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## TEAM PLAYERS

BEHIND THE SCENES IN F1  
WITH THE PEOPLE WHO MAKE  
A GRAND PRIX HAPPEN







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ISSUE  
#15

# AUTO

INTERNATIONAL  
JOURNAL OF THE FIA

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## THE FIA

The Fédération Internationale de l'Automobile is the governing body of world motor sport and the federation of the world's leading motoring organisations. Founded in 1904, it brings together 236 national motoring and sporting organisations from over 135 countries, representing millions of motorists worldwide. In motor sport, it administers the rules and regulations for all international four-wheel sport, including the FIA Formula One World Championship and FIA World Rally Championship.

## THE FIA FOUNDATION

The FIA Foundation is an independent UK-registered charity that supports an international programme of activities promoting road safety, the environment and sustainable mobility. It was established in 2001 with a donation of \$300 million from the FIA and is governed by a Board of Trustees. Among its activities, the Foundation participates in various UN road safety and environment related partnerships and is a member of the UN Global Road Safety Collaboration.

## THE FIA INSTITUTE

The FIA Institute is an international not-for-profit organisation that develops and improves motor sport safety and sustainability. It leads projects that encourage the rapid development of new and improved safety technologies; that facilitate higher standards of education and training; and that raise awareness of safety and sustainability issues. The Institute was established in October 2004 and funds its activities through annual grants from the FIA Foundation.

Dear readers,

On 23 April, something that was a dream for me and I believe also for all motor sport fans, took place in Paris, with the staging of a Formula E race in the heart of the city.

The first ever race for four-wheeled vehicles, the Paris-Rouen, took place in 1896 and 120 years later, motor sport was back, just a stone's throw from the historic headquarters of the FIA, in the shape of our Formula E championship, which looks to the future. In the same way that a driver relies on a huge team to get through a race weekend, so too our event would not have happened without the efforts of so many people to whom we are grateful.

The racing season is now in full swing and attention to safety is as always, at the highest level: in this issue we look at what is being done to study every accident down to the smallest detail, because it is by analysing the dynamics of accidents that one can work to avoid them in the future.

More often than not, drivers starting out in the sport aspire to get into Formula One but motor sport offers many alternatives to satisfy the desire to compete. The spotlight might be less bright but the joy of victory is just as intense. These and many other stories can be found in the pages of this issue of AUTO. I hope you enjoy reading them.



A handwritten signature in black ink, which appears to read 'Jean Todt'.

Jean Todt,  
FIA President



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UP  
FRONT

Racing car art

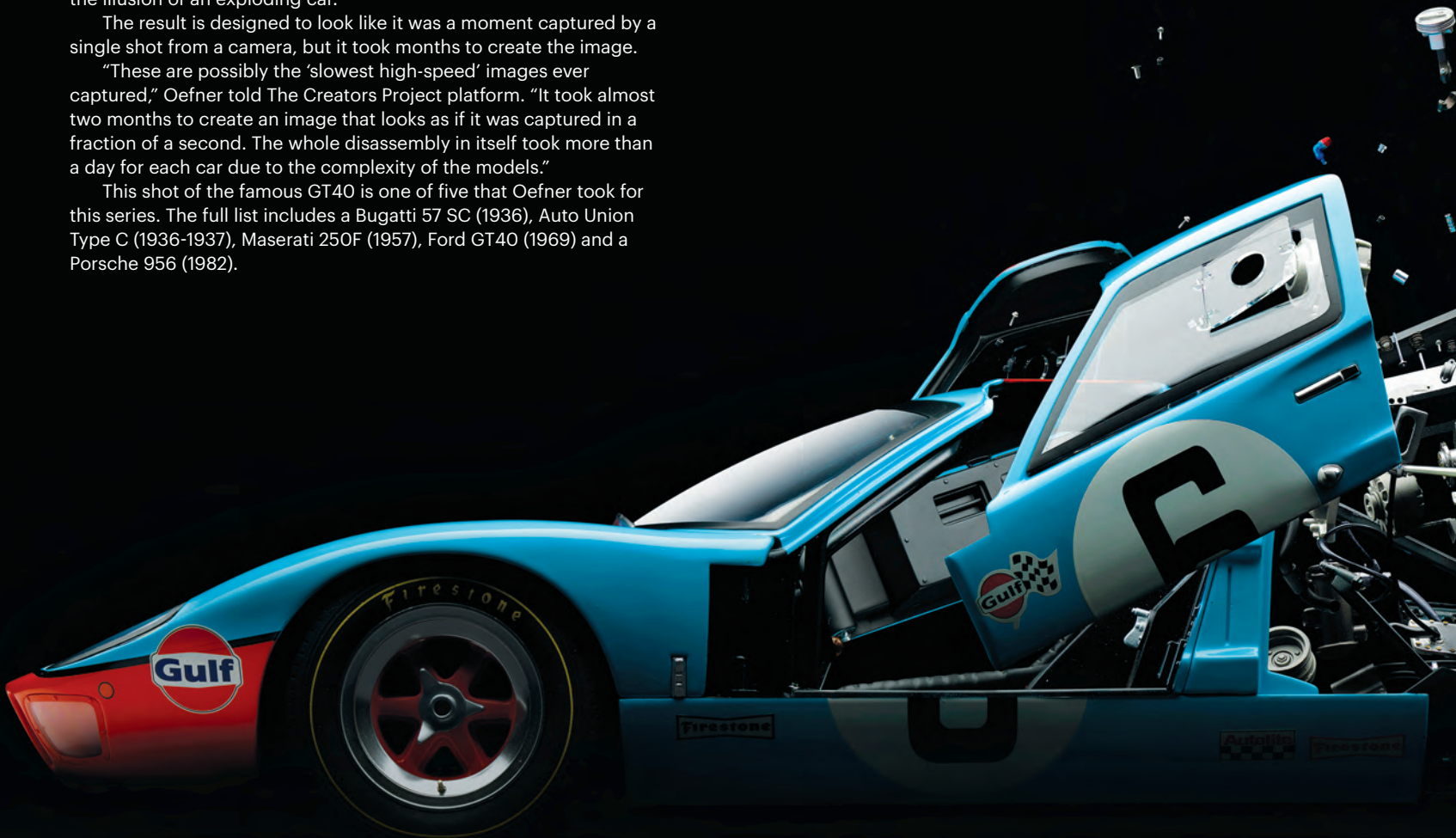
# FULLY BLOWN

This “disintegrating” Ford GT40 is the work of Switzerland-based photographer Fabian Oefner, who meticulously pieced together thousands of shots to make the final image. The car has been dismantled completely, from the body shell to the smallest screws, then photographed piece by piece in a specific position to obtain the illusion of an exploding car.

The result is designed to look like it was a moment captured by a single shot from a camera, but it took months to create the image.

“These are possibly the ‘slowest high-speed’ images ever captured,” Oefner told The Creators Project platform. “It took almost two months to create an image that looks as if it was captured in a fraction of a second. The whole disassembly in itself took more than a day for each car due to the complexity of the models.”

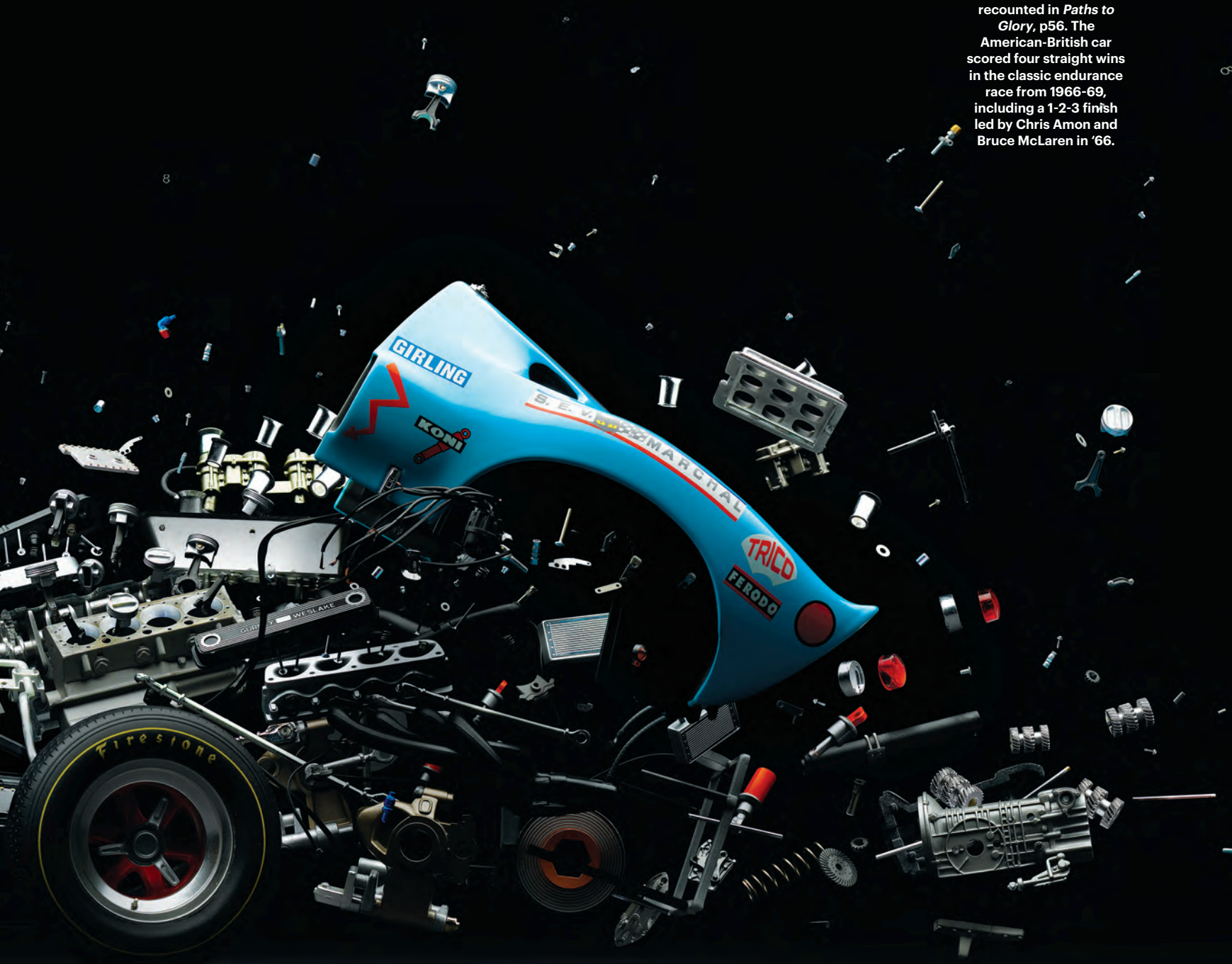
This shot of the famous GT40 is one of five that Oefner took for this series. The full list includes a Bugatti 57 SC (1936), Auto Union Type C (1936-1937), Maserati 250F (1957), Ford GT40 (1969) and a Porsche 956 (1982).





### FANTASTIC FORD

The GT40 was the car that ended Ferrari's dominance at the Le Mans 24 Hours, as recounted in *Paths to Glory*, p56. The American-British car scored four straight wins in the classic endurance race from 1966-69, including a 1-2-3 finish led by Chris Amon and Bruce McLaren in '66.





Truck racing

# MOVING ON UP

The FIA European Truck Racing Championship was back with a bang in May with the first round of the 2016 season taking place at the Red Bull Ring in Austria. This is a momentous year for the championship following the appointment of a series promoter by the FIA for the next five years.

ETRA Promotions plans to build on the already strong foundations of the series, which boasts race attendance second only to Formula One on the circuits of Europe.

ETRA is implementing a solid strategy and investment plan to further increase media exposure and wider public awareness of this spectacular branch of the sport. It has recruited experts from various areas of motor sport and truck racing to develop the championship brand, attract new series partners, gain more media coverage in motor sport and lifestyle media, as well as the truck specialist press, and work on increasing television distribution.

Goodyear tyres has signed a three-year deal to be the official technical partner of the championship and Meritor, which manufactures brakes and axles, has joined as a commercial partner.

FIA President Jean Todt said: "I am very optimistic that all the new partners will create a successful story and they can count on my support for the future."

Georg Fuchs, managing director of ETRA, added: "We all have to bring together the existing strengths and combine them under stable platforms. We now have to communicate what a great championship this is from the point of view of the events, the fan entertainment and the synergies that also combine racing and industry."

The FIA ETRC is the premier truck racing series in the world with the best trucks and drivers competing over nine rounds for the title. Racing on some of Europe's most famous circuits, teams from France, Germany, Czech Republic, Hungary, Spain, Portugal and many other nations compete for the truck racing's most prestigious crown.







### RACING GIANTS

Austria's peaks provided a suitably grand setting as the popular FIA European Truck Racing Championship got underway at the Red Bull Ring in May. Jochen Hahn leads the points after round one, which saw three different winners top the podium (inset) over the weekend.



UP FRONT





# AUTO NEWS

New agreement reached on Formula One power units; FIA launches new Karting Slalom initiative; news from the FIA Mobility Conference in Helsinki; and Ford buoyed by autonomous night-time driving test

## GLOBAL AGREEMENT REACHED ON FORMULA ONE POWER UNITS

After extensive work in conjunction with the FIA Formula One World Championship's four power unit manufacturers, and with the support of the Commercial Rights Holder, a global agreement on power units was reached for the 2017-2020 period.

The deal was approved at all levels of F1's governance structure, including the World Motor Sport Council, and will be included as technical and sporting regulations for the 2017 and 2018 F1 championships.

It covers four key areas: cost and supply price, obligation to supply, performance convergence and power unit sound.

There will be a significant reduction in the price of power unit supply to customer teams and in cost to manufacturers over the coming years. In 2017 the power unit price for customer teams will be cut by €1 million per season compared to 2016. From 2018, the annual supply price will go down by a further €3m. This reduction will be driven by sporting and technical rule changes in 2017-18, with a decrease in the number of power unit elements per driver per season.

Supply of power units to customer teams will be ensured, as the homologation procedure will include an "obligation to supply" that can be activated.

