Saudi Arabia's motorsport ambition

Technology, investment and the future of racing

pwc

Foreword

Formula 1, the pinnacle of global motorsport, has seen a remarkable surge in popularity, with its fanbase reaching 826.5 million in 2024 and viewership climbing to 1.6 billion.[1] Beyond F1, motorsports are expanding, with electric racing and other formats like sports car and off-road racing gaining traction, propelled by innovations in technology and a global push toward sustainability.

The Middle East, particularly Saudi Arabia, is positioning itself as a global motorsport hub with major investments like the upcoming 2025 Saudi Arabian Grand Prix at the Jeddah Corniche Circuit. The region is leveraging motorsport not just for entertainment, but as a catalyst for economic diversification, innovation and global influence. However, the industry faces challenges, including regulatory complexity, environmental concerns, talent shortages and financial sustainability. Despite these hurdles, motorsport remains a key driver of innovation - advancing electric mobility, autonomous systems and sustainable materials. With strategic investment in AI-driven circuits and next-gen technologies, Saudi Arabia is helping shape the future of mobility, performance engineering, and smart infrastructure worldwide. [2]

This report looks at the integration of advanced technology that will be essential in maximising the economic and entertainment potential of its circuits.

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Introduction

Since the early 20th century, Formula 1 (F1), the pinnacle of global motorsport, has enthralled audiences with its speed, technology and thrill. From legends, such as Farina and Fangio to Schumacher, Vettel and Hamilton, and from iconic teams, such as Williams and Ferrari to Mercedes, Red Bull and McLaren, F1 embodies the spirit of human ambition and achievement. With a global fanbase surpassing 750 million - an increase of 50 million since 2021 - the sport's popularity continues to surge, driven by a growing interest in the Middle East and a rising number of young female fans, according to a study by Nielsen Sport. [3]

The sport experienced an unprecedented surge in global popularity, driven by Liberty Media's transformative acquisition of Formula 1 in 2017 for an enterprise value of US$8 billion and equity value of US$4.4 billion.[4] This growth was further accelerated by the launch of the *Formula 1: Drive to Survive* docuseries in 2019, which broadened the sport's appeal to younger, more diverse audiences, particularly in the United States, where TV viewership on ESPN doubled since 2018. The show has not only broadened F1's audience but also reshaped its demographics - 42% of fans are now under 35, with female viewership rising to 41%. The influx of younger, more engaged fans has made F1 an attractive platform for sponsors, driving sponsorship revenue to US$632 million in 2024, more than doubling since 2019. [5]

Formula One's global fanbase has now grown to 826.5 million in 2024, up nearly 90 million from the previous year, according to new data released by Nielsen Sports. [6] Also, compared to 2023, global TV viewership for F1 grew from 1.5 billion to 1.6 billion, with about 66 million global viewers per race on average on linear platforms, while social media followers rose from around 70 million to 97 million. [7]
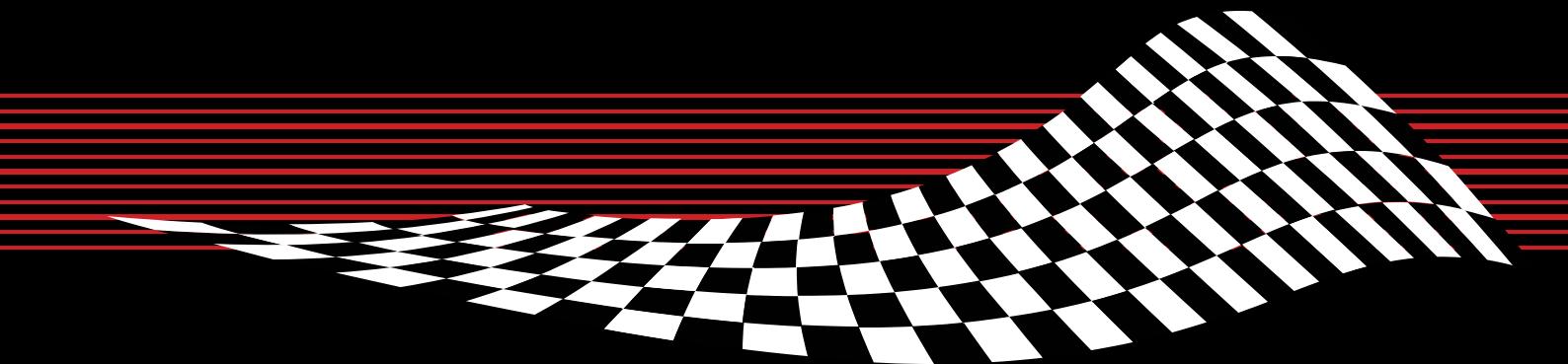
01

The global growth
of motorsports

The global growth of motorsports

Motorsports is experiencing significant growth across different segments. Formula 1 remains the dominant force, while electric motorsports are gaining momentum, driven by sustainability initiatives that are reshaping the industry. Beyond F1, sports car racing, stock car racing, off-road racing and touring car racing are also attracting increased interest, fueled by technological advancements, evolving fan engagement strategies and rising investments.

Motorsport market size by type of sport (2024)

29%
22%
13%
6%
9%
21%

- Formula racing
- Sports car racing
- Stock car racing
- Touring car racing
- Off-road racing
- Others
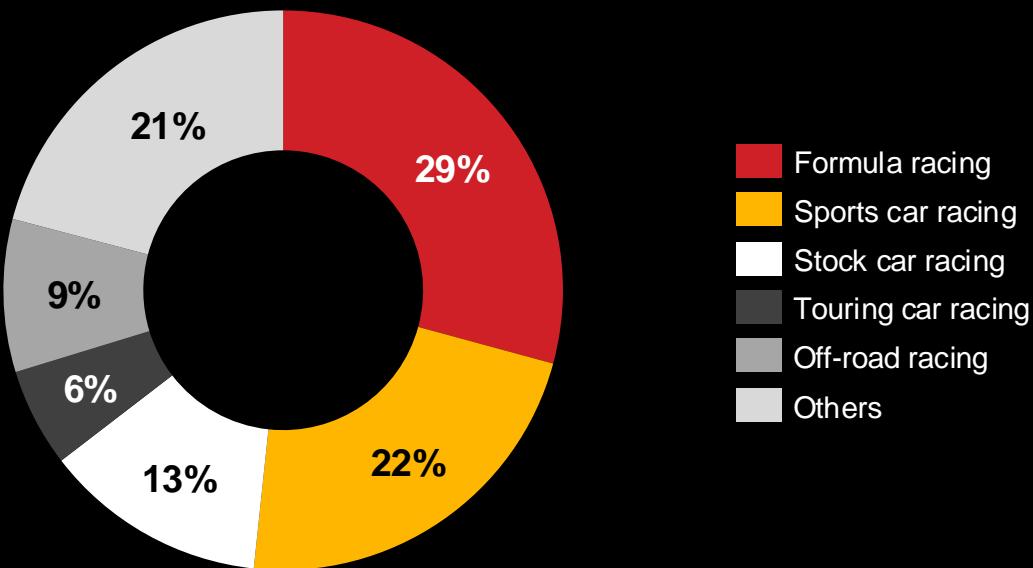
- **Formula racing**, particularly **Formula 1**, **dominates the motorsport market with over 29% of the market share** [8], supported by its global appeal, high-profile sponsors, and extensive media coverage

