 1, data is a team's most valuable asset, and maintaining its secrecy is critical. Sharing insights, even within different departments of the same team, carries the risk of leaks that could be exploited by competitors. Therefore, the need for confidentiality might limit collaboration, slow down integration of knowledge, and add a layer of organizational complexity. At the same time, teams must find ways to ensure that the right people still have access to the right insights at the right time, balancing secrecy with efficiency.

b) Combining different types of data:

As we saw, a Formula 1 team collects a variety of enormous amount of information: telemetry from cars, component wear and maintenance history, financial budgets, logistical data, and sponsor engagement metrics. Each of these sources has its own format, update frequency, and purpose. Integrating them into a single, coherent system that can provide clear, actionable insights is far from simple. Teams must carefully plan data pipelines, harmonize formats, and coordinate between engineers, strategists, and management to ensure that all pieces of the puzzle fit together. Without proper integration, valuable information can remain unused, preventing decision-makers from seeing the full picture, and taking the optimal decision.

c) Making decisions in real time:

The speed of decision-making in Formula 1 is another big challenge. Some critical choices, such as pit-stop timing or tire strategy, must be made in seconds, based on constantly updating and changing information as we saw. Traditional Business Informatics tools are often designed for analysis over hours, days, or even weeks, so they need to be adapted to deliver instant insights during a race. Dashboards must be intuitive and highlight the most important information without overwhelming the user as well. The systems must also be precise and fast, because even a minor delay or misinterpretation can affect both race results and financial outcomes.

d) Limitations of predictive models

Even the most advanced predictive models have limitations. Forecasts about component failures, race performances, or logistical delays can obviously never be perfect, and unexpected events, such as sudden weather changes and accidents on track, can quickly make predictions inaccurate. Overreliance on models without human judgement can then create blind spots and lead to poor decisions. Formula 1 teams must therefore use Business Informatics as a guide, combining data-driven insights with experience and expertise, and always remain ready to adjust strategies as conditions evolve.

A very interesting example that happened in real life, really somewhat shows the limitations of predictive models:
During the 2018 Singapore third qualifying session, Mercedes AMG Petronas F1 Team predicted that the fastest lap that can possibly be done in their car is 1:36:700, and that was made by the team's own simulations using all available data and supercomputers. But the lap That Lewis Hamilton (Mercedes driver 2013-2024) delivered defied all expectations as he set a whopping 1:36:015, nearly 0.7 seconds faster the team's own simulation, which is truly a big gap in Formula 1.

This is just a case example of how predictive models can go in the wrong direction, and that without human judgement, they don't give much of an advantage.

In conclusion, while Business Informatics provides powerful tools to optimize performance, reduce risk, and support strategic decisions, its application in Formula 1 is far from straightforward. Teams must balance the tension between data secrecy and usability, overcome the challenges of integrating diverse data types, ensure decisions are made quickly and reliably, and remain aware of the limits of predictive models. Understanding these challenges is essential for designing Business Informatics systems that are not only technically advanced but also practical and capable of delivering real competitive advantage on and off the track.

6. CONCLUSION

Formula 1 serves as a compelling showcase of Business Informatics in action. While the sport produces immense volumes of technical and operational data, success is determined not by the data itself but by how effectively teams transform it into actionable insights that inform both sporting and business decisions. Business Informatics works as the bridge between raw technology and strategic management, enabling teams to optimize performance on the track while ensuring long-term organizational sustainability.

For students and practitioners of Business Informatics, I think Formula 1 offers a rich and practical case study; It highlights the importance of integrating data collection, predictive analytics, decision-support systems, and business strategy under high-pressure, real-time conditions. Beyond motorsports, the lessons learned in Formula 1 are transferable to any industry where complex data must be rapidly translated into informed, high-stakes decisions. Ultimately, Formula 1 exemplifies how Business Informatics can turn raw numbers into competitive advantage, demonstrating the true power and relevance of the discipline in the most demanding environments.

7. Appendix

All datasets, Python code, and dashboards for this project are publicly available for exploration and further development:

- The complete project repository can be accessed on GitHub.
- Sample data files used in the dashboards are available here.
- The Python scripts for creating the interactive dashboards can be found here.

Sources:

- How Data Works in Formula 1 – Racecar Engineering
- F1 Data Analysis: Transforming Performance – Catapult
- What Goes Into F1 Strategy – Mercedes AMG F1
- How Race Strategy Works in Formula 1 – Motorsport Engineer
- From Ledgers to Lap Times: Finance Roles in F1 – Fluid Jobs
- Managing Logistics in F1 – Formula 1 Official
- The F1 cost cap broken down

Dashboards:

- Telemetry Dashboard
- Component Dashboard
- Shipments Dashboard

A personal final note

This report reflects not only my work but also my passion. Formula 1 has always fascinated me and exploring it through the lens of Business Informatics allowed me to see how data drives decisions behind the scenes. This project deepened my appreciation for the field and strengthened my motivation to keep learning.

I hope this work helps you see the depth and potential of combining data and innovation, and I encourage you to interact with it, explore the GitHub repository, experiment with the dashboards, and even expand upon them to make the models more realistic and dynamic.

Thank you for reading, and for joining me on this journey as a Business Informatics student with a passion for Formula 1.

Abderrahmane Chakroune