The deal also includes measures aimed at achieving performance convergence. The token system is to be removed from 2017. Additionally, constraints on power unit part weights, dimensions, materials and boost pressure will be introduced in 2017 and '18.

Manufacturers are conducting research into improving the sound of the power units, with results expected to be in place by 2018.



A new agreement is set to cut the cost of power units in F1.

## ANTI-DOPING DRIVE

*The FIA has ramped up its Race True anti-doping educational programme with the first of a number of training sessions for drivers competing in FIA championships.*

*FIA Head of Medical Affairs Sandra Silveira-Camargo gave a presentation to teams and drivers at Spa-Francorchamps during round two of the FIA World Endurance Championship.*

*While motor sport does not have a major doping problem, ignorance of the rules can lead to an ineligibility period of up to four years for drivers. FIA medical representatives spent the weekend at Spa in May visiting the teams and drivers to answer any questions that they had on a one-to-one basis.*

*As well as the World Endurance Championship, the training programme will be provided to competitors in Formula One, the World Rally Championship, World Rallycross Championship, the World Touring Car Championship, Formula E and European Formula 3.*

*The training sessions are in response to results from 2014, when 3.6 per cent of doping tests carried out by the FIA led to a positive result. If the programme proves successful it will be expanded to include more series in the future.*



## FIA UNVEILS KARTING SLALOM PROJECT

The FIA has launched a Karting Slalom project as part of a new initiative to enable children around the world to discover karting and receive structured training.

FIA National Sporting Authorities (ASNs) that successfully apply to participate will receive a free karting 'toolbox' comprising two complete karts ready for use, 200 plastic cones, a guide to setting up the Karting Slalom, and the safety and sporting rules.

The concept of the slalom event is simple and easy to put into place, with a capacity for 200 participants per competition. The event requires only a small area of tarmac, such as a supermarket car park or a school

courtyard, some marker cones, a few barriers and two karts.

The format involves each participant completing four practice runs followed by two timed runs under the supervision of the judges, who will ensure that the course is properly followed and indicate any potential penalties if a cone is touched/knocked over.

The first pilot event took place in Algeria in May. In future, ASN's will be able to apply to the FIA Sport Grant Programme to take part.

Graham Stoker, FIA Deputy President Sport, said: "Everybody should be given an opportunity to try our sport. Karting Slalom can deliver this to developing ASNs."

## VW AND CITROEN OFFER 2017 WRC INSIGHT

The FIA World Rally Championship will introduce more powerful, faster and spectacular cars in 2017. Volkswagen designers have produced a visual concept of their 2017 challenger (right), which will generate about 380bhp/280kW, or roughly 60bhp/45kW more than the current car.

"The 2017 WRC regulations include many spectacular technical innovations for the WRC," said Volkswagen Motorsport Director Jost Capito. "The World Rally Cars of the future will incorporate all the experience that the teams have gained in recent years. They will be more dynamic but safer."

Citroën Racing has gone one step further by completing some initial testing of its 2017 World Rally Car. Overseen by Laurent Fregosi, Citroën Racing's new Technical Director, the development team headed to southern

France for the first proper test session in May, following shakedown tests in Versailles in early April.

Team manager Yves Matton said: "The car is very much in line with what we had imagined when we talked about the new regulations. All the factors we had wanted to improve – the noise, impression of speed and aggressive design – are already in evidence, even though this was only the car's first test outing. I think rally fans are going to like the new generation of WRCs."





## UN BACKS ROAD SAFETY RESOLUTION

The UN General Assembly has approved a resolution supporting coordinated global action for road safety. This resolution could pave the way for the creation of a UN Road Safety Fund – a project actively supported by the FIA High Level Panel for Road Safety and FIA President Jean Todt, who is also the UN Secretary General's Special Envoy for Road Safety.

For the past few years, President Todt has been an active advocate of creating innovative financing mechanisms to fund road safety programs across the world. He gave a speech to the UN General Assembly in New York, supporting the resolution and paving the way for the creation of a UN Road Safety Fund.

He said: "Today is a big day for the road safety community. Together with the FIA High Level Panel members, we will do everything in our power to support the creation of this Fund, which would revolutionise road safety financing. I can't think of any other public policy investment which would be more profitable when comparing its benefits to its costs. We have a responsibility to provide every person on this planet with safer mobility."

According to the 2015 WHO Global Status Report on Road Safety, some 1.25 million people are killed in car crashes around the world each year, which makes road traffic the world's number one cause of death for 15-29 year olds. Some 90 per cent of these fatalities occur in low- and middle-income

countries. In the past three years there has been a 16 per cent rise in the number of vehicles on the world's roads, further underpinning the urgent need for action.

In the last few months, there has been a growing awareness in the international community of the urgent need to address the global pandemics of road fatalities, especially in developing countries, and to establish global action plans to obtain concrete results. In September, the UN adopted its 2030 Sustainable Development Goals, including a specific target to halve global road traffic fatalities and injuries in just five years.

The global cost of road traffic crashes is estimated at \$500 billion every year, and would require ambitious and innovative financing schemes around the world. However, compared to other major global issues, including other leading causes of death that raise billions of dollars each year in donor support, road safety is falling far behind.

Established at the UN Headquarters in New York on 11 November 2015, the FIA High Level Panel for Road Safety aims to raise funding and political awareness in response to the road safety crisis. The Panel, which includes Coca-Cola CEO Muhtar Kent, Renault CEO Carlos Ghosn and Huffington Post President Arianna Huffington, brings together global leaders to promote innovative solutions to meet the road safety health and development challenge.

### VOLVO PLANS CHINA'S LARGEST DRIVERLESS TEST



Plans to launch China's most advanced autonomous driving experiment are being developed by Volvo, which will include local drivers testing autonomous cars on public roads in everyday driving conditions.

The Chinese-owned Swedish manufacturer expects the experiment to involve up to 100 cars. In the coming months it will begin negotiations with interested cities in China to see which are able to provide the necessary permissions, regulations and infrastructure to allow the experiment to go ahead.

Volvo believes the introduction of autonomous driving (AD) technology promises to reduce car accidents as well as free up congested roads, reduce pollution and allow drivers to use their time in their cars more valuably.

"Autonomous driving can make a significant contribution to road safety," said Håkan Samuelsson, Volvo President and Chief Executive. "The sooner AD cars are on the road, the sooner lives will be saved.

"There are multiple benefits to AD cars. Governments need to put in place the legislation to allow AD cars onto the streets as soon as possible," he added. "The car industry cannot do it all by itself. We need governmental help."



FIA President Jean Todt gave a speech to the UN General Assembly in April 2016 in support of the new road safety resolution



# PORTUGAL'S PRESIDENT COMMITS TO 'SAVE KIDS LIVES'

Portugal's President, Marcelo Rebelo de Sousa, has pledged to support the United Nations' Save Kids Lives campaign, which calls for urgent action to halve road deaths and injuries by 2020.

The Portuguese President made the commitment following meetings held with FIA President Jean Todt as they recently met with FIA World Rally Championship teams taking part in the 50th Rally de Portugal.

"Rally Portugal is an important event for our country, not only from an economic and tourism point of view but also in terms of road safety," said President de Sousa. "The ACP has already received awards for the

organisation of this event, which shows what Portugal can do. This is an event for the whole country and serves as an example for all, particularly young people."

The FIA President was pleased to receive such strong support from Mr de Sousa, saying Portugal's passion for motor sport helped it act as a 'laboratory' for road safety.

"Portugal has always been close to motor sport and the presence of the President is a strong demonstration of its importance here," he said. "Motor sport can help as a laboratory to test and improve road safety measures for road users – and I know that Portugal also has some ambitious goals in the area of road safety."



(L-R) ACP President Carlos Barbosa, Portuguese President Marcelo Rebelo de Sousa and FIA President Jean Todt.



EU Commission Transport Commissioner Violeta Bulc.

## ALBANIAN CLUB WINS EU ROAD SAFETY AWARD

The Automobile Club of Albania was recently honoured with the European Road Safety Charter's Excellence in Road Safety Award at a ceremony in Brussels.

Presented by Violeta Bulc, European Commissioner for Transport, the awards recognise the best road safety activities from across Europe. For the 2016 edition, the ERSC had chosen to award actions on Youth and Innovation, with the ACA winning for a series of nationally broadcast animated road safety messages aimed at children aged from five to 12.

Also present at the ceremony was FIA President Jean Todt, who paid tribute to the Albanian club's initiative. "This award is a deserved recognition of the Automobile

Club of Albania's innovative road safety programme which connects with children in an effective and appealing way," said President Todt, who also met with Commissioner Bulc to discuss wider road safety issues in the region. "I would like to thank the European Commission, and Commissioner Bulc for the ongoing support of the awards, as well as all other winners and participants – in particular the many FIA Clubs that took part."

The European Road Safety Charter, led by the European Commission, is the largest civil society platform on road safety. To date, more than 2,300 public and private entities have committed to the Charter and carried out road safety actions.



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## NEW PERSPECTIVES ON MOBILITY AT FIA'S HELSINKI CONFERENCE

Taking collaborative effort as its theme, the FIA's 2016 Mobility Conference, held in Helsinki and hosted by Finnish FIA member club Autoliitto, saw clubs from around the world gather to debate the challenges faced by mobility organisations due to the arrival in the automotive sphere of disruptive technologies and new business models.

Across three days of meetings and presentations, delegates heard from a range of experts who offered strategies aimed at helping clubs to adapt to a rapidly changing mobility environment.

Among the speakers present, Finland's Minister for Transport and Communications Anne Berner spoke about the country's efforts to develop a 'Mobility as a Service' culture in which citizens are placed at the centre of transport policy, British Airways Chairman and CEO Alex Cruz advised on the benefit of alliances among clubs, while Uber's Head of Public Policy for Safety, Privacy and Security Dorothy Chou presented the latest developments in the sharing economy.

Speaking about the issues, FIA President Jean Todt said that in the quest to improve global road safety and, ahead of this October's UN Habitat III conference in Ecuador, to respond to increasing urbanisation, the FIA and its members need to work together to help shape the future of mobility.

"We need to be ready for the changes underway, as we seek to continue our mission to provide safe, clean, accessible and affordable mobility solutions for all," he said. "We face significant challenges but I am confident that by working together, we will meet them on behalf of all our members."



(Clockwise from top): Anne Berner, Alex Cruz and Dorothy Chou.



### FORD CONDUCTS AUTONOMOUS NIGHT TEST

Ford recently stepped up its autonomous vehicle research with a night-time test using a LiDAR system to navigate an unlit road – without headlights.

To navigate in the dark, Ford used its Fusion hybrid autonomous car, which employs high-resolution 3D maps – complete with information about the road, road markings, geography, topography and local landmarks – for navigation.

In tandem with the car's virtual driver software, the vehicle also used LiDAR pulses to pinpoint itself on the

map in real time. Additional data from the radar system was combined with LiDAR to complete the full sensing capability of the autonomous vehicle in the dark.

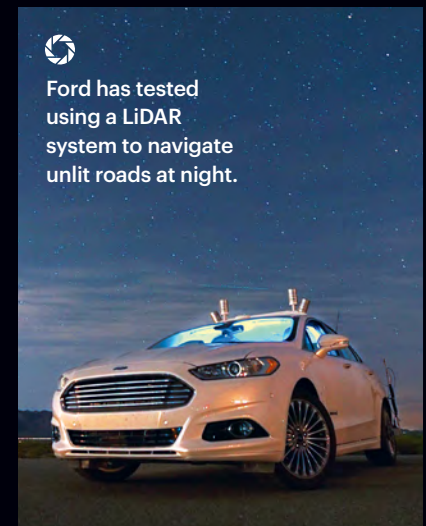
The car's LiDAR sensors shot out 2.8 million laser pulses a second to precisely scan the surrounding environment.

"Thanks to LiDAR, the test cars aren't reliant on the sun shining, nor cameras detecting painted white lines on the asphalt," said Jim McBride, Ford technical leader for autonomous vehicles.

"In fact, LiDAR allows autonomous cars to drive just as well in the dark as they do in daytime," he added.



Ford has tested using a LiDAR system to navigate unlit roads at night.





AUTO  
ASKS

## QUESTION:

HOW DO WE SOLVE  
THE PROBLEM OF  
CONGESTION AND  
POLLUTION IN  
THE WORLD'S  
MAJOR CITIES?

*With the need to cut congestion and pollution a continuing concern worldwide, AUTO asks three traffic experts how this can best be achieved in different cities with different needs*

---



The President

## EDMUND KING OBE

**AA PRESIDENT AND VISITING PROFESSOR  
OF TRANSPORT, NEWCASTLE UNIVERSITY**

I used to run a pressure group, 'Movement for London,' which seems like a contradiction in terms. Traffic speeds in central London have remained at about 10mph for the last 100 years since the days of the horse and cart.

London is one of the few global cities that has a Congestion Charge for vehicles entering the centre. This was meant to reduce congestion but has just changed the mix of vehicles in favour of those who can afford it. My theory is that traffic speeds won't get worse or indeed better. If traffic slows it puts some people off and if it speeds up others are encouraged to drive. Hence we have a congested equilibrium.

In some ways the pollution problem is easier to fix. Low-emission zones can exclude the gross polluters and incentives for electric or low-carbon vehicles can help air quality. However, deliveries are a problem as it takes longer to clean the predominantly diesel lorry stock.

There are improvements that can help both congestion and pollution. Investment in public transport, cycle paths and a pleasant walking environment can encourage people out of their cars. Essential traffic can be diverted to tunnels, ring roads and park and ride systems.

Ironically some technology, such as used by [online transportation network company] Uber, can make things worse.

London's Mayor failed to persuade Government to allow him to cap the number of minicabs – they have increased from 59,000 in 2009/10 to more than 95,000 today. The number of private hire vehicles circulating within the central zone has increased by over 50 per cent in two years, meaning one in 10 vehicles entering the zone is now a minicab. This causes congestion.

In the future green/clean driverless cars may be less polluting, but if unrestricted may lead to congested chaos with empty cars searching for those elusive parking spaces. Even as president of the Automobile Association I let the train and bus take the strain when travelling into the capital.