- **Sports car racing** gains traction with its focus on endurance events like Le Mans, showcasing innovation in vehicle performance and engineering

- **Stock car racing** remains a **popular American motorsport** known for its rugged competition and connection to working-class roots, but faces challenges as it attempts to broaden its appeal while retaining its loyal fanbase

- **Touring car racing** continues to grow steadily, attracting fans with its relatable vehicle designs and competitive racing formats across diverse terrains

- **Off-road racing** appeals to **adventure enthusiasts**, with events like the Dakar Rally offering unique challenges and promoting rugged automotive technology

- **Electric motorsports**, including Formula E, is the **fastest-growing segment**, **driven by sustainability goals** and strong manufacturer support, while Motorcycle Racing, led by MotoGP, continues to captivate global audiences with its global races and high-profile riders
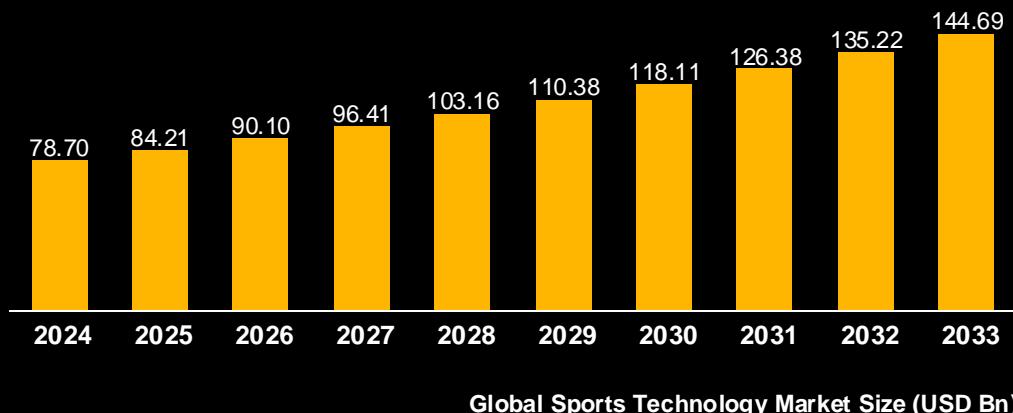
Globally, the motorsports market size is projected to reach US$144.69 billion by 2033, growing at a 7% compound annual growth rate (CAGR) from 2024 to 2033.[9] As the sport evolves across different regions, Europe remains the market leader, contributing 45% of global revenue in 2024.[10] This dominance is driven by F1's deep-rooted heritage, high-profile events and its massive commercial ecosystem.

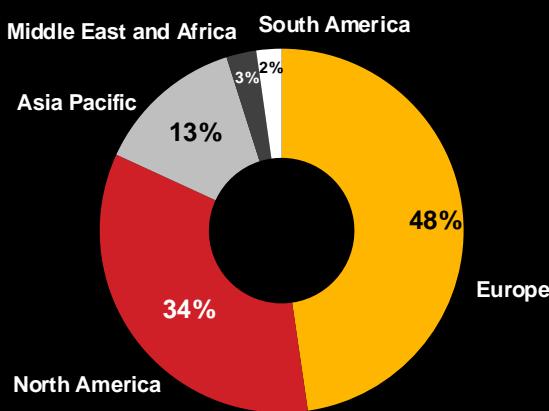## Interest in motorsport is reflected in the globally growing market

USD 144.69 Bn by 2033
Growing at a 7% CAGR between the period of 2024 and 2033

2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
78.70	84.21	90.10	96.41	103.16	110.38	118.11	126.38	135.22	144.69

Global Sports Technology Market Size (USD Bn)

The market size breakdown of the motorsport market highlights several key trends[11]

Pie chart:
- Europe: 48%
- North America: 34%
- Asia Pacific: 13%
- Middle East and Africa: 3%
- South America: 2%

Europe leads the motorsports market, contributing **45% of global revenue in 2024**, driven by its historic circuits like Silverstone and Monza, and adoption of electric racing formats such as Formula E.

Asia-Pacific is the fastest-growing region, fueled by rising motorsports interest and significant investments in infrastructure and event hosting.

North America maintains a strong presence through popular series like NASCAR, backed by substantial sponsorship deals and innovative fan engagement strategies.

The Middle East & Africa region is emerging as a key player with growing investments in hosting high-profile motorsports events and developing tourism around motorsports.

Asia-Pacific is emerging as the fastest-growing region, fueled by an increasing interest in motorsports and substantial investments in infrastructure and event hosting. North America remains a stronghold, largely due to the rising tide of F1 plus existing series such as the National Association for Stock Car Auto Racing (NASCAR)'s popularity, lucrative sponsorship deals and innovative fan engagement strategies. Meanwhile, the MENA region is also gaining momentum, with governments and investors positioning the region as a key player in motorsports tourism and global racing events.

