Deloitte.

Back-to-back Formula 1® Constructors' Championships are won with split-second decisions

Speed matters. But data-informed decisions and strategy drive performance.

ADVANCED TECHNOLOGY RUNS **THOUSANDS OF RACE SIMULATIONS PER SECOND.**

THE SITUATION

At the highest levels of motorsports, the margin of error is razor thin. With speeds typically exceeding 200 miles per hour, the difference between victory and defeat can be measured in milliseconds. Since entering the sport in 1966, McLaren's Formula 1® (F1) Team has secured more than 200 Grand Prix wins, 13 Drivers' World Championships and 10 Constructors' World Championships. But ahead of the 2020 season, McLaren grappled with how to build upon its successful legacy.

The elite drivers on the track don't race alone. They're supported—simultaneously—by mechanics and team members on the pit wall and in the garage at championship races held around the world and by engineers back in Woking, England, at the McLaren Technology Centre (MTC). The sizable, extremely skilled team designs, builds and maintains McLaren's F1 race cars and leverages technology for their continuous improvement.

Even with its collective experience and extensive resources, McLaren goes into every race with just a few certainties: They know when the race is going to start and the cars' starting positions and they know (approximately) how long the race is going to last, in terms of laps or time. The team might arrive at the track with a meticulous race strategy that outlines a direct path to the podium. But even a millisecond of reaction time while cars scramble and pull away from the pack could have multiple ramifications on that predetermined strategy.

The race strategy adjusts further with every new condition: changing weather … the behavior of other drivers … the rate at which the car is burning through fuel. The team that can navigate these and countless other uncertainties—in real time—most effectively is the team that gains competitive advantage. Like its competitors, McLaren collects and analyzes extensive data to try and achieve that edge.

But the sport's governing body also instituted a cost cap, starting with the 2021 season, to promote parity among teams by limiting total spending on teams' design and operation of their cars. And McLaren recognized the additional certainty that any solutions to improve performance on the track had to be executable within that strict budget.

THE SOLVE

Testing a car on-track is restricted to specific time designated during official events regulated by the Fédération Internationale de l'Automobile (FIA). Digital twins are widely used to help teams test their cars cost-effectively and account for factors that may not be possible with on-track testing, such as wind or rain. McLaren already utilized a very accurate mathematical- and physics-based model of its cars. Rather than aerodynamic modeling, McLaren needed help establishing a system that could support the *in-race decisions* that can influence race performance.

McLaren has access to a tremendous amount of data. An F1 car contains around 300 sensors that generate tens of thousands of telemetry data points per second transmitted from the cars to the pits. It had extensive timing data for McLaren's cars and those of its competitors. But how could McLaren use this data to inform decisions that needed to be made during a race: *How many pit stops does the car need to make? When to pit, including whether to do so before a competitor or at the same time? When to change the cars' tires and which tires should they use?*

If any of these questions had a "right" answer, the decision-making process could be optimized and fully automated. But because these questions can have a *better* answer, Deloitte and McLaren focused on simulation. Instead of replacing human intelligence, simulation could augment it by supporting decision-making at the highest point of knowledge. This is a McLaren ethos that places a judgment call in the hands of the person most qualified to make it at the time it needs to be made.

McLaren is also committed to leveraging data for decisions, not dashboards. Collaborative conversations began by identifying specific in-race decisions that needed to be made, providing McLaren engineers with the right data sources and models to leverage during a race. The goal was to empower confident, split-second actions—not drown engineers in information.

Simulation is probabilistic, not deterministic, and a racetrack is inhospitable to grappling with millions of race permutations. The system—which operates within the cost cap—was designed to be used in the MTC. Data gleaned from the car arrives in Woking from Singapore or Silverstone, England, or any other grand prix location in as little as 52 milliseconds—virtually real-time—although some races such as Australia are closer to 290 milliseconds. Then, McLaren engineers can analyze potential outcomes, layering on different variables for how the race could play out, and make an informed strategic decision to benefit the overall team.

The importance of innovation and advancements that can improve speed while staying on budget resonates across business sectors. Companies may have data from sources that are difficult (if not impossible) to work with in real time and technology can help provide structure for leveraging an array of variables and "coefficients." Deloitte teams using the Deloitte IndustryAdvantage™ approach can help organizations leverage digital twins, combined with strategic simulations—on any proverbial grid—to tackle this common challenge and manage uncertainty.

LEVERAGE THE BEST OF YOUR PEOPLE AND YOUR TECHNOLOGY SIDE BY SIDE.

THE IMPACT

In 2021, McLaren returned to the top of the podium at a Formula 1® grand prix for the first time in nearly a decade. Other major victories followed, including the 2024 and 2025 Constructors' Championships—McLaren's first since 1998—and McLaren's first individual World Drivers' Championship since 2008. At McLaren, success is driven by the team's balance of technology innovation and data-informed decisions, as well as its culture of learning.

Innovation is constant in motorsports and when it comes to the technology behind it, teams can't simply wait in the slipstream—and McLaren's competitors are also working hard to enhance their performance on the track. As technology evolves simulations can evolve with it, so McLaren can continue to access relevant, timely data, make informed split-second decisions and compete at the highest level under ever-changing circumstances.

Deloitte has implemented its advanced simulation technology for businesses in industries that don't require informed decisions to be made at 200+ miles per hour. But whether a company is identifying the most efficient way to get packing containers on and off a shipping vessel or determining its targeted return on invested capital, simulations can help prepare for (almost) everything—which helps better position a company to be ready for anything.

FROM MILLIONS OF POTENTIAL RACE OUTCOMES TO ONE WINNING STRATEGY

LET'S CONNECT.

Do these challenges sound familiar?

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