The campaigner

## **GLYNDA BATHAN**

**DEPUTY EXECUTIVE DIRECTOR,  
CLEAN AIR ASIA**

Urban air pollution is a significant issue in many Asian countries. Asia is an increasingly urban region, which contains 14 of the world's 20 largest 'megacities', while China alone has 400 cities with populations of more than 300,000 people. Asia is home to more than half a billion vehicles, including motorbikes, and this number is growing rapidly. Air pollution and congestion are significant issues.

It is clear that simply building new roads isn't the solution to congestion, as experience has shown that these quickly get filled up. Clean Air Asia works to promote better air quality and liveable cities. We support authorities to identify the sources of air pollution and develop Clean Air Action Plans to reduce emissions, including making transport systems sustainable. Cities must improve public transit systems to maintain high levels of public transport use, and promote active transport. Pedestrianised zones, cycle paths and 'park and ride' programmes can all play a role.

With the number of vehicles rising rapidly, it is vital to introduce emission standards for light and heavy-duty vehicles and promote vehicle fuel economy, and we work with the Global Fuel Economy Initiative to support governments to introduce effective policies in this area. Improving the quality of fuel, including reducing sulphur levels, is important to lower particulate emissions from vehicles. While these policies are set at a national level, cities can support implementation by, for example, creating low-emission zones.



The policy maker

## **ROB DE JONG**

**HEAD OF TRANSPORT UNIT, UNITED NATIONS  
ENVIRONMENT PROGRAMME (UNEP)**

Air quality in cities around the world is getting worse, particularly in developing countries. We can only solve the problem of air pollution and vehicle emissions through an integrated approach.

First of all we need a new approach to city planning, giving preference to active transport – walking and cycling – and designing and organising cities around people and mobility needs rather than cars. UNEP and the FIA Foundation's 'Share the Road' initiative works with cities to introduce policies that prioritise funding for non-motorised transport infrastructure in order to improve road safety, reduce emissions and promote better health.

Secondly, we can introduce quality affordable mass transit, such as bus rapid transit systems and light rail. Road networks in cities do not have sufficient capacity for large volumes of private vehicles. An integrated mass transit system is a far faster and more efficient way of moving large numbers of people around and reduces congestion and pollution.

Finally, we need to be switching to lower and no-emissions vehicles, improving vehicle fuel efficiency and promoting electric cars and two- and three-wheelers. Existing technologies can significantly improve the efficiency of vehicles. As the Global Fuel Economy Initiative has shown, this is a win-win – saving money and reducing emissions. New electric mobility is particularly exciting for cities. For example, in China there are now more than 200 million electric motorbikes, and we may start to see such new technologies spreading rapidly in the coming years.

Cities worldwide are at different stages and have different challenges. For example, only a handful of African cities have effective mass transit systems, and so this is a priority. While for cities like Paris a shift to electric cars will help to address air pollution. Ultimately only an integrated approach combining all these elements will provide a sustainable solution.



TECH  
REPORT

High-speed crash tests

# SAFETY MEASURES

*For the first time in Formula One a number of high-tech measurement devices have been utilised to give a fuller picture of what happens during an accident*

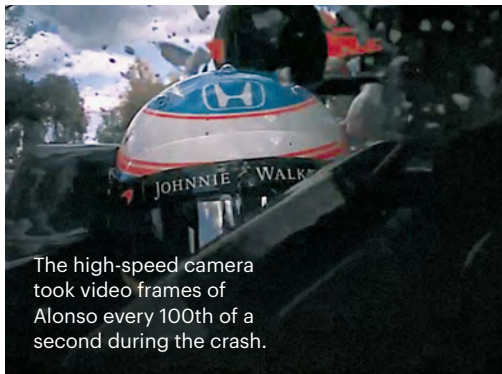
TEXT: MARC CUTLER

Alonso's huge crash in the Australian GP was captured in detail by various measurement devices to understand the effects on the driver.









The high-speed camera took video frames of Alonso every 100th of a second during the crash.



Fernando Alonso's accident at the season-opening 2016 Australian Grand Prix was a significant moment in the history of motor sport. And not just because the Spanish driver walked away from a huge 300km/h crash.

The fact he did so is remarkable in itself but the analysis of the accident is also a first in the sport. It was the first time that all of the new safety measurement systems have been brought together to provide a forensic picture of what happens to the driver and the car during a major accident.

A high-speed camera that is always pointing at the driver was installed in every car from the first race of this season. This now works in conjunction with a tiny accelerometer in a driver's earpiece that measures the forces on his head. They in turn work with an Accident Data Recorder – essentially the 'black box' of F1 cars – which measures all of the external forces.

Combined with the multiple camera angles from the cameras around the track, safety researchers have more information than ever before to determine what exactly happens at every millisecond of a crash. This is essential for deciding on future areas of safety development and research.

### ANATOMY OF AN ACCIDENT

In the case of Alonso's accident the data gathered is remarkable in both its detail and conclusions.

The McLaren driver crashed into the back of Esteban Gutiérrez's Haas Formula One car at the end of the DRS zone between Turns 2 and 3 of the Albert Park circuit in Melbourne. He was travelling at 313kph as he began his overtaking manoeuvre and had slowed marginally to 305kph at the point of impact, when his front-right wheel made contact with the rear-left wheel of Gutiérrez's car.

After the initial impact, Alonso's front-right suspension was destroyed, and the car veered left towards the outside wall. The wall collision was made with the front left corner of the car, resulting in a peak lateral deceleration of 45G, with high acceleration levels also recorded by the ear accelerometers, demonstrating the forces on the driver's head.

The High-Speed Camera, which took video frames of the driver every one hundredth of a second, showed that Alonso's helmet made contact with the left inside face of the headrest twice during the impact, corresponding with two peaks seen on the ear accelerometer data.

The car rebounded and proceeded to slide along the circuit towards the gravel trap. With front-left, front-right and rear-left suspensions destroyed, the car was heavily leaning laterally on its left side as it travelled over the grass. This left side dug into the gravel, which rolled the car and propelled it into the air, recording a lateral deceleration of 46G.

The car travelled in the air, rotating approximately 540 degrees (1.5 times) and was airborne for 0.9 seconds. On landing it made its initial contact with the ground on its rear impact absorbing structure, experiencing a peak longitudinal acceleration of 20G.

The car then rotated about its rear before falling and eventually coming to a stop on the left side of its engine cover, just before the tyre barrier.

Alonso walked away.

The fact that he was relatively unharmed – suffering only minor injuries which forced him to miss the next race – is testament to the safety elements in the car that have been developed over the last 20 years. A report into the accident by the Global Institute for Motor Sport Safety, the research partner of the FIA Institute, concluded:

Information from the Accident Data Recorder and ear accelerometers provided a precise account of the G-forces experienced by Alonso.







Gutiérrez helps Alonso away from the crash. Amazingly, the Spaniard suffered no lasting damage.

TECH REPORT

“From an initial 305kph impact, the car of Alonso was able to manage three high-G decelerations and an airborne phase without major injury to the driver, primarily due to a range of safety systems on the car performing well for their designed purpose.”

**SAFETY IN PRACTICE**

The data gathered from the accident will help to ensure that other drivers walk away from equally major collisions.

As you would expect from such a high-tech championship, much of this data was delivered to medics and researchers at the track in real time.

“We receive the data in real time as the car is running, so if it crashes the ADR is able to send us a signal to give us a rough idea of the magnitude of the accident,” says Laurent Mekies, Global Institute’s General Manager Research.

“We have that in the same timeline as any other parameters so we can put that on the same graph with the car speed, where the driver braked, with anything that is recorded by the car and this allows us quite a reasonable understanding of the dynamic of the car from the loss of control to the actual crash and impact.”

The accelerometer is housed in the driver’s earpiece with a wire running straight into the Electronic Control Unit (ECU) of the car, alongside the cable from the ADR.

“That’s the beauty of the system,” says Mekies. “You gain all that info in a non-invasive way for the driver because we don’t add extra connections, we just use what is already available there and add our own stuff into it. That was very much the driving concept in the way we are trying to implement this data system.”

Similarly, the high-speed camera is hidden in the cockpit surround behind the steering wheel. However, footage from this camera cannot be delivered in real time because there is a huge amount of data from recording at 400 frames per second. To

“WE WANT TO UNDERSTAND THE DYNAMIC OF THE HEAD, NECK AND SHOULDERS IN A HIGH-G CRASH”

LAURENT MEKIES, GLOBAL INSTITUTE GENERAL MANAGER RESEARCH

prevent any loss, this data is recorded twice on the car – on the camera itself and also transmitted to the ECU.

The footage has already proved invaluable for safety researchers. Mekies says: “What we want to understand is the exact dynamic of the head, neck and shoulders in a high-G crash and how they interact with the other parts of the cockpit environment – the padding, the HANS, belts and anything else that can be in the space of the driver. This camera allows us to better understand the exact forces on the head to a given displacement, the elongation of the neck, how it engages with the headrests, how the headrests perform and what we need to do to produce the next generation cockpit environment.”

For any major accident, all of the information collected from a crash is studied by the FIA and sent to Global Institute researchers for further analysis. ►



“One of the primary functions of the Global Institute is to be a crash investigation body,” says Mekies. “This means that on one side we do the crash investigations and on the other side we actually do the research into mitigating the consequences of crashes that we have analysed. So this gives us a full 360-degree approach.

“It’s also very important that everybody fully embraces what we are trying to achieve and why we need all these sensors on the cars. [F1 Race Director] Charlie Whiting is giving us invaluable support by keeping the communication flowing with the teams and the drivers, and is always pushing us to go and target the next step.”

But this work is not just limited to F1. The FIA recently launched a World Accident Database for every championship to insert data from major accidents. The Global Institute analyses that data and feeds back recommendations to the corresponding series.

**EVEN MORE INSIGHT**

Safety researchers have more data than ever before but there is yet more to come. Despite the detail with which that they can currently analyse an accident, there is always more that can be added to the picture to give a clearer view.

As Mekies says in relation to the high-speed camera, “I don’t like to call it a complete picture because I think we have added one step and there will be other steps after that. It’s an exercise that never stops, but it is certainly a very significant step.”

The next step is biometrics – gathering data from drivers such as heart rate, body heat and even sweat levels.

“I hope that we will be able to put something on a driver before the end of the season, at least in a test. Biometric data will help us to assess the driver’s conditions before, at the time of the crash and after the crash, as far as the rescue operations are concerned.”

There are also plans to have more cameras pointing at the drivers in future. F1 is bringing in a cockpit protection system and this will offer further opportunities for camera placement above the driver. There is no end to the usefulness that this data would bring to drivers.

As Mekies puts it: “You could imagine a million things tomorrow – you could imagine us trying to estimate the loads on the actual upper body of the drivers through the safety belts, for instance. It is something that will never stop as much as safety research will never stop and we will continue to push the boundaries to gain a deeper understanding.” ■

**TOOLS OF ANALYSIS**

*Three important components work in conjunction to accurately record what happens during an F1 accident*

**ACCIDENT DATA RECORDERS**

Accident Data Recorders (ADRs) capture data about the performance of a car during a crash, which can be downloaded and interpreted by researchers to study how the safety devices reacted during an impact.

They help researchers understand how the driver’s safety equipment is performing and allows them to more fully understand the limits concerning drivers’ tolerance to injury. With ADRs working in conjunction with devices like the high-speed camera and the accelerometer, a bigger and fuller dataset can be collected and a better picture of an accident emerges. All of that data is then fed into the World Accident Database

Although Formula One, the World Rally Championship, and other high-profile series have already been using ADRs for some time, for many lower-level series the price of the system had prohibited its widespread use. But following research conducted by the FIA Institute that successfully reduced costs, from the beginning of the 2015 season, ADRs became mandatory for all FIA Formula 4 championships around the world.

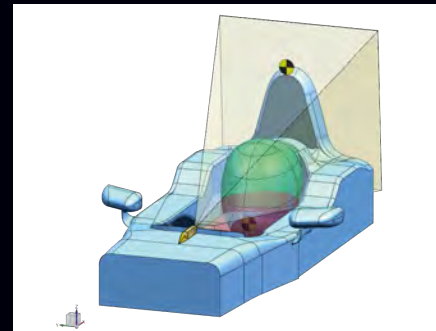


**IN-EAR ACCELEROMETERS**

These tiny accelerometers have been housed in silicon gel (above) and designed to sit in a driver’s ear canal to precisely measure the accelerations of a driver’s head in the event of a crash.

Introduced into Formula One in 2014, they work in combination with the Accident Data Recorders that measure the forces acting on the car and provide hugely important information.

After a few years of research, which included getting the accelerometer to measure the forces that can peak at 400G, the devices were trialed and then introduced into the top level of motor sport.



**HIGH-SPEED CAMERA**

This cockpit-mounted camera, which was introduced to F1 in 2016, rapidly films the driver at up to 400 frames per second. The data captured by the camera provides accurate information of what happens to a driver in the event of a crash, which may have been missed by previous technology, and can help inform medical officials of any injuries.

The research team at the Global Institute worked together with Charlie Whiting’s FIA F1 team of engineers and automotive engineering company Magneti Marelli to create a prototype system that would record images in real time onto the memory of the car’s black box device, which was specifically designed to have the capacity and processing power to receive and record the video data.

The camera that has been developed is 12mm wide, 25mm tall and around 80mm in length, roughly half the size of a smart phone. These specifications are designed so the camera can be integrated seamlessly into the cockpit of a single-seater car (above).



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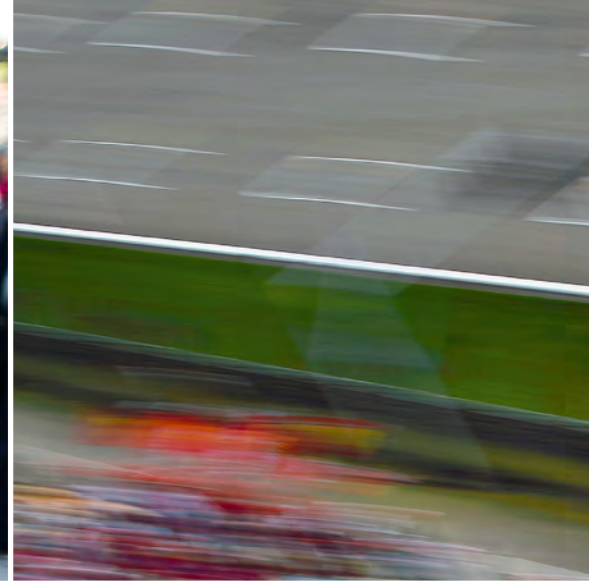


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COVER STORY

Inside F1

# TEAM PLAYERS

*Hundreds of people help to make a Grand Prix happen - and the work starts up to a week before the race lights turn green. AUTO spoke to six team members to find out more about their roles...*

TEXT: JUSTIN HYNES PHOTOGRAPHY: PETER J FOX

**T**hirty minutes to go before the lights go out for the start of a Formula One Grand Prix. In the garages of the sport's 11 teams fire-up sequences are initiated, driver visors are pulled down and radios crackle into life as engineers begin to run through grid procedures.