02

The rise of
Middle East
in global motorsports

The rise of the Middle East in global motorsports

The Middle Eastern economies see F1 as critical to their economic diversification and have invested enormous sums to position the region as a key player in the global motorsport industry, hosting major international racing events and making strategic investments to develop a thriving motorsports ecosystem. Abu Dhabi, which held its first Grand Prix in 2009, spent US$40bn constructing an artificial island for the event. The growth in motorsports in the MENA region can be attributed to several key drivers and trends[12,13,14,15]:

Promotion of major events
Attracting premium motorsports events, such as Formula 1 and World Endurance Championship races boosts interests in motorsports

Hosting 4 F1 races
Out of 24 total races, indicating the growing importance of motorsport in the region

Investment in local ecosystem
Creating programs, social media campaigns, and grassroots events to attract and develop local talent

83% of racing drivers
Seek more structured support systems, with only 15% of drivers aged 21 years or younger

Youth interest in motorsports
Hosting local events and promoting local drivers spurred interest in the region's youth for motorsports

73% of youth seek more events
Across motorsports in the UAE, and are interested in new and local drivers

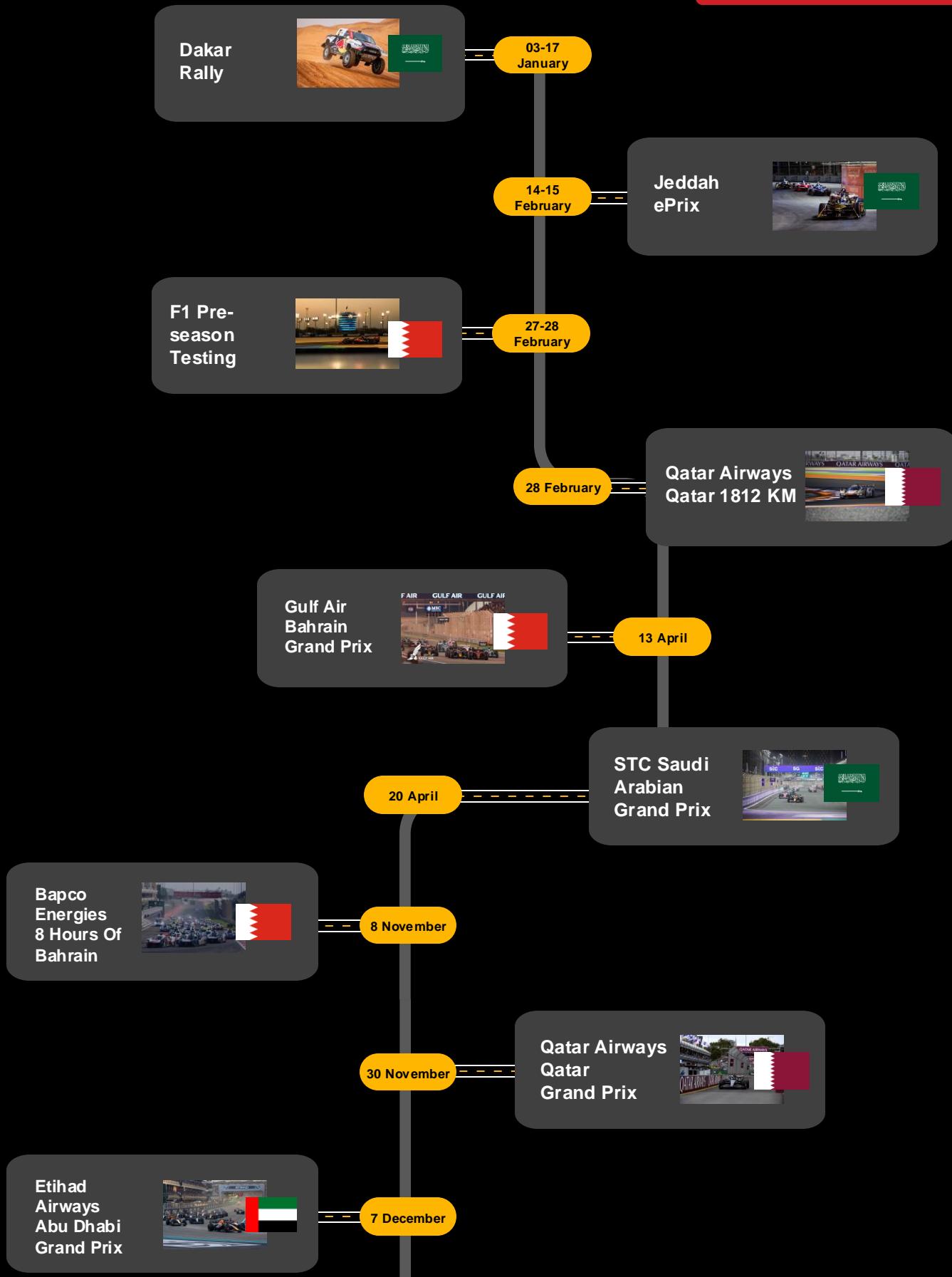**Local participation in events**
Competing locals from across the MENA regions are participating in national and international level championships

Over 150 competitors
From 16 nations competed in the 2024 MENA Karting Championship Nations Cup

The Middle East hosts motorsports events for major series, particularly Formula 1, in which the season typically begins and ends in the Middle East:

Dakar Rally — 03-17 January

Jeddah ePrix — 14-15 February

F1 Pre-season Testing — 27-28 February

Qatar Airways Qatar 1812 KM — 28 February

Gulf Air Bahrain Grand Prix — 13 April

STC Saudi Arabian Grand Prix — 20 April

Bapco Energies 8 Hours Of Bahrain — 8 November

Qatar Airways Qatar Grand Prix — 30 November

Etihad Airways Abu Dhabi Grand Prix — 7 December

The Kingdom of Saudi Arabia has taken an aggressive approach to solidifying its role in the future of motorsports. The Kingdom has committed over US$6 billion to its sports industry since 2021, fueling the development of world-class venues like the Jeddah Corniche Circuit and the upcoming Qiddiya Speed Park.[16]

Saudi Arabia

55% of Extreme E Is owned by the Public Investment Fund, amounting to around USD 54.5 Mn[17,18]

5% of Formula E Is owned by the Public Investment Fund, amounting to USD 6.9 Mn[19]

USD 480 Mn Racetrack, Qiddiya Speed Park Track to be developed in Qiddiya[20]

USD 650 Mn F1 Contract, With Saudi gaining rights to host the Saudi Grand Prix over a 10-year period[18]

UAE

USD 1 Bn Racing Circuit Developed, making the Yas Marina Circuit one of the most expensive circuits globally[21]

A2RL Established in 2024, Bringing in over 600,000 spectators through various channels during the inaugural event

Qatar

30% of Audi Formula One Team Acquired by Qatar Investment Authority, amounting to over USD 360 Mn[22]

Qatar Motorsports Academy Stars Introduced to develop Qatari motorsport talent, enhancing Qatar's talent pool within the sport

Bahrain

Acquisition of McLaren Racing In 2024 by Mumtalakat, Bahrain's sovereign wealth fund[23]

As Saudi Arabia readies itself to host the 2025 Saudi Arabian Grand Prix, which takes place over 50 laps of the 6.174-kilometre Jeddah Corniche Circuit on April 20 – it positions itself strongly at the forefront of global motorsports. This report looks at the integration of advanced technology that will be essential in maximising the economic and entertainment potential of its circuits.