On the grid the excitement is building. Mechanics clamber through gaps in the pit wall catch fencing, trolleys stacked with the support systems needed to keep 22 high-tech racing machines alive and kicking in the run-up to the race are wheeled to grid positions, while hundreds of guests, camera crews and team personnel stream onto the start-finish straight to bask in the reflected stardom a grid walk brings. In the grandstands the atmosphere cranks to fever pitch as cars are wheeled to their starting positions.

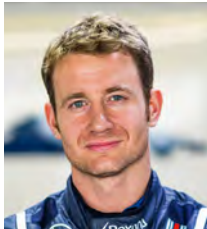
Tuning into this blend of sport, science and technicolor showmanship it's easy to imagine that this is how Grand Prix racing starts and ends - a globe-trotting extravaganza that drops fully formed into circuits worldwide like a vast visiting alien spaceship.

The reality, though, is somewhat different. Rewind a full seven days from the race start and the blinding light show is but a glimmer in the dark, as the first advance crews arrive to begin the long slow build towards showtime.

Over the course of the following days hundreds more will arrive, each playing an integral role in getting a Grand Prix from garage build to glory. Every one of them, from cook to car mechanic, from pit crew member to paddock potentate, has a story to tell of their role in keeping the world's top-level motor sport machine ticking. Here are just six... ▶

PHOTOGRAPHY: PETER J FOX; DPPI





**NAME: KIERAN BELL**  
**TEAM: WILLIAMS**  
**POSITION: GARAGE**  
**ELECTRICIAN**

Williams' Kieran Bell is a member of what might loosely be termed Formula One's advance expeditionary force. Responsible for building the electric infrastructure in the team's facilities at a race, Bell is one of the first of his team to arrive at a circuit, where he's confronted by an empty shell of a garage.

"For a European race we'll travel on Tuesday and we'll aim to be at the track at around midday or soon after. We'll get our steel toecaps on, the hi-vis vests and we'll get stuck into the garage build. I travel with a group of eight guys but we also have the truck drivers who will meet us at the circuit, and they'll try to get started with the unloading of the trucks and the freight.

"On that first day I'll be trying to get all the big cables in before any of the garage bannerings goes up. On TV you only ever see the 'front of house'. But behind the scenes you've got a car floor area, a front and rear wing area, gearbox departments, engines have got their own clean room and an Energy Recovery System room and so on.

"There's a tyre area, one truck carrying spares, various items for the car and then another truck for engineers and sub-assembly, which looks after gearbox ratios, brakes, dampers etc.

"That build carries on until Wednesday when the mechanics join us," he adds. "We want to have the heart of the garage working at that stage so we can get out of the way and give them the room to get started with the cars."

Once the major infrastructure is in place, Bell is freed up to help out in other areas and across the weekend also acts as a fire marshal for the team during qualifying. It's a session he says is the most enjoyable of the event.

"There's a huge amount of interaction in the garage. It's fuel in, fuel out; tyres on and off – there are a lot of people operating really efficiently, all working together to get those cars as far up the grid as you can. It's a real buzz."

Sunday, though, can feel like a gruelling slog. A morning of race preparation – during which Bell readies the grid trolley featuring the power supplies needed for the car – gives way to the main event and then the prospect of a long evening packing all of the team's equipment away for the next race.

"We normally finish after a 2pm race at about 11pm, but any time on the same day is a bonus. If you get a late race start, it can go on for a long time. It's 5am or later in Singapore."

Bell admits that as the season continues to expand, the task has become more demanding, but despite the intensity there's still a reward.

"I've worked on sites as an electrician, but in F1 these are the people you win and lose with, the people you get into those mad, manic flaps with and with whom you laugh about it afterwards. It's only in this job that you really get to know people on a much deeper level than you would elsewhere. It's more than just work colleagues, you are part of a team – and that's addictive."







**NAME: GRAHAM WATSON**  
**TEAM: SCUDERIA TORO ROSSO**  
**POSITION: TEAM MANAGER**

COVER STORY

A 19-year veteran of Formula One, Graham Watson has risen from a mechanic's role at Benetton to a position of running the rule not only over the operation of Toro Rosso's race team, but how it meets F1's sporting rules across a race weekend.

Watson's role across a grand prix has a dual nature, with his first set of responsibilities focused on getting the race team and its trackside infrastructure up and running.

"We'll have a first group go out to the circuit to look after garage set-up, which is based on the sea freight we've shipped," he says. "That first group is normally between 10 and 13 people. It's a reasonable number but when you see the amount of equipment and garaging we have, it's not huge. They work long days. It's seven 'til seven on the Monday before the race weekend. On Tuesday, the same guys come in. During that day, the mechanics are flying in. Sometimes we'll bring a few of them in on Tuesday afternoon but generally they'll arrive at the circuit on Wednesday morning and start with the cars. On Thursday it's scrutineering and then we're off."

The logistical side of Watson's role – "barring anything unforeseen" – is shuttered by Thursday and it's then that he "morphs into a sporting director role".

"We have a team managers meeting every Thursday with [FIA race director] Charlie Whiting, the stewards and [FIA technical delegate] Jo Bauer. Prior to that we'll have an internal meeting at which we'll gather any questions from our engineering group, the drivers... anything they want the FIA to clarify from the previous race. I'll come back from that meeting and provide responses."

On Friday morning, Watson can be found putting the Toro Rosso pit crew through its paces in intensive pit stop practice.

"After that it's the two practice sessions and then another FIA meeting with the drivers, to which the team managers also go, a) to make sure *they* go and b) to make sure they're not saying anything too daft!"

"Then it's practice three and qualifying. There it's basically keeping the team in the right regulations, making sure we're on track at the right time, keeping up to date on times, counting down off the stopwatch," he adds. "Particularly between qualifying sessions it can get pretty hectic in the garage. Engineers forget about the time and I'm constantly on the radio reminding them."

Sunday, which for most dawns with the cars still in parc fermé and with precious little access to them before the race formation lap, is often the day of most pressure for Watson.

"There's generally a bit of work on the car, so there has to be some documentation submitted to the FIA to get approval," he says. "Then we have a strategy meeting. I also try to get in a small pit stop practice. There's a final pre-race meeting and after that I give the pit stop crew an overview of what's going to happen during the race."

"After that we're into the race and you just hope you score the points and that you don't get called to the stewards to answer questions against some sort of indiscretion!"

Beyond the race Watson will remain at the track to oversee as much of the pack down as possible, but thereafter it's "back to Faenza and we start the whole process again". ▶





**NAME: WILL JOSEPH**  
**TEAM: McLAREN**  
**POSITION: PERFORMANCE ENGINEER**  
**CAR #14 (FERNANDO ALONSO)**

Like many of his McLaren colleagues, Will Joseph's work starts almost as soon as the flag falls on the previous race.

"We normally get home from a grand prix on Monday and on Tuesday morning we'll look at what went well and what didn't," he says. "We spend a lot of time looking at car limitations and opportunities for improvement on both the chassis and power unit side.

"Then we'll get into preparation for the next race using the simulator and offline simulations. On my side that involves the 'toys' on the car – the electronic elements we have some control over, etc. Later in the week the Honda engineers will be in the simulator with us. You do find that from one race to another you're turning through a cycle."

The cycle begins to accelerate as the 'off-week' gives way to travel to an upcoming grand prix.

"We're normally at the track on Wednesday or Thursday at a European race and you'd hope to have the majority of your core preparation done.

"This is my fifth year in this role and I've worked with Lewis Hamilton, Sergio Pérez, Kevin Magnussen, now Fernando Alonso and in Bahrain this year Stoffel Vandoorne. It's exciting learning how to work with different drivers, how to get the best from them."

Friday is when the meat of the race work begins, with Will sifting through the data from two practice sessions to fine-tune the car's performance. Often it's the time between the two sessions that's the most pressurised.

"We have two and a half hours between FP1 and FP2 and that flies by. I spend a lot of time pulling together information from our systems engineer and power unit engineer and from the guys at the factory. You're working out your next move and it's pretty intense."

The time after practice is spent in a similar round of debriefs and planning sessions, with the goal of arriving at a direction to be taken for final practice and qualifying.

"I decide how much fuel we put in the car, which is a huge responsibility," he says. "The buzz is working closely with the driver and feeling like you can make a difference."

By the time the race starts, Joseph's work is largely complete, so is there a chance to draw breath? Joseph pauses and smiles. "Not really. The flight home, maybe!"



**NAME: GUILLAUME ROCQUELIN**  
**TEAM: RED BULL RACING**  
**POSITION: HEAD OF RACE ENGINEERING**

As with McLaren's Will Joseph, Guillaume Rocquelin – 'Rocky' to everyone in the Formula One paddock – begins to plot the course of a Red Bull Racing weekend long before the first staff leave for the airport.

"Building up the performance over a race weekend starts with a baseline established from information we've gathered from past events, which is technical in terms of set-up but also based on general reports about how it went previously," he says. "That establishes targets for the weekend. So basic set-up is split between what we know of the race from the previous year and what we've learned across previous races from this season. Once we've done that, we take it to the simulator with both race drivers and pursue further development ideas.

"In that way everything converges," he adds. "Then on a Thursday at the circuit we get everybody together and establish where we are, what's happened, what are the updates and what are the new targets. We'll also have a conference call with the factory and get their updates."

Once a run-plan is developed, Friday's practice sessions run to an almost naturally defined process.

"Friday's underlying plan generally fits a pattern because we only have so many tyres at a given time," he says. "It's not like, 'it didn't work, let's try something else'. You can't do that because you haven't got the tyres to find out the answer. It becomes a digital process – it either works or it doesn't and you move on. There are finite steps. That's where the offline work at the factory becomes more important, with a steady flow of information and updates as they try different things."





AT THE CIRCUIT  
EVERYONE GETS  
TOGETHER AND  
ESTABLISHES  
NEW TARGETS”  
GUILLAUME ROCQUELIN

There are always occasions when the best laid plans fall apart, but even when conditions or circumstances change Rocquelin says it rarely results in gambling on instinct.

“You’ve always got some format to fall back on – your baseline,” he says. “You need to have a process and the outcome will be what it is. You’ve got to stick some kind of organisation because there’s too many people involved.

“Everybody has a different way of working, but to me it’s about being able to build something using all the tools at your disposal. You have good days and bad, but just reacting and throwing something at the problem that might work is a short-term approach. It’s about having a systemic approach: we tried that and it didn’t work, next time we’ll try this. Eventually you start to see patterns forming and you refine your approach.”

Rocquelin made his name in the sport as Sebastian Vettel’s race engineer during the German’s – and the team’s – glory years, but in 2014 he made the step up to overseeing the team’s trackside engineering needs. It’s a role, he says, requiring a different mindset to that of a driver’s engineer over a race weekend, being less head down in the data and more strategic.

“It’s not about the here and now,” he admits. “It’s more about the next session, the next event.

“Part of my job is that if I see one side of the garage going off on a tangent, you’ve got to say, ‘the other guys are doing this; it seems to be working so this is probably where you need to be’. You’re standing back and saying, ‘OK, I can see a pattern developing; how are we going to bring it back together?’ It’s more pressure, but that’s what I like.”

**NAME: VINCENZO SANTANGELO**  
**TEAM: SCUDERIA FERRARI**  
**POSITION: CHEF**

The phrase ‘an army marches on its stomach’ is particularly apt in F1, where the equivalent of several battalions of team members, guests and media populate what amounts to a small town each race weekend.

Coping with the demands of those who inhabit Ferrari’s district of F1’s village is executive chef Vincenzo Santangelo, one of four chefs working in the team’s kitchen. “We arrive eight days before the race, on Sunday, and begin to set up,” he says. “Some staff start work on building the kitchen and some go shopping. Then we will think about menus.”

At European races the crew’s kitchen is a known quantity, being part of Ferrari’s clutch of motorhomes, but at flyaways there’s often little infrastructure to work with “so we bring everything ourselves”.

“In some countries you can have food delivered by truck. In others it’s not so easy because some companies can supply until Friday and some not, so every day you must go and buy.”

Once the kitchen is up and running the crew cater to the needs of 120 team personnel, plus team guests and media from Thursday through to Sunday.

“In the morning we get to the circuit half an hour before the team to prepare breakfast,” says Santangelo. “We leave when the last team member leaves.”

The long hours and uncertain conditions beg the question why chefs such as Santangelo resist a quieter life, but it is the unpredictability of a race environment that keeps him interested.

“In a restaurant you can get anything you want. Here, you never know. So you have to react quickly and if you have a good, creative mind then you find a way.” ▶





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**NAME: TOTO WOLFF**  
**TEAM: MERCEDES**  
**POSITION: HEAD OF MERCEDES MOTORSPORT**

From the outside, the perception of the role of a team’s most senior member can often be blurringly imprecise. Is he or she the ultimate caller of the racing shots across a weekend, or is the team boss more of a figurehead, a totem around which Formula One’s murky politics spin?

According to Mercedes’ Head of Motorsport the answer lies somewhere in between, with the boss needing to remain on top of track developments while allowing senior race team members to make their collective calls, and also manage the political and public side of the team’s operations.

“My role at the races is to give the team overall leadership but also give our technical experts – Paddy Lowe, Andy Cowell and their guys – the space to do their job without interference,” says Toto Wolff. “We have some of the best people on the planet in their roles and they need the right conditions to perform. That means I handle the politics, most of the media workload and work with our partners, so the technical guys can concentrate on the job.”

Wolff will remain back at his office later than most and only arrive at the track on the Thursday of a race weekend or sometimes Friday, depending on meetings away from the circuit.

“One of the main roles I play is to be a sounding board for the team’s senior members. The engineers work in a very data-driven way but sometimes things need a more instinctive perspective and I make sure we have every angle covered.”

Away from helping plot the course of the team’s race weekend, Wolff is involved in F1’s seemingly endless capacity for another variety of plot – the political.

“F1 is an intense crucible with all your rivals, the regulator, the commercial rights holder and the media in the space of several hundred metres, so there’s always something going on,” he says. “I think it’s normal that this kind of environment is very political because everybody has different agendas and they are trying to influence the outcomes.”

“A sport needs to capture people’s attention and polarise, and the politics are definitely a part of the mix that attracts people to F1 – even if the main focus should be on the heroes out on track.”

As ever in F1, on a Sunday the business and brokering briefly give way to the reason everyone is there – the race.

“The race is intense – it’s 90 minutes of complete focus. I’m in constant radio contact with Paddy, providing inputs and taking a big-picture view; again, it’s about giving a different perspective, to make sure we’ve got every base covered.”

“It’s a high-pressure environment but not one that I would call stressful. Stress is something you make for yourself; my focus is on meeting our challenges and giving the team what they need to perform to the maximum throughout the season. The pace doesn’t relent, but there are moments when you have to step back and enjoy it. But only for a second – there’s no room for complacency or you will get left behind.” ■

## RACING IN NUMBERS

On TV it might seem like an F1 team consists of the drivers and a few engineers and pit crew, but it’s much larger than that.

A race team is split into two parts – operational and non-operational – and the number of staff involved with racing activities is capped by FIA rules at 60 per team. Non-operational staff, including reserve drivers, might number up to 25. An average operational F1 squad might look like this:

- Team Principal

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- Driver x 2

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- Sporting Director

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- Engineering Director/  
Head of Trackside Engineering

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- Chief Race Engineer

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- Race Engineer – Driver 1  
Race Engineer – Driver 2

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- Performance Engineer x 7

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- Design Support Engineer

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- Car Systems x 4

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- Comms/IT x 2

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- Team Manager

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- Deputy Team Manager/Logistician

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- Chief Mechanic

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- Car Mechanic x 11

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- Car Support Crew x 7

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- Garage Technician Team Leader

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- Garage Technicians x 5

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- Fuel and Lubricants Engineer

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- Senior Power Unit Engineer

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- Power Unit Engineers x 5

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- Power Unit Technicians x 4

COVER STORY



AUTO  
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Formula E in Paris

# POWER TO THE PEOPLE

*When Paris hosted a round of the FIA Formula E Championship it was a case of the future meeting the past, with the all-electric series proving a hit in the place where motor sport was born*

TEXT: SAM SMITH









It was the race that blurred the lines between the past, present and future. The Paris ePrix, the latest round of the burgeoning FIA Formula E Championship, brought international motor sport back to the capital for the first time since 1945 – and it was a major success story.

The Paris ePrix gave a surge of power from the future to the historic Hôtel des Invalides, the complex of evocative buildings in the 7th arrondissement of Paris. It swung a large electric light over the future of racing with a glow reaching across the motor sport and automotive worlds.

The forward-thinking FIA Formula E Championship has set about re-calibrating the public's perception of what future motor sport will look, feel and sound like. Efficiency is the watchword in the all-electric championship, and racing on the streets of a spectacular capital city such as Paris captured the spirit of innovation and future mobility with which it is synonymous.



### BACK TO ITS ROOTS

It was fitting that Formula E came to Paris, for in 1896 the very DNA of what is now known as motor sport was born there.

The Paris to Rouen Le Petit Journal Competition for Horseless Carriages (Concours du 'Petit Journal' Les Voitures sans Chevaux) was won – on the road at least prior to disqualification – by famed automobile pioneer Jules-Albert de Dion in a steam-powered machine called the De Dion-Bouton. It set in motion automobile competition, which by the end of the 19th century had firm roots in France.

Fast-forward 122 years and the same spirit of technological adventure was witnessed by thousands of fans who lined the Les Invalides streets to see 18 of the finest drivers in the world showcase their craft. They did it in cars that can run at 200kW, emit no





emissions and in efficiency terms are the cleanest future-thinking mobile laboratories in the world. Once again, Paris would see motor sport innovation in action on its streets.

France also hosted the first post-World War II event held on a track in the Bois de Boulogne, at the Porte Dauphine. This was used until 1951 before the Autodrom de Linas-Montlhéry became the circuit of choice. Wherever racing took place in Paris the fans flocked to it and a heritage of invention and evolution underpinned the basis and growth of worldwide motor sport.

A new generation of racing fans certainly appreciated the Formula E motor racing spectacle as much as their forbears, and the drivers were overwhelmed by the support and fervent interest from trackside and also from the windows of offices and buildings above the circuit. Motor sport had come home.

“The atmosphere here is amazing,” says Lucas Di Grassi, who went down in history as the first-ever winner of the Paris ePrix.

“Even people in houses were opening their windows to cheer me.

“The support was tremendous and for me this first event in Paris was a huge success. It is a good template to have for the championship and for that you have to firstly thank the people of Paris, and then give big applause to the FIA and Alejandro [Agag] and his team at Formula E, because it was a great experience.”

Right in Di Grassi’s slipstream at the end of the race was local ace Jean-Eric Vergne. The DS Virgin driver grew up in the north of the city in Pontoise, and knows almost every avenue and street of the Les Invalides district.

“It was amazing seeing what had been achieved when I came here earlier in the week, before the race,” says Vergne. “I’m extremely proud to be a Parisian today. You can forget the recent difficult times in France and Brussels. It’s something incredible to show the strength of the city.” ▶

## THE FRENCH REVOLUTION

*Bringing Formula E to Paris required sporting commitment as well as political good will*

Without strong political support from the outset, the dream of a Paris ePrix would have remained precisely that. But following the successful introduction of the AutoLib’ programme to Paris in 2012 – a subscription service for shared electric cars and for electric charging points backed by then-mayor Bertrand Delanöe, himself a supporter of the ePrix – the city was seeking to position itself at the forefront of electric mobility.

“Hosting this race in the heart of Paris is a way to put the city at the service of sport and we are delighted to offer a stunning setting for this event,” Mayor of Paris Anne Hidalgo said at the ePrix.

“It is also a way to tackle climate change and reduce carbon emissions. Today, we celebrate the forward-thinking innovation of these high-performance cars and underline our commitment to move forward towards a more sustainable future.”

Putting the ePrix in Paris certainly made the city sit up and take notice. Official figures put the sell-out crowd at 20,000 people, with 8,000 VIP and 12,000 general admission tickets sold. However, those figures fail to paint the real picture, with fans hanging from windows to cheer on the drivers and ticket-less locals who flooded the pits and track once the race was over. Formula E aroused the city’s curiosity.

“This is a gift for Paris and for those who believe in electric mobility,” Hidalgo told *l’Usine Nouvelle*. “The event shows there is research around electrics, so that technology will progress. With the choices we have made in Paris, it makes sense to favour electric mobility.”

There had been discussions about holding a motor race in Paris since the Mitterrand presidency, but Formula E was the only category able to offer a sufficiently attractive package, series CEO Alejandro Agag revealed.

“In the first meeting at city hall they said, ‘if your cars were not electric, we wouldn’t be sitting here’,” he said. “We’ve been impressed by the level of work from then on. The Mayor of Paris was fundamental to this, as was the Mayor of the 7th arrondissement and the Minister of Sport.”

Below: Paris ePrix winner Lucas Di Grassi. Left: A crowd of 20,000 attended the race, bottom, while the Moulin Rouge provided extra colour.





One man who has followed both French and indeed global motor sport over the last 40 years is Alain Prost. ‘The Professor’ was at his most erudite over the Formula E race weekend as he soaked in the atmosphere and magnitude of what the FIA Formula E Championship was creating.

“Whatever I say it will be hard to give an accurate summary of how great this all really is,” says the four-times F1 World Champion. “If you asked me two years ago if this could ever happen I doubt that I would say yes. For sure, it is important for the whole French nation that we show we can achieve a great event like this.”

### **E FOR ENTERTAINMENT**

There was so much for the fans to see and do at the Paris ePrix. The vibrant ‘e-village’ saw families getting involved in racing simulators and other activities from the championship and its manufacturers.

They could take in the fascinating past and future aspects of motor sport as a 1931 Bugatti Type 56 electric car toured the paddock and track. Amazingly power came from a single 28-amp electric motor producing 1hp (0.8kW) and the energy was housed in six 6-volt accumulators for a total of 36 volts.

The elegant Bugatti was followed by the remarkable GreenGT H2 Hydrogen-cell car, which was driven by France’s last Grand Prix winner Olivier Panis. The H2 concept features two 160-litre carbon fibre and aluminium tanks which can store 8kgs of hydrogen (the equivalent to 50 litres of petrol/gasoline).

Famous faces in the crowd included French Prime Minister Manuel Valls, Mayor of Paris Anne Hidalgo, Prince Albert of Monaco and supermodel Eva Herzigová. It was an atmospheric and

colourful grid thanks in part to the spectacular sight of the famous Moulin Rouge dancers. With unique tunes pumped out of turntables by the amusing be-helmeted EJ, the vibrant scene resonated off the surrounding boutiques, offices and homes.

“The atmosphere at the start was wonderful,” says Nicolas Prost, who took his car to fourth place in the race. “There was a great buzz all week long and I think a lot of people are rightly proud of Paris and also of France. The public really get behind you when you race at home.”

The operational and logistical challenge of getting the 1.25-mile track ready had tested the organisers to the limit, but some novel solutions were found. Much of the infrastructure for the circuit arrived by boat down the River Seine.

“It is the biggest event we have had so far,” says series boss Agag. “You know, once the political decision was taken to host the race here in the centre of Paris, the speed and efficiency of the French administrations has been very impressive. I would say the best in the world so far and we have had incredible co-operation with the city of Paris. We have been really impressed by the level of professionalism.”

The first ever Paris ePrix sold out in record time for the series and attendance was put at 20,000 people. Agag believes that more will see the event in subsequent editions of the race.

“We will have our usual debriefs but, for sure, the aim is to have more tickets available,” concluded Agag. “This year we had to limit the numbers but in the future I can see a really big crowd for the Paris ePrix because the French public have motor racing in their soul.” ■







## FIA PRESIDENT JEAN TODT RECALLS A 'GREAT SHOW' IN PARIS

"Back in January, when the outline for the Paris ePrix track was presented to the media in a ceremony at the City Hall, I said this race was the realisation of one of my dreams. Now that it has actually taken place, I can add that it was very exciting to see racing cars running through the heart of Paris, an amazing city, which is also the historic home to the Federation over which I have the honour to preside.

"I think it was a great show, for those who were there in person at Les Invalides and for those who watched on television or via the Internet, all over the world. Of course, there are many aspects that can be improved, but one must not forget the complexity of the challenge involved in organising an event like this. We live in a world that moves along at an impressive pace and usually there is an overriding tendency to take it all for granted. I've been involved in

motor sport for 50 years now and I can say with hindsight that it is no simple matter to put on a race like this in a place like this. In addition, one should not forget that, for a few months now, Paris has been experiencing a heightened security situation.

"I am sure the organisers will take on board all the experience they have gained when it comes to the second edition of the Paris ePrix, which I really hope can be staged next year. As we say in France, bravo to those authorities who gave permission for this dream to become a reality, the Mayor of Paris Anne Hidalgo, the Mayor of the 7th arrondissement Rachida Dati, the Minister for Sport Patrick Kanner and the Military Governor of Paris Bruno Le Ray. Also to the organisers, first and foremost Alejandro Agag, and to everyone who contributed to the success of the event with their work and their passion."

Paris Mayor Anne Hidalgo with Mayor of the 7th Arrondissement Rachida Dati, FIA President Jean Todt, Prince Albert of Monaco and Sport Minister Patrice Kanner. Below: French Prime Minister Manuel Valls.



AUTO FOCUS



**AUTO  
FOCUS**

Life outside F1

# PATHS TO GLORY

*While Formula One may be the goal for many aspiring drivers, with 22 seats available only a few can make it to the top. But as motor sport continues to develop there are now more options than ever for a young driver to forge a strong career*

TEXT: GARY WATKINS







Oliver Gavin (right) gave up his F1 dream and invested in US sportscars, enjoying success with Corvette.

Many, if not most, aspiring racing drivers set out with the goal of reaching Formula One. The dream of competing at the pinnacle of the sport – or perhaps the twin peaks of racing in North America, NASCAR and Indycar – is not attainable for the vast majority. But there are still hundreds of drivers around the world earning a good living by racing cars.

Take Oliver Gavin, now in his 15th season as a factory Chevrolet driver with the Corvette Racing sportscar team. He had the scent of F1 more than once in his formative seasons: there was a near-miss with the back-of-the-grid Pacific team early in his career; he tested with Benetton on an ad-hoc basis; and even drove the F1 Safety Car. Yet by the end of the 1990s, marriage, impending fatherhood and a difficult return to the Formula 3000 F1 feeder series, now replaced by GP2, forced him to reconsider his goals.

“I was hell bent on chasing the dream and getting to F1 when I was younger,” recalls the 43-year-old. “That burning desire to reach F1 clouded my judgement. Reality has to set in at some point, and for me it came after I got married and had a daughter on the way.

“I realised that I had to make a big push at making motor racing work for me as a career. And if I couldn’t, I’d have had to find another way to support my family.”

Gavin looked to the US sportscar racing scene, having admired the exploits of two British professionals who had carved a niche in that arena, James Weaver and Andy Wallace. But to break in, he still had to speculate to accumulate – he used all his savings to buy a handful of rides in mid-2000.

“It was a big jump, because I used up all the money I had,” explains Gavin. “At one event, the team owner came back to the pits after starting the race with the gear lever in his hand. I’d paid to be there, but I didn’t even get in the car. But I’d done enough to be invited back. I had my expenses paid at first – I remember being put up in a rather grotty hotel – and by the end of the season, I was even being paid a little bit.”