The success of a modern motorsport circuit depends on more than just financial investment - leveraging innovation in fan engagement, race operations and digital broadcasting will be key to ensuring long-term success in the industry.

03

## Key technology trends in motorsports

Key technology trends in motorsports

An analysis of technology adoption within motorsports reveals key trends that define the evolving direction of the industry:

Hybridisation and electrification:
Integration of **electric motors** with combustion engines to **enhance efficiency and performance** while aligning with **environmental sustainability.**
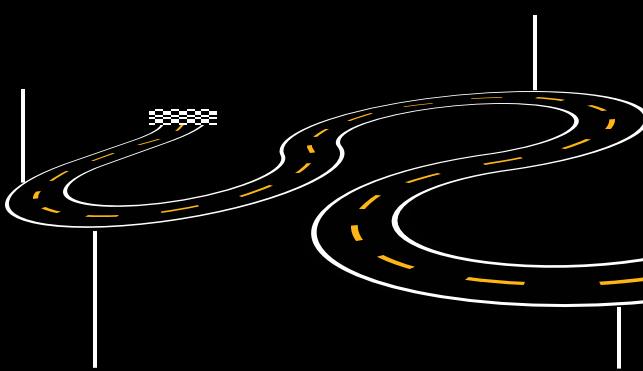
3D printing and rapid prototyping:
Adoption of **3D printing for quick, on-site manufacturing** of customised, lightweight vehicle parts, enhancing flexibility in design and testing.
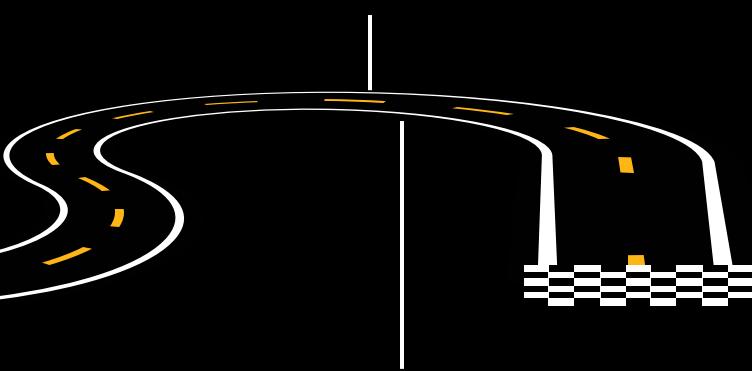
Hyperconnected operations:
Coordination of **IoT and connectivity technologies** to streamline communication and data exchange across racing team operations.

Reliance on advanced simulations:
Utilisation of simulations to **model vehicle behaviors and race strategies**, reducing physical testing needs and accelerating development.

AI-driven decision making:
Application of AI to analyse complex data sets, **facilitating strategic decisions and predictive maintenance** in both team and event operations.

Dynamic advertisements:
Implementation of digital solutions that **adapt content dynamically**, enhancing **audience engagement and marketing flexibility.**

04 Key stakeholders shaping the future of motorsports

Key stakeholders shaping the future of motorsports

The technological evolution of motorsports is driven by two key stakeholder groups:

01 Series organisers

Entities responsible for organising and managing racing events. This includes everything from setting the regulations, scheduling the events, to overseeing the execution on race days.
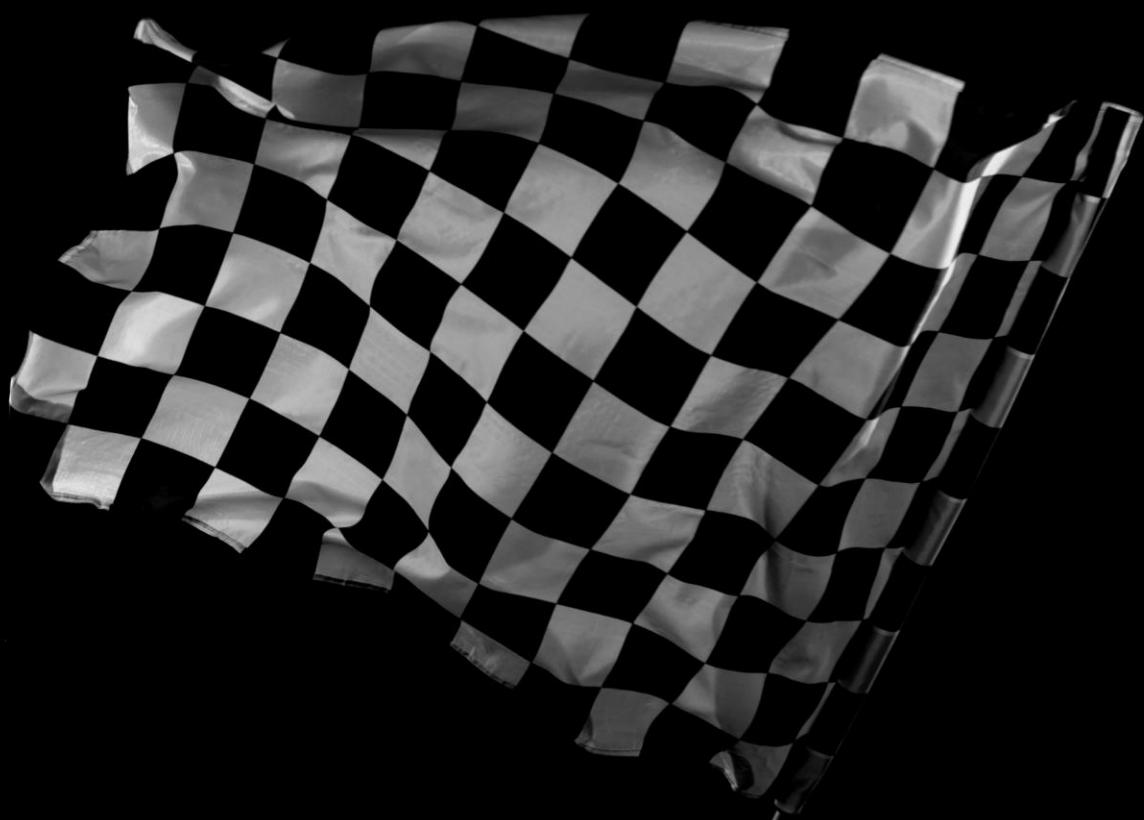
Objectives

- Streamline operations
- Enhance fan engagement
- Improve safety

02 Racing teams

Teams that compete in racing events, encompassing the drivers, their crews, and the technical staff. Their focus is on optimising the performance of their vehicles and drivers

Objectives

- Optimise performance
- Enhance talent
- Improve efficiency
- Enhance fan engagement

05

Technology in use
series organisers

01 Series organisers

In pursuit of optimising the operation and management of motorsports events, various technology solutions have been designed to meet their objectives effectively.

Overview:

- Series organisers are increasingly turning to technology to enhance the **overall execution and management of events**

- These adaptations aim to **streamline operations, improve safety protocols and enrich the spectator experience**

- By integrating these solutions, series organisers can **handle the complexities of race logistics**, **monitor compliance with regulations**, and **offer fans innovative ways to engage with the sport**

Value chain for series organisers

Governance and regulation	Event planning and management	Media and broadcasting	Sponsorship and commercial activities

Series Perspective

Establishes and enforces rules, licenses, and certifications to ensure fair competition and safety	Coordinates race calendars, venue contracts, and logistics for seamless global events	Produces race content and manages media rights to deliver coverage worldwide	Secures partnerships and drives revenue through sponsorships and merchandise

Use case

• Laser scrutineering • Live race compliance • Timing technology	• Integrated safety response technology • LiDAR track scanning	• Gyroscopic camera integration • AI feed enhancement • Cloud-based broadcasting	• AI trackside ad inventory management • Virtual ad placement • Advanced data analytics

Governance and regulations

High-speed systems and IoT devices enable enhanced, efficient regulatory assessments by organisers:

Technology use case

Laser scrutineering

- Uses electronic scanners to measure F1 car dimensions

- Compares physical specs against pre-approved CAD data

- Enables quick checks for width, height and basic parameters

- Supports detailed scans for full compliance with FIA standards

- Enhances scrutineering accuracy during race weekends

Live race monitoring

- Provides real-time circuit supervision through integrated data, video and radio

- Speeds up incident detection and response

- Merges marshalling, stewarding, video review, scrutineering and race management into one system

- Streamlines oversight and improves safety throughout the event

Timing systems

- Tracks car positions with timing loops, transponders and decoders

- Measures timing accuracy down to ten thousandths of a second

- Uses test vehicles to verify system setup before each race

- Includes backup systems like light beams and high-speed cameras to ensure accuracy

Benefits

Enhances transparency in scrutineering outcomes by matching cars to CAD designs, strengthening trust in rule enforcement.

Combining functions into one platform streamlines operations and helps race officials make faster, more accurate decisions.

Accurate timing ensures fair results and supports smoother race operations.

Event planning and management

In an effort to enhance operational safety, technology solutions have been implemented, ensuring that drivers as well as assets are efficiently monitored:

Technology use case

Integrated safety response technology
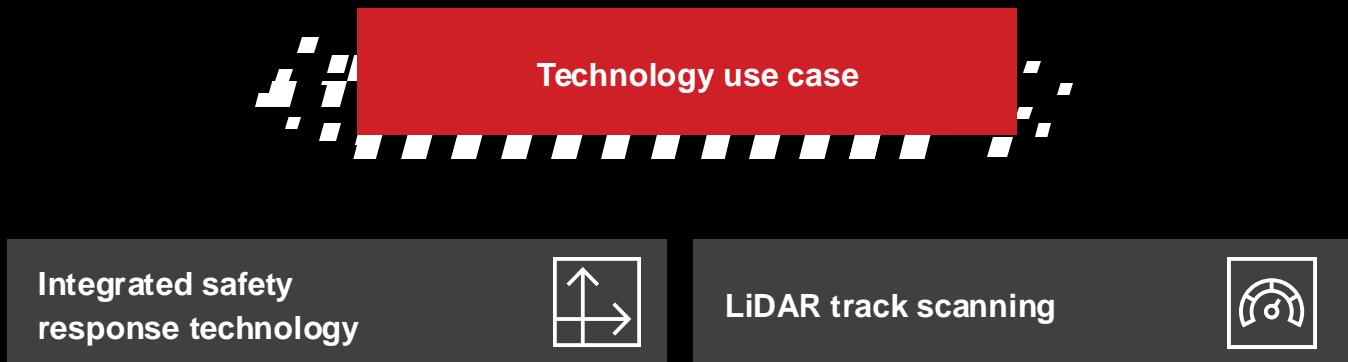
- The IndyCar safety team uses hydraulic rescue tools and 360° cameras to support quick extractions and track awareness during incidents.

- The system uses wireless tech to transmit crash data in real time, helping medical teams coordinate with race control.

LiDAR track scanning

- LiDAR scans racetracks to produce precise 3D models of the surface and surroundings

- Gives all teams equal access to detailed track data for use in simulations

- Supports fair competition and consistent strategy planning across teams

Benefits

- Enhances real-time incident analysis and response
- Improves safety for drivers and teams
- Provides recorded material for emergency training scenarios

- Accurate 3D models minimise the need for physical track testing
- Teams can simulate different track conditions and setups
- Enables significant time and cost savings during preparation

Media and broadcasting

The motorsport industry has seen significant developments in broadcasting, coupled with technology solutions to enhance viewer experiences:

Technology use case

Gyroscope camera system

- Enhances Formula 1 broadcasts with dynamic in-car perspectives and on-the-fly adjustments during banked turns.