Gavin’s exploits in a handful of races in North America that year led to a link-up with fledgling US sportscar manufacturer Saleen. He won his class at the Sebring 12 Hours in March 2001 ahead of the Chevrolet Corvettes, and a year later was racing one. Fifteen years on, he’s won four major sportscar titles with Corvette Racing and claimed class honours in the Le Mans 24 Hours on five occasions, most recently in GTE Pro last year. ▶





Harry Tincknell received valuable career advice from his manager and triple Le Mans winner, Allan McNish.



Having proved his worth in sportscars, Tincknell is now part of Ford's return to the top level.





AUTO FOCUS

Success out on the race track is part of his secret, but forging a long career with one manufacturer takes much more than that, reckons Gavin.

“You’ve got to work at it: you have to get on with the team and fit in with your team-mates,” says Gavin, who has already added class wins at the Daytona 24 Hours and Sebring IMSA SportsCar Championship rounds to his CV this season. “If you don’t, you aren’t going to get anywhere in sportscar racing.

“I’ve also tried to stay true to something James Weaver told me years ago. He said that there was always something to learn from someone. I’ve tried to do all that with Corvette Racing, and I’m still here after 15 years.”

**SINGLE-SEATERS TO SPORTS CARS**

Gavin was nearly 28 when he set course for a sportscar career. Harry Tincknell was just 22 when he did the same.

“I’d had a strong year in the European Formula 3 Championship in 2013 and finished fifth,” says Tincknell. “But it had got to the point where I was going to need £1 million a year to move up to GP2 and £8-9 million if I was going to break into F1. That wasn’t an option.”

Tincknell’s manager, then as now, was three-time Le Mans winner Allan McNish. He suggested a move to sportscar racing, just as the Scot had done when his single-seater career hit the rocks in the mid-1990s.

“It seemed like a good time to make the switch,” explains

Tincknell. “Porsche had just come into LMP1 in the FIA World Endurance Championship and there were rumours about Nissan. It looked like there were going to be some good opportunities.”

Tincknell left single-seaters behind and embarked on a season at the wheel of an LMP2 prototype with the Jota Sport team in the European Le Mans Series. After one win and three poles, as well as a class victory at the Le Mans FIA WEC blue-riband round, he was signed up for Nissan’s P1 campaign.

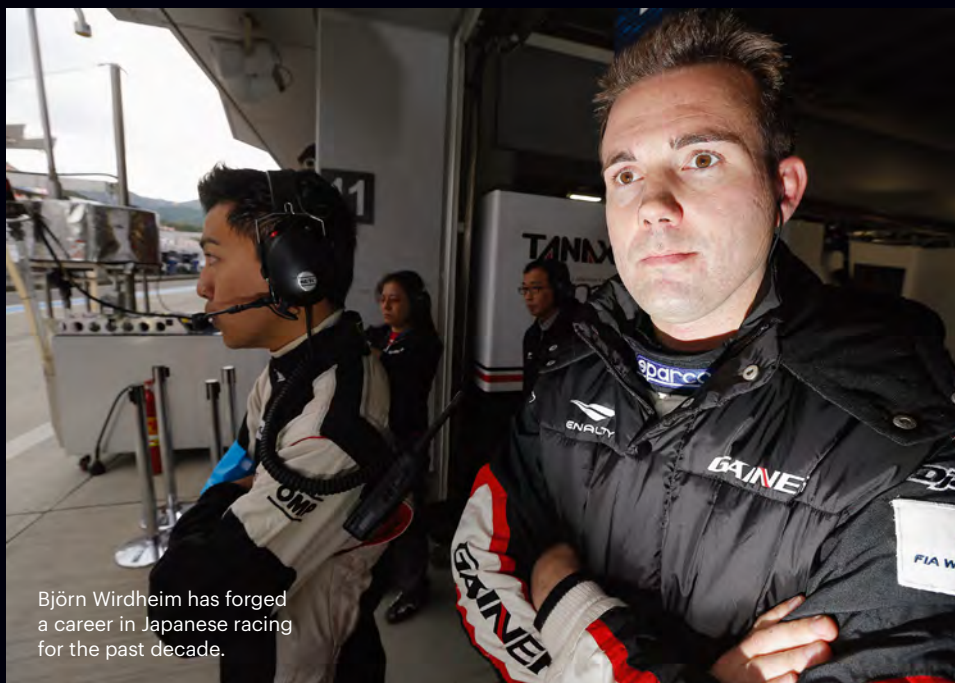
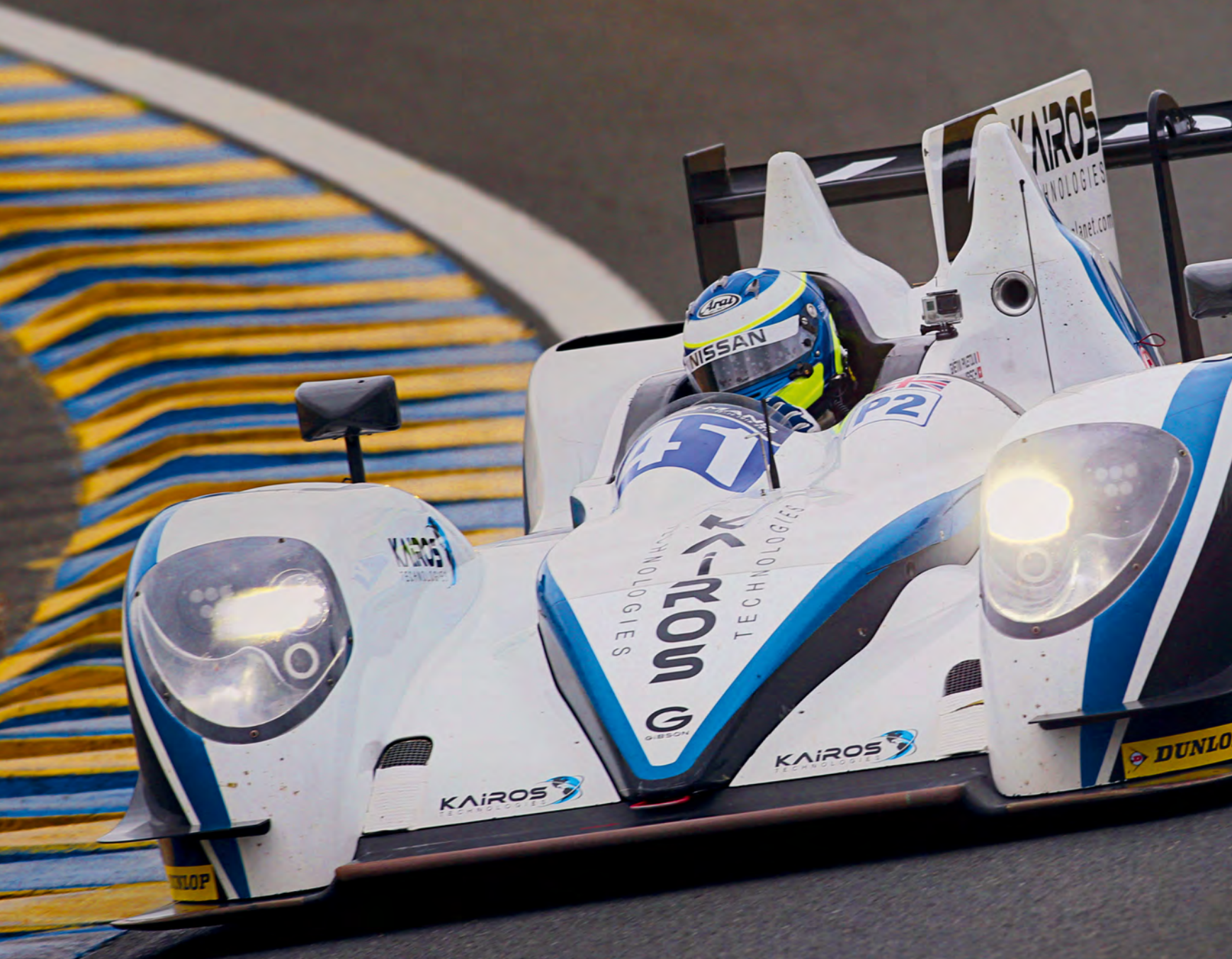
That programme turned out to be short-lived, but the 24-year-old now has his second factory drive. He is part of Ford’s return to international sportscar racing and is contesting a programme of FIA WEC races around Le Mans in GTE Pro with the Chip Ganassi Team UK squad.

“What I have achieved shows that there are opportunities if you are good enough,” he says. “I guess some people dream for a whole career of landing a factory drive, and I’ve been lucky enough to have had two in the space of a couple of years.”

**WEST TO EAST**

While Gavin looked west across the Atlantic to the USA for his next career move, Björn Wirdheim cast his eye eastwards. The Swede was test driver for the Jaguar F1 team the season after winning the F3000 title in 2003 and then had a year in Champ Cars in North America, but when it came to getting paid to race, his opportunity arose in Japan. That was 10 years ago, and he’s just started his 11th season as a professional in the Far East. ►





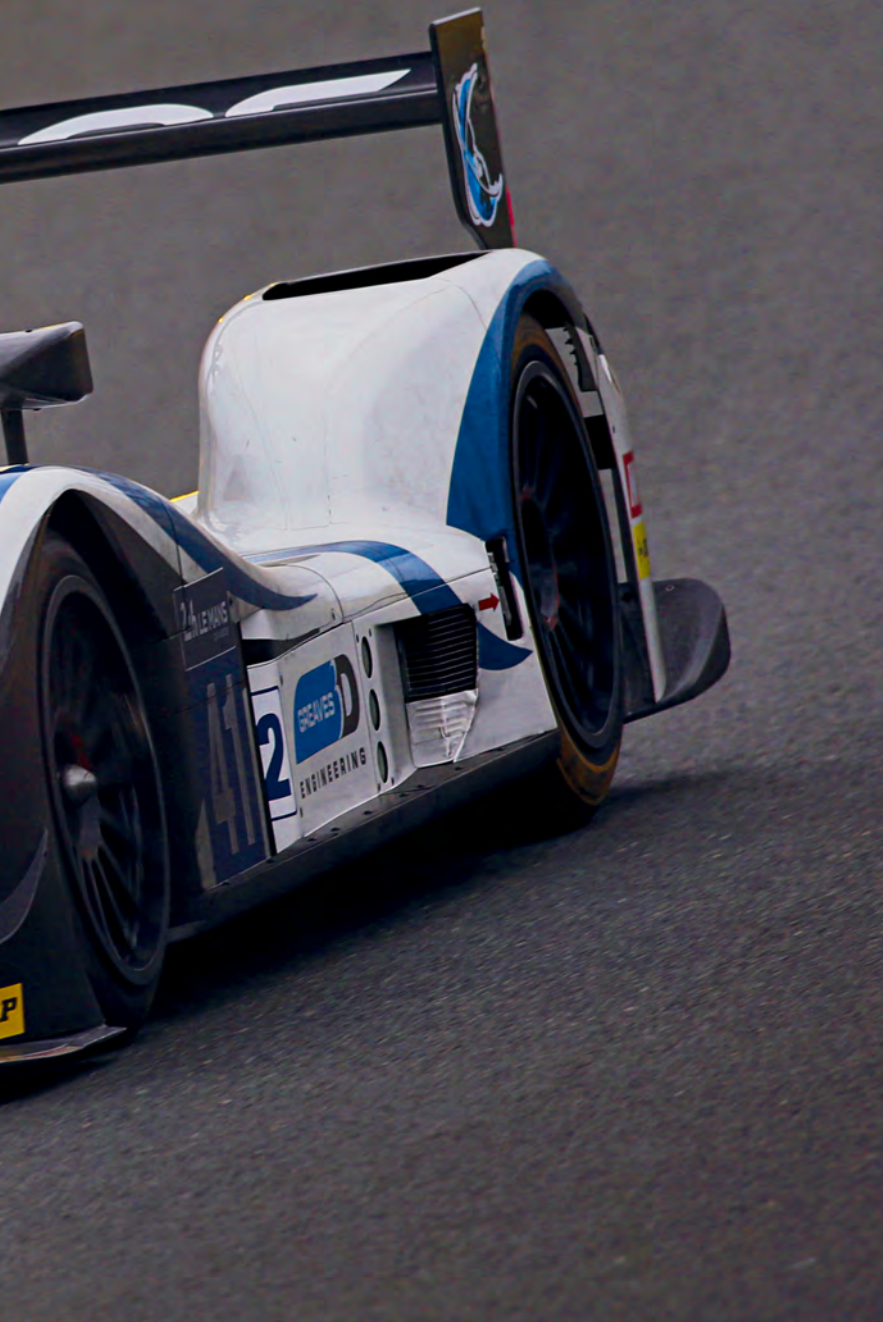
Björn Wirdheim has forged a career in Japanese racing for the past decade.

## PAID TO RACE

Potential salaries for drivers outside Formula One:

- FIA WEC – Around €1.5 million a season for the biggest names to €50,000 for drivers getting their first paid seats
- IMSA SportsCar Championship - Up to €300,000 a season for the top factory drivers
- DTM - In the region of €750,000 a season for the established stars down to around €100,000 for first-year factory drivers
- FIA WTCC – Around €300,000 a season for the established names





“I’M PAID TO DO WHAT I LOVE, WHICH IS DRIVE RACING CARS. I’M NOT SURE A LOT OF PEOPLE REALISE YOU CAN DO THAT OUTSIDE F1”

ROB HUFF

AUTO FOCUS

Wirdheim’s mentor, fellow Swede Eje Elgh, had been among the first wave of Europeans to break into Japanese motor sport in the early 1980s and pushed his young charge in that direction.

“Eje could see that F1 wasn’t going to happen for me and that it wasn’t going to work out in Champ Cars either, so he managed to arrange a test in Formula Nippon [now Super Formula],” recalls Wirdheim. “That’s how I came to be offered the drive with Dandelion Racing for 2006.

“I was lucky that I had Eje on my side. There are opportunities for Europeans in Japan, but the key is finding a way in. His contacts helped me unlock the door.”