- Tested in 2022 with McLaren, with wider use planned to highlight unique F1 track features.
- 4o

AI live feed enhancement

- Formula 1 uses AI to fill in missing frames, creating smoother and more visually appealing slow-motion replays.

- Improves clarity and fluidity of key moments like crashes or close racing, ensuring high-quality replays.

Cloud-based broadcasting

- F1 TV is a cloud-based platform with live streams from track-side and on-board cameras, plus real-time subtitles in multiple languages.

- The cloud-first setup enables smooth global video distribution and handles high traffic during race weekends.

Benefits

- Creates a more immersive viewing experience

- Increases viewer retention through engaging visuals

- Boosts sponsor visibility with dynamic angles and footage

- Highlights key moments in high quality

- Delivers a more immersive fan experience

- Collects data on viewer habits and preferences

- Informs future content and marketing strategies

- Supports continuous platform improvement

Sponsorship and commercial activities

Dynamic displays and data analytics have enabled event operators to maximise their revenue potential, bringing in more advertisers and sponsors to fund their events:

Technology use case

Trackside advertising inventory management

- Formula 1 and Flamingo AI developed a specialised machine learning tool to **optimize trackside sponsorship signage placement** based on historical data and race footage analysis

- The technology analyzes race footage to **identify active cameras and the logos they capture**, enabling a tailored approach to **maximise each sponsor's exposure** while maintaining contractual obligations and avoiding visual clutter

Virtual advertising placement

- Virtual advertising overlays advertisements onto physical locations during live broadcasts. This approach employs **image recognition and artificial intelligence** to alter the sponsorship messages depending on factors, such as viewer location

- The technology primarily uses specialised software that can recognise camera angles and zoom levels to **accurately place virtual ads in real-time during races**

Advanced data analytics

- Formula 1 leverages cloud computing and machine learning technologies to **enhance digital broadcasts**. The partnership utilises sponsor services, such as Amazon SageMaker, Amazon Web Services (AWS) Lambda, and AWS an alytics tools

- Formula 1 leverages the advanced data tracking systems to **provide live race metrics and insights directly to fans** during race commentary

Benefits

- The AI tool's precise analysis and placement of signage ensure that each sponsor **receives optimal exposure**

- Sponsors receive **bespoke strategies** for their specific visibility needs and objectives, **enhancing the branding and effectiveness** of the campaign

- Virtual advertising technology enables Formula 1 to **customise advertising content** for different geographic regions

- Virtual advertising **reduces the logistical and financial burden** of transporting and setting up physical advertising materials at each venue

- The utilisation of AWS machine learning and analytics services allows fans to **receive in-depth insights and analysis**, such as track dominance and telemetry comparisons, enhancing **understanding and engagement** with the race events

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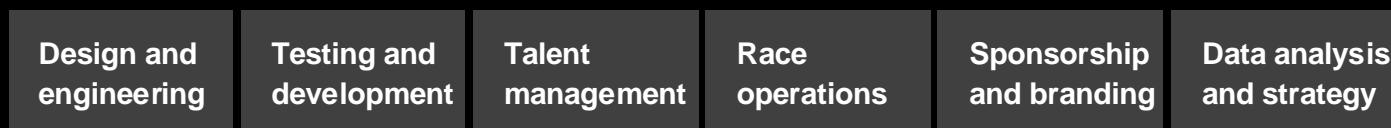
Technology in use
racing team

02 Racing teams

Technological advancements have led teams to **leverage innovation for a competitive edge**, capitalising new opportunities to enhance performance.

Overview:

- Racing teams **across various motorsports disciplines** are progressively leveraging **advanced technology solutions** to **boost performance and gain a competitive edge**

- The strategic adoption focuses on **enhancing driver performance and optimising team operations**. Through advanced technological solutions, teams can **analyse vast amounts of data from races** to fine-tune engine settings, improve aerodynamics, and tailor strategies to specific track conditions

The value chain for racing teams

Design and engineering	Testing and development	Talent management	Race operations	Sponsorship and branding	Data analysis and strategy

Team Perspective

Design and engineering	Testing and development	Talent management	Race operations	Sponsorship and branding	Data analysis and strategy
Develops and optimises the car's chassis, aerodynamics, and components to maximise performance within regulatory constraints	Conducts on-track and simulation testing to refine the car's performance and reliability	Recruits and trains drivers, engineers, and crew to maintain competitive excellence	Executes race strategies, pit stops, and in-race decisions to achieve optimal results during events	Secures team-specific partnerships and manages marketing efforts to enhance brand visibility and generate revenue	Utilises telemetry and performance data to inform race decisions and continuous development

Use case

Design and engineering	Testing and development	Talent management	Race operations	Sponsorship and branding	Data analysis and strategy
• Computational Fluid Dynamics • Additive Manufacturing • Digital Simulation Software	• Wind Tunnel • Automated Mechanical Testing	• Driver Simulator	• Track Telemetry • Advanced Communication Systems • GenAI Enabled Live Analytics	• GenAI Livery • Dynamic Advertisement Panels	• Post-Race Analytics • GenAI Post-Race Analytics

Design and engineering:

Manufacturing and simulation technology solutions have enabled teams to enhance and optimise their design processes:

Technology use case

| Computational Fluid Dynamics modeling | Additive manufacturing | Digital simulation software |

- McLaren and Dell developed CFD simulations to model aerodynamics and refine car performance without wind tunnel testing.

- Enables extensive digital testing, reducing cost and time spent on physical trials.

- RB F1 team and Roboze use additive manufacturing to produce lighter, more complex components from high-performance composites.

- Produces ultralight, durable components with high thermal and mechanical resistance, improving aerodynamics and structural strength.

- Siemens and Oracle Red Bull Racing developed tools for faster design, testing, and manufacturing.

- Enable fast engineering changes, advanced bodywork modeling, and wire harness design.

Benefits

- CFD wind tunnels cut reliance on costly full-scale tests, helping teams stay within budget caps.

- Digital simulations increase confidence in designs before costly manufacturing and testing.

- 3D printing allows flexible design experimentation across materials and processes.

- 3D printing technologies **accelerates the development and innovation cycles.**

- Siemens' technology **reduced the time to execute engineering changes**, with design cycle times improving by 300%.

- Manages 10,000 unique parts per car, customising setups per track and streamlining manufacturing logistics.