Wirdheim started out in Formula Nippon, but by year two of his Far Eastern adventure, he was also racing in Super GT. However, it is in Japan’s premier sportscar series that he has carved his career over successive seasons. He was a factory driver with Toyota’s Lexus brand and then Nissan in the top division of the championship, known as GT500, and now he races a Mercedes in the secondary GT300 class.

“You have to be quick, obviously, and you can’t afford to make many mistakes,” says the 36-year-old. “There is maybe a lower tolerance of drivers crashing in Japan than in Europe. There are always up-and-coming Japanese drivers being pushed by the manufacturers and that definitely puts more pressure on the European drivers.”

#### TOURING THE WORLD

Rob Huff was another to abandon the F1 dream early and can now look back on a career in touring cars that has encompassed stints with four different manufacturers and victory in the FIA World Touring Car Championship in 2012.

He’d won the Formula Vauxhall series in his first year of racing in 2000 before a lack of funds stymied his graduation to Formula Renault. He won a scholarship to race Renault Clios in 2002, before competing in a new one-make series for SEAT Leóns in 2003. The reason was simple: there was the prize of a drive in the British Touring Car Championship for the winner.

“I had to pay for my racing again, or mum and dad did,” explains Huff. “It was a gamble worth taking, because there was a paid drive at the end of it if I won.”

Huff did win and then moved to the FIA WTCC with Chevrolet in 2005, and he has been a permanent presence there ever since. He is now driving – and winning – with Honda after a stint with Lada.

“I have been able to maintain a professional career over 13 seasons and have driven for four different manufacturers,” says Huff. “I’d love to say that it was all planned, but it wasn’t that way at all. Sometimes it has been more a case of luck than judgement.

“I’m lucky that I am paid to do what I love, which is drive racing cars. I’m not sure a lot of people realise you can do that outside F1, but I’ve proved that it is possible even without bags of money.” ■



AUTO  
FOCUS

Roads to Le Mans

# TEST OF EN

*Beyond the top-flight prototypes, the secondary LMP2 category is providing a hotbed of competition in*

TEXT: JUSTIN HYNES





# DURANCE

*sportscar racing. And it's where Jota Sport is expanding its operation in a bid for further class success*







LMP2 champion Roman Rusinov aboard the Jota G-Drive Oreca in the WEC-opening 6 Hours of Silverstone.



Each year, in the week before the main event, the Place de la République in Le Mans buzzes with an energy impossible to replicate at any other time of the year. In advance of motor sport's most legendary endurance race, and on the day known as Le Pesage, an ever-more exclusive parade of racing machinery is wheeled between the crowd barriers for scrutineering by race officials.

But amid the steady stream of marquee sportscar brands that make up the majority of competitors at this most classic of races, it is the manufacturer prototypes, the monsters of endurance racing's top LMP1 category, that draw the most attention, the most intakes of breath, the greatest number of camera phone flashes.

That the handful of manufacturer prototypes on show garner the lion's share of the spotlight is unsurprising. These are, after all, creatures occupying an ultra-rarefied space, the product of multi-millions of dollars' worth of development and testing and driven by the sport's unalloyed celebrities – such as Porsche's former F1 star Mark Webber, Toyota's clutch of F1 drivers including former WEC champions Anthony Davidson and Sébastien Buemi, and Audi's triple Le Mans winners André Lotterer and Benoît Tréluyer.

However, while the battle between racing powerhouses such as Porsche, Audi and Toyota undoubtedly drives the popularity of the FIA World Endurance Championship and its flagship 24 Heures du Mans event, the white hot glare surrounding LMP1 often serves to obscure what might be the heart and soul of sportscar racing – a vibrant LMP2 class filled with privateer teams that not only embody an enduring passion for competition at its purest, but which make up the backbone of a thriving motor sport industry.

Take Britain's Jota Sport. The drive up to the 2014 Le Mans LMP2 class winner's headquarters is markedly different to the approach to LMP1 kingpins Porsche's Weissach HQ. While the manufacturer's facility is a vast, gleaming statement of engineering prowess and innovation, the road to Jota's factory involves a slow wind through the sleepy byways of southern England's Kentish countryside and a short detour down a lane to a small collection of industrial buildings on the edge of a farm. Here, it is a case of function over form, of purpose over posturing.

But while the facility might lack visual impact, inside it is a hive of industry as, for the first time in its 15-year-plus history, the team sets about preparing to run two different cars across two different championships.

"We were running our LMP2 programme quite comfortably," explains team boss Sam Hignett, who in 2000 set up Jota on the edge of his parents' farm primarily to service his own aspiration as a financially-straitened racing driver.

"However, last year, with the new LMP2 regulations coming in for 2017, it became apparent at Le Mans that [the team's long-standing chassis supplier] Gibson weren't going to tender for being one of the series' four chassis manufacturers. We had to make some choices."

The result is a split programme, with the team running a Nissan-powered Gibson 015 in the European Le Mans Series but also opting to forge a new relationship with one of the WEC's selected constructors – Oreca.

"I bought Gibson/Zytek's first car and their last one," recalls Hignett fondly. "We've book-ended that project and I attribute a third of our success to the relationship we have with Gibson. But we needed to be careful about the future."

"If we had carried on solely with Gibson in 2016 and had success, who are we at the end of the year other than another bunch of guys with a cheque for a couple of million euros to buy cars in 2017? So the only viable business solution was to do something with Oreca. They were the only people who had a semi-2017 compliant car on the ground at that stage, so we bought the Oreca quickly."

## "IN LMP2 YOU ARE MORE CONNECTED TO THE RACING AS PART OF A SMALLER TEAM"

GARY HOLLAND, JOTA TEAM MANAGER

### TWO-PRONGED ATTACK

The decision by Hignett and his partners was planned as a twin assault on the ELMS series, but late last year a second partnership opened up with 2015 LMP2 champion G-Drive. The Russian company ended its relationship with the Oak team, installed Jota to run its programme and the Oreca chassis was switched to a WEC campaign.

The twin assault has led to rapid expansion at Jota's facility, with the squad more than doubling in size from 10 employees to 24. This, explains Hignett, was made necessary by the demands of running the Gibson and the Oreca.

"Fundamentally the engine is the same. It's the Nissan NISMO engine but there is a gentleman's agreement that if you buy a Gibson chassis you run the Gibson version of the NISMO engine," he says. "If you buy an Oreca chassis you run the Oreca version. So we are in a unique position where we have the same engine built by two different companies with two different sets of engineers, etc."

The increase in commitment might seem small compared to manufacturer works programmes involving hundreds of people, but for team manager Gary Holland, who joined at the start of this year, the compact nature of LMP2 teams is part of the allure.

"Here you are more connected to the racing as part of a smaller team," says Holland, who tasted F1 glory as part of the 2009 title-winning Brawn GP team. "Although we are small from a footprint point of view, we are efficient, because we're not heavily staffed."

"The atmosphere of not only an LMP2 team, but an endurance team, is completely different," he adds. "It's more informal. Everybody's got a name. You're not just a number on a rota or a pit pass. Every single person makes a difference and I like the fact that the way we motivate those people has a direct bearing on our end result. We can steer quickly, too; we're reactive, and it's probably more of a fast-paced environment [than F1] because fewer people are involved in more projects so the multi-tasking side of it is huge."

"It would mean more to me to win Le Mans and the WEC and ELMS this year than it did to win the F1 championship, just from a personal point of view, because more things have to fall into place in order for that to happen."

### COMPETITION AT ITS PEAK

Making those things fall into place is the task of sporting director, Bob Friend, who admits that in the build-up to the start of the season the team was at full stretch.

"Once we're into the season properly, then we can assess things," he says. "At the moment, you're so deep in it, you can't even see the next step! When it's all laid out at Le Mans you can look in the garage and say, 'OK, we've made it, we look great and we're going to make this work for the two cars.' Only then will it feel ready!" ►



# “OUR GOAL IS TO BE THE FIRST CALL WHEN A MANUFACTURER DECIDES THEY WANT TO GO LMP1 RACING”

SAM HIGNETT

One of the founding members of the team, Friend has seen the privateer LMP category change dramatically over the past decade.

“It’s so much better now,” he smiles. “Up until about 2006 or ’07 it was a race of attrition. To be honest, LMP2 cars were pretty rubbish. They’d fall to bits. You’d come in, change the parts on the gearbox, fix the broken suspension and so on. But what you’re seeing now with LMP2 technology and reliability is that it’s pushing the whole thing. We push the guys in the pit stops to be faster. The drivers need to be on it all the time. There’s no, ‘oh, they’re bound to come into the pits for half an hour and we’ll make back the three laps we’ve lost.’ You can’t rely on that any more. You’ve got to push the whole time.”

The solidity of LMP2’s racing platform is reflected in the strength of the 2016 grid, one of the most closely matched for some time. Ten LMP2 cars are contesting the full 2016 WEC campaign, with Jota being joined by stellar names such as the Nissan Renault Alliance’s famed Alpine marque, perennial WEC challengers Strakka and the Manor team run by former F1 team bosses Graeme Lowdon and John Booth. It’s a contest that G-Drive’s 2015 LMP2 champion Roman Rusinov believes is impossible to call.

“The competition in LMP2 will be very tough, but very nice,” said Rusinov during pre-season testing. “All the cars on the entry list can challenge for the win, so we will have a very nice competition this year.”

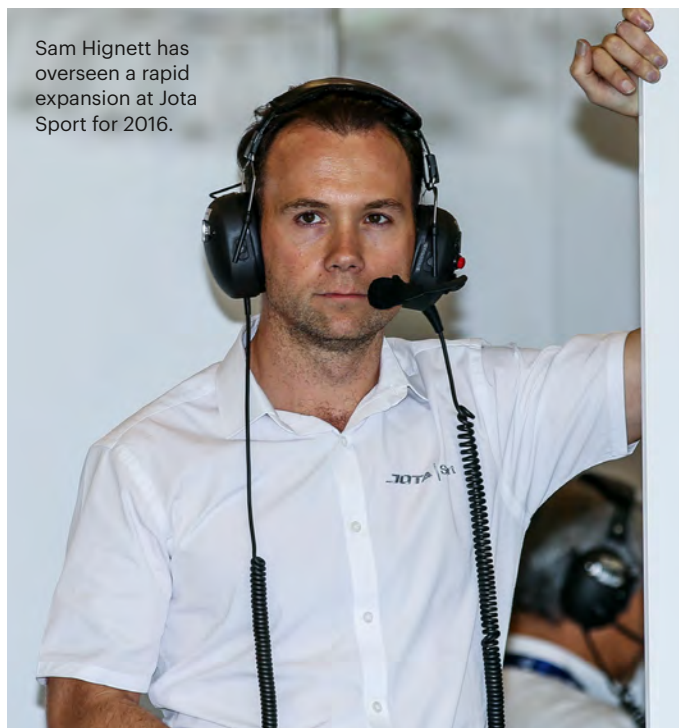
Jota Sport’s hard work was rewarded at the opening WEC round, the 6 Hours of Silverstone, in April. Rusinov and team-mates Nathanael Berthon and René Rast finished third in class, while in the ELMS former F1 driver Giedo van der Garde, 2014 Le Mans LMP2 winner and ex-Nissan LMP1 racer Harry Tincknell, and Jota partner and Tincknell’s fellow Le Mans winner Simon Dolan took the outright victory.

## LOOKING TO THE FUTURE

While the season kicks into gear with the ELMS team heading to Imola and the WEC programme visiting the legendary Spa-Francorchamps before they are reunited at Le Mans in mid-June, Hignett is already looking ahead towards further expansion.

“As a business, our goal is to be the first phone call when an automotive manufacturer decides they want to go LMP1 racing,” he says. “For that you need to be successful – and we’ve had a fantastic couple of years at Le Mans with a first and a second – but you also need to be on a world stage, hence the WEC. You also need to be running two cars.

“This programme enables us to tick more boxes for what we perceive a manufacturer would look at,” he says. “If we can come



Sam Hignett has overseen a rapid expansion at Jota Sport for 2016.





out of this year with a good result in the WEC and at Le Mans, and we've proved we can house a big commercial entity in G-Drive, then if a manufacturer decides they want to go LMP1 or GTE racing, we'll be well positioned to get that call.

"Meanwhile, we'll continue in LMP2. It's a fantastic category," he adds. "The FIA and ACO have got it absolutely spot on. It is expensive, but there are plenty of us doing it, so we are finding the money. We all moan and whinge, as every race team does, but when push comes to shove we're all there."

And ultimately the reason for being there is simple, according to Gary Holland.

"There are a number of events that everybody who's ever worked in motor sport wants to win – the Monaco Grand Prix in Formula One, the Bathurst 1000, Pikes Peak, Paris-Dakar, the Monte Carlo Rally, the Indianapolis 500, Daytona, Sebring... But I believe Le Mans is right near the top of that list. Maybe it's because I'm so immersed in it, but I think it's one of the greatest achievements anyone could aspire to in motor sport. It's just a legend."

And it is a legend that spreads infinitely wider than the hothouse racing of the star-studded manufacturer prototypes. It's alive and thriving in quiet corners of England and France, the United States and Russia, where small groups of men and woman pursue an often lonely dream. Lonely, but just as big and just as important. ■



Oliver Turvey's career was rejuvenated in sportscars prior to a return to single-seaters.

## STEERING DRIVERS TOWARDS A LONG RUN

*There should be more synergy between sportscars and single-seater series, says Jota Sport chief Sam Hignett, to give young drivers a career in racing*

In addition to its partnership with G-Drive in the World Endurance Championship, Jota Sport has linked up with British single-seater team Arden International to provide more opportunities for drivers who wish to transfer between sportscar and open-wheel motor racing.

Jota boss Sam Hignett believes the partnership is important in terms of keeping both single-seater series and endurance racing healthy.

"Because I knew the WEC partnership with G-Drive was coming up I went to two grands prix in Europe last year to bring drivers across from GP2 or GP3 to the WEC," he says. "The sort of budget they need in GP2 and GP3 are what a team in WEC needs. Those 40 drivers were my market place. But I got nowhere."

The result was a call to an old friend – Julian Rouse, general manager at Arden.

"I said 'here's my problem. I don't want to steal your drivers, but I want an 'in' into your world'. His answer was, 'that's funny, we've got a different problem, because very few of our guys get to Formula One any more'," Hignett explains.