Testing and development:

Once a design is conceptualised, testing solutions are deployed to ensure the standards set by the governing body is met, ensuring compliance:

Technology use case

| Wind Tunnel	Automated Mechanical Testing
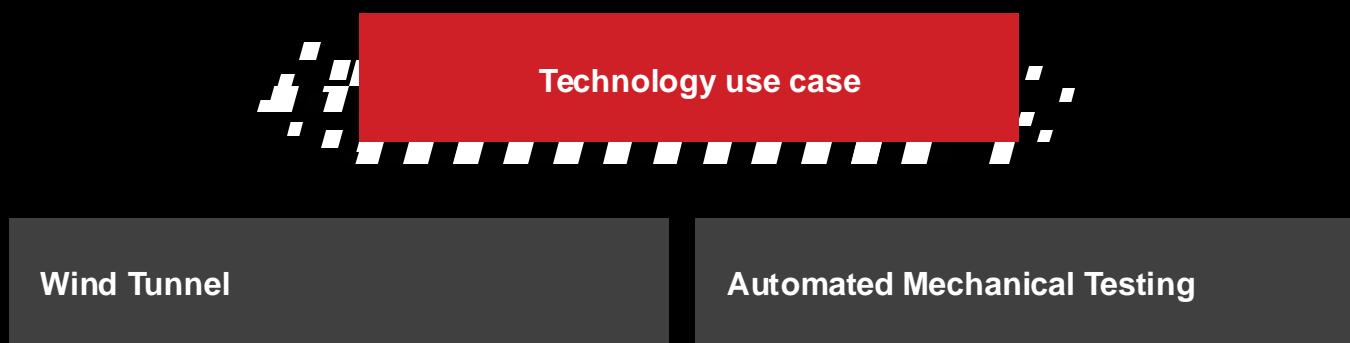
- Wind tunnels are specialised facilities used to **test and analyse the aerodynamic properties of race cars** by simulating airflow over scale models. These facilities allow engineers to gather data on aerodynamic forces, cooling effects, and component performance.

- Wind tunnels enable teams to **experiment with and refine car configurations** before actual on-track testing. This aids in decision-making around design modifications and **understanding the aerodynamic impact of each component.**

- The suspension testing rig conducts **advanced suspension testing and optimisation**, utilising seven hydraulic actuators to simulate various racetrack conditions, allowing teams to **fine-tune vehicle dynamics under controlled settings.**

- The rig allows for the exploration of over a trillion different vehicle setups, **significantly accelerating the suspension development process** by reducing the need for physical track testing.

Benefits

- Wind tunnels allow for **more accurate aerodynamic testing** by simulating racing conditions, refining car performance through better understanding of **aerodynamic efficiency, balance, and component behavior.**

- Controlled test conditions ensure all results are reproducible, offering consistent and reliable data with the **capability of conducting over 100 tests per day**. This precision allows teams to **develop effective suspension systems and fine-tune minute details.**

Talent management:

Advanced computing software, coupled with simulators have enabled drivers to test under preset conditions, enhancing driver talent and experience:

Technology use case
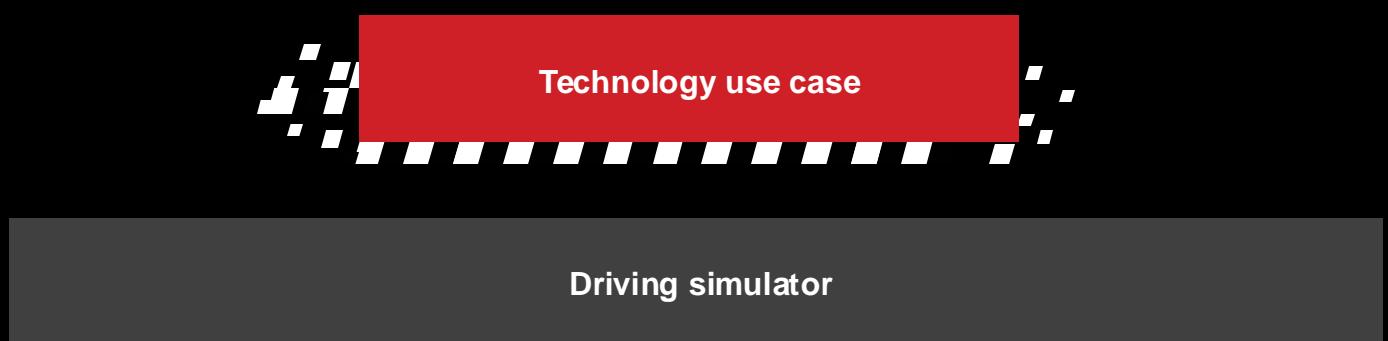
Driving simulator

- **The McLaren Formula 1 team utilises a driving simulator** situated within the McLaren Technology Centre to enhance vehicle development and race preparation.

- The simulator is instrumental in **collecting feedback from drivers on car behavior under simulated conditions**, which is used to make iterative improvements to the vehicle's design and setup.

- In addition, d**rivers and engineers use the simulator to prepare for upcoming races**, experimenting with different strategies and setups to adapt to anticipated track conditions.

Benefits

- By enabling drivers to simulate races on various circuits under different conditions, **the technology solution helps in optimizing race strategies** and adapting to track specifics before arriving at the venue.

Race operations:

Advancements in networking and IoT technologies have allowed teams to improve data transfer and communication, enabling highly connected operational efforts:

Technology use case

Track Telemetry

- Formula 1 teams use track telemetry with 300 sensors per car to transmit data and video for performance and strategy optimisation.

- This telemetry enables detailed monitoring of aerodynamics, engine performance, and vehicle reliability.

Advanced Communication systems

- Andretti partnered with D2N Technology Solutions to enhance communication within the Walkinshaw Andretti United team

- D2N provides real-time communication between drivers, engineers, and pit crews. "Listen Everywhere" allows fans and partners to access live team communications, enhancing race day experience.

Digital Simulation Software

Zapata AI and Andretti Global use AI-enabled live analytics in motorsports:

- Custom AI models and algorithms run on-site via edge computing at race locations.

- Crews use text commands to access relevant performance data instantly.

- Reduces latency and improves real-time decision-making during races.

Benefits

- Continuous monitoring helps detect and prevent failures early, extending the lifespan of key components.

- Enables quick strategy and vehicle adjustments, improving race performance.