"So you have these big

spenders in GP2 and GP3 who disappear and then they have to find more and bring them through," he adds. "If those series could push some drivers our way it's more than just financially sustainable for everyone, there's also the satisfaction of seeing drivers progress. It gives the single-seater teams a progression they can sell to young drivers – the possibility of a factory drive in sportscars."

Hignett believes the route is not just one way, with drivers flowing out of single-seaters to endurance racing but also gaining a chance to re-establish careers that may have stalled (see *Paths to Glory*, p44).

"We'd love to do the transition both ways and one example is Oliver Turvey," he says. "When we took him he'd run out of Racing Steps Foundation assistance but within a few years had built a relationship with McLaren. He got a Porsche test and the Honda GT drive and now he's gone full circle back to Formula E. Hand on heart, and I'm sure Oliver would say the same, if he hadn't got his name in lights in sportscar racing he wouldn't have got to Formula E. So it is funnelling back that way too."



## THE BLUE OVAL IS BACK

*Fifty years after it made Le Mans history, Ford is returning to the great race - and to the World Endurance Championship - to reignite a rivalry that defined the golden age of sportscar racing*

The FIA World Endurance Championship's LMP2 category isn't the only class offering a contest replete with top-line marques fielding beautiful weaponry in a knife-edge battle for supremacy.

This year Ford has launched a two-pronged attack on sportscar racing's biggest competitions, charging Chip Ganassi Racing with running two new GT cars in the WEC and two in the Stateside IMSA WeatherTech SportsCar Championship.

The 'Blue Oval's' decision to compete in both series renews one of motor sport's great rivalries, an epic contest borne out of spurned advances, spite and revenge.

In 1963 after nine months of intense negotiation Henry Ford II was on the verge of an historic \$10 million agreement to buy Ferrari, a deal that had gone far enough for *Time* magazine to report that "the two companies have already started design work on a new, prestigious Ferrari-Ford".

The deal never happened. Lacking reassurance that he would remain in control of Ferrari's motor sport operation, Enzo Ferrari balked. The Americans had come dressed for success but were ditched at the altar.

Ford was furious and upon returning to Detroit 'Hank the Deuce' instructed his company's performance division to build a machine that would destroy Ferrari in the arena it had made its own - sportscar racing.

The command was easy to issue but difficult to deliver. Since 1960 Ferrari had dominated at Le Mans, winning for three years in succession. Ford had little experience in sportscars.

The company turned to Roy Lunn, who after working for Aston Martin and Jowett in the UK had overseen development of a mid-engined concept car for Ford, branded the Mustang I. The expertise he brought to the project put Lunn front and centre in Ford's plans.

Lunn returned to England where Ford partnered with Lola, constructor of an advanced mid-engined racer, the Mk6. Two



Ford reigned supreme with the GT40 at Le Mans '66 to exact revenge on Ferrari.

Mk6 chassis were acquired and with former Aston Martin team member John Wyer on board and Bruce McLaren hired to test the car, the team set up shop in Ford's new Advanced Vehicles HQ in Slough.

After the first chassis was finished, the GT/101 (the '40' was a nickname inspired by the car's height) was exhibited in New York in April 1964, where Ford boss Lee Iacocca told the press that "in going into GT racing, we feel we are accepting the toughest challenge presently available to the minds and talents of motor car builders."

He wasn't wrong. Early races with the GT40 were troubled. At its first event, May 1964's Nürburgring 1000kms, it retired with suspension failure. Three weeks later at Le Mans high-speed stability issues hampered progress and all three entries retired. Another outing, at Reims, followed along with more DNFs. Ferrari, meanwhile, won at Daytona, Sebring and Le Mans.

At the end of 1964, Ford brought in US racing legend Carroll Shelby to take over construction of the GT40s.

At Daytona in '65, the MkII GT40 scored its first win, with Ken Miles and Lloyd Ruby driving. A podium at Sebring followed, but the rest of the year was a disaster, including at Le Mans where all five GT40s retired. Ferrari again rubbed salt in the wound by recording a sixth straight La Sarthe win.

Ford's revenge, though, was getting closer. The 1966 season began with an emphatic 1-2-3 finish at Daytona and then 13 Fords ran at Sebring, where Miles and Ruby were victorious.

By Le Mans, the GT40 was on a roll. The two works Ferrari P3s crashed, while the final North American Racing Team P3 was forced out with overheating problems. When Chris Amon and Bruce McLaren led three GT40s across the line, Ford's revenge was complete.

The GT40 went on to dominate at Le Mans through the remainder of the 1960s. Dan Gurney and AJ Foyt won the following year with a MkIV iteration of the car, Pedro Rodríguez and Lucien Bianchi (uncle of late F1 driver Jules) won with a Mk1 in 1968, while its place in history was sealed by Jacky Ickx and Jackie Oliver in '69. Its dominance ended in 1970 with the arrival of the Porsche 917.

This year, Ford has renewed its rivalry with Ferrari in the WEC GTE class. With 2013-14 winner AF Corse seeking to restore Ferrari to glory after losing out to Porsche's Manthey squad last year, and with Aston Martin fielding a strong challenge, Ford's work is cut out but early results are promising, following a second place finish at the 6 Hours of Spa in May.



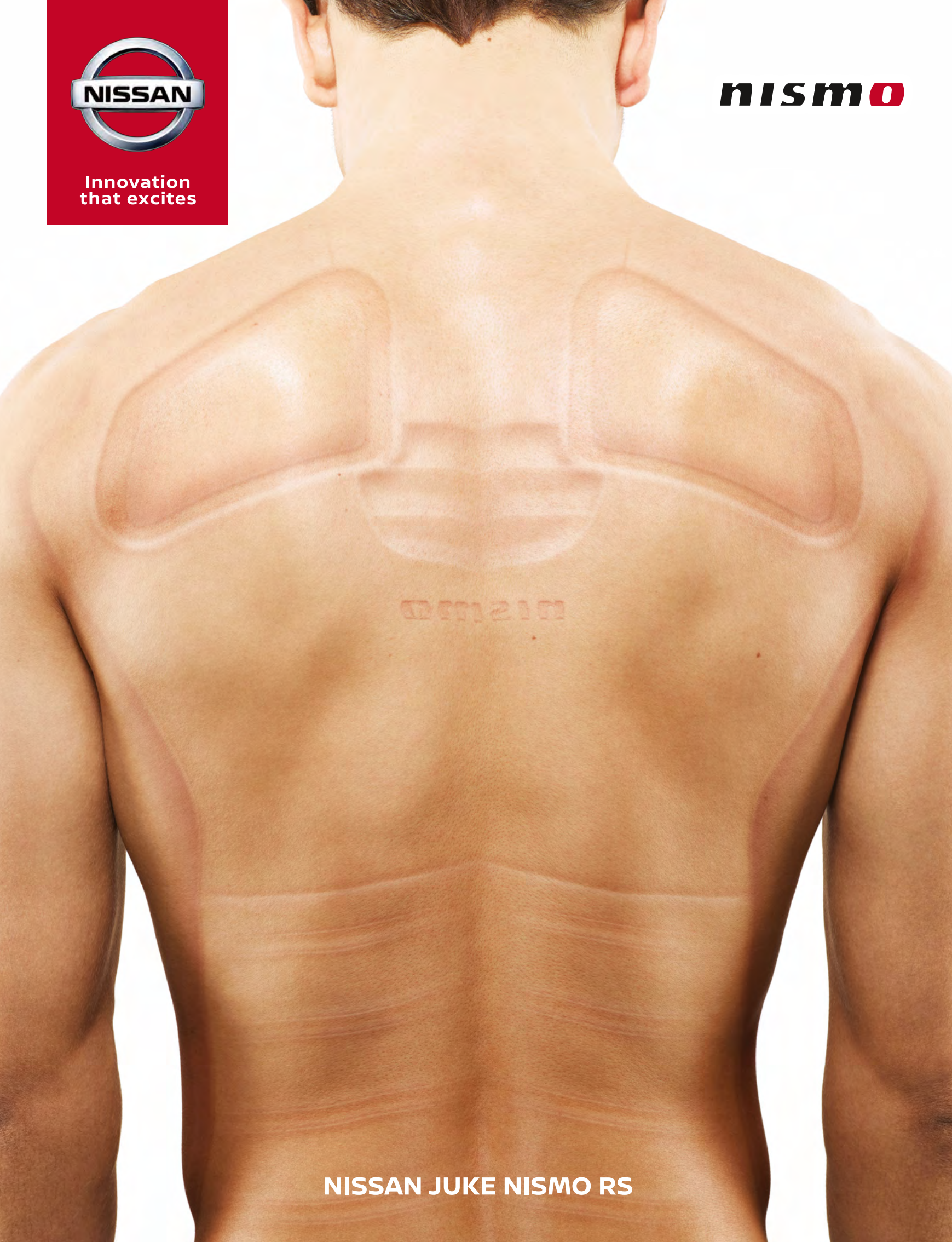
Ford earned its first podium place in WEC after finishing second at the 6 Hours of Spa





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FIA Grant Programmes

# HELP IS AT HAND

*From the crowded streets of Tanzania and Nepal to the race circuits of the Bahamas and the Philippines, the FIA Grant Programmes are dedicated to taking action to save lives on the road and to develop motor sport at grassroots level*

TEXT: LUCA COLAJANNI

The FIA has two pillars – Mobility and Sport – charged with the development of safe, clean and fair motoring and motor sport around the world. To support the goals of each pillar, the Federation has initiated dedicated grant programmes designed to bring about change.

On the world's roads the battle to improve safety is one conducted on many fronts. At its most elevated it involves building the political will to drive through change at governmental level. However, beyond the rarefied confines of parliamentary chambers the impact is most acutely felt at grassroots level, in campaigning to change hearts and minds on the roads where some 1.3 million people are killed each year.

In 2013, for example, in conjunction with the World Health Organisation, action took place in a host of locations deemed to be among the most dangerous for pedestrians. From Rome to Santiago, from Minsk to Brussels and through campaigns in countries such as India, Israel, Moldavia and Nigeria, road safety initiatives staged as part of the United Nations Global Road Safety Week targeted those who tackle roads on foot.

The programmes are as diverse as the issues that demand action. In Bogota, FIA member club the Automobile Club de Colombia constructed a 'Pedagogic City Traffic Park' to raise awareness among schoolchildren about safety for all road users. The 'park' was visited by over 100 schools for a day of road education and the activity contributed to a 71 per cent drop in road accidents among under 17s, according to estimates from the Bogota Mobility Department. ▶

PHOTOGRAPHY: ISTOCK





In Germany, one of the world's largest motoring organisations, the Allgemeiner Deutscher Automobile-Club (ADAC), established a training programme and an action plan for fire service and ambulance crews who respond to road traffic accidents. The programme was then also implemented by fellow FIA member clubs in Austria, France, Switzerland, Spain and Romania. Meanwhile, in Nepal, a road safety awareness campaign aimed at children, set up by the Nepalese Automobile Sports Association, reached more than 150,000 youngsters.

Twenty more programmes are being created in 2016 to provide a practical follow-up to the UN's #SaveKidsLives campaign, co-ordinated by the United Nations Road Safety Collaboration, aimed at reaching a target of a million signatures in support of the Child Declaration for Road Safety.

These are just a few examples of projects set up in the past or in the current year thanks to the FIA Road Safety Grant Programme, established in 2012 and still operational today.

The programme was established to support the 2011-2020 Decade of Action for Road Safety, created by the United Nations General Assembly in a resolution voted through by over 100 countries on 11th May 2011, and thanks to funding from the FIA Foundation, more than 200 projects have been created in over 70 countries, with a total budget in excess of €4 million.

"By offering the opportunity to apply for the Road Safety Grant Programme, the FIA supports its members in their various efforts to improve road safety measures around the world. From Peru to Poland, from Tanzania to India, the FIA Road Safety Grant Programme calls for a collective approach among FIA clubs to solve existing road safety issues," explains Andrew McKellar, FIA Secretary General Automobile Mobility and Tourism.

"The programme not only connects creative initiatives to financial resources, but it also ensures that every safety outcome is

## "THE GRANT PROGRAMME ENABLES ASNs TO DEVELOP MOTOR SPORT IN THEIR COUNTRY"

JEAN-LOUIS VALENTIN



The Bahamas' first female kart licence holder, Mya Curry, receives her licence from EduKarting's David McLaughlin (left) and instructor Craig Camilleri.





Boda-boda drivers in Tanzania have received practical and theoretical training (left) to make them safer on the road.

measured through specific safety targets,” he adds. “Most importantly, results and lessons learned are shared across the entire FIA network to further mobilise actions for road safety. The Road Safety Grant Programme is a way to unite mobility stakeholders and make progressive steps towards a future where every journey is a safe one.”

The UN Decade of Action’s structure of tackling improvement across five pillars – capacity building, safe vehicles, safe infrastructure, safe road users, and post-crash intervention – is mirrored by the activities of the FIA Grant Mobility Programme, with the aim of not only supplying clubs with financial assistance but also the necessary know-how to implement activities that not only heighten public awareness of road safety, but which also deliver tangible results.

### CATERING FOR ALL NEEDS

There are three categories for these projects, divided into Small, Medium and Large. The S-Projects are chiefly concerned with initiatives that support the FIA Action for Road Safety Campaign and the related FIA Golden Rules for Safer Motoring projects, such as media events and promotional campaigns: each project receives up to a maximum of €5000 with an annual budget of €100,000 available.

M-Projects can benefit from up to €30,000, to a maximum value of 60 per cent of the cost of each project, with an overall annual budget of €500,000.

As for the L-Projects, they are more wide ranging and long-term, promoted by the FIA Programmes Committee and aimed specifically at innovative initiatives in one of the five areas specified by the UN Decade of Actions as requiring collaboration from the clubs.

Currently there are two strands being worked on: ‘Child Safety in Cars’, with the development of a device aimed at improving safety

for small children in cars, and ‘Road Safety Indicators’, a programme devised in collaboration with the ITF (International Transport Federation) looking at the development of universal indicators for road safety, in order to deliver a better understanding of the problems linked to that and a comparison of the different policies employed in different countries.

The associations involved have a dedicated website available (<http://www.roadsafety