- On-site data processing allows rapid strategy changes, giving teams a competitive edge.

Sponsorship and branding

Teams are increasingly adopting innovative solutions to enhance revenue-generating mechanisms, tapping into unrealized potential in areas such as vehicle liveries:

Technology use case

GenAI livery	Dynamic advertisement panels
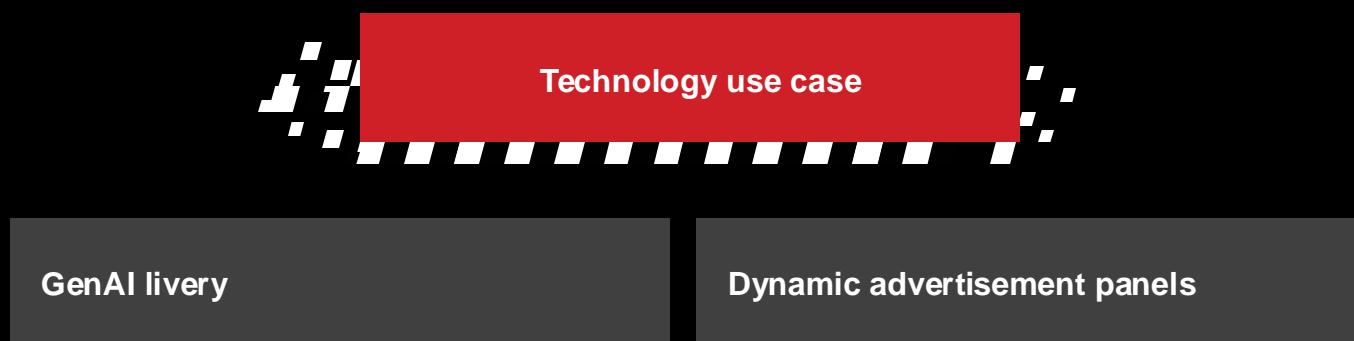
- **The McLaren team** leveraged **GenAI to create a special livery for the NEOM McLaren Formula E Team's car**, commemorating McLaren Racing's 60th anniversary during the London E-Prix.

- The project involved inputting visions of the McLarens future, provided by McLaren drivers, into a text-to-text AI. These inputs were transformed into **prompts for a text-to-image AI**, **which generated. unique artworks.**

- The McLaren Formula One team has announced its partnership with Seamless Digital to utilise **dynamic branding technology** throughout the 2023 racing season.

- The digital displays will feature **rotating branding for sponsors**, showcasing varying sponsorships throughout the race, presenting opportunities for further monetization.

Benefits

- The unique use of AI **generated interest and excitement among fans**, enhancing their engagement with the brand through cutting-edge technology.

- Dynamic displays allow for **multiple sponsor brands to be showcased** during a single event, **increasing the value of the advertising space on the car.**

Data analysis and strategy

Analytics have become increasingly prominent in recent years, with the future offering advanced opportunities through the development of AI and ML models:

Technology use case

Post-race analytics

- Ducati leverages **data from telemetry systems** extensively in their post-race analytics to **enhance motorcycle performance and strategy in MotoGP racing.**

- After each race, **the team analyses telemetry and sensor data** to pinpoint areas for improvement, focusing on engine behavior, traction, and braking efficiency.

- This data, combined with **direct feedback from the riders** about their experience on the track, **helps to refine bike setups and race strategies.**

GenAI post race analytics

- **Formula E, in partnership with Google Cloud** developed a Generative AI (GenAI) chat interface using **Google's Vertex AI platform** to enhance driver performance.

- The solution integrates **telemetry data, historical race results**, and unstructured information into a **conversational AI system** powered by Google's PaLM 2 API and Langchain.

- It enables drivers to **query performance metrics** (e.g., "What was the exit speed from turn 1?") to enable drivers to identify areas of improvements.

Benefits

- The combined **data and feedback inform adjustments** in bike settings and tactics to **optimize performance** for future races.

- **Enhanced data accessibility** by simplifying access to complex race telemetry and historical data through a **conversational interface.**

07

Challenges, risks and impact of innovations

Challenges and risks

While motorsports continue to expand, several challenges and risks could impact long-term sustainability and growth. Regulatory complexities imposed by governing bodies such as the FIA require adherence to strict technical, environmental, and safety standards, which can impact the viability of new racing venues and technological innovations. Environmental concerns are increasingly under scrutiny, as motorsports must balance their carbon footprint with the push for sustainable racing technologies such as alternative fuels and electric vehicle integration.

Talent shortages pose another challenge, with a limited pipeline of skilled engineers, mechanics, and drivers required to support the industry's rapid expansion. Financial sustainability remains a crucial factor, as hosting major events and maintaining high-tech circuits demand substantial investment and consistent revenue generation through sponsorships, ticket sales, and broadcasting rights. Additionally, heightened competition among emerging motorsport hubs worldwide underscores the need for unique differentiation through branding, fan engagement, and technological innovation. Addressing these challenges is essential to ensure the continued evolution and success of motorsports on a global scale.

The broader impact of motorsport innovations

As Saudi Arabia and the broader MENA region invest in motorsports and advanced racing technologies, the opportunity to commercialise and expand these innovations into other industries grows exponentially.

From electric mobility to autonomous driving, advanced materials and sustainable fuels, motorsport continues to drive innovation that influences the future of global industries. The rapid development of high-performance battery systems and energy recovery technologies in racing has accelerated the transition to more efficient electric vehicles (EVs). Autonomous racing competitions are refining AI-driven perception and control systems, directly enhancing the safety and reliability of self-driving cars. The integration of 5G networks and real-time telemetry, first pioneered for race teams, is now improving public transportation systems and air traffic management, making global mobility smarter and more connected.[24]

At the same time, motorsport's commitment to sustainability is driving the development of next-generation fuels, lightweight materials – such as carbon fibre, and aerodynamic efficiency—all of which contribute to more energy-efficient transportation, reduced emissions and advancements in industries like aviation, healthcare and consumer technology.

As motorsport innovation continues to reshape industries worldwide, Saudi Arabia is positioning itself at the forefront of this transformation. By investing in cutting-edge racing technology, AI-driven circuits, and sustainable engineering, the Kingdom is not only solidifying its place in motorsports but also driving the future of global mobility, sustainability, and performance engineering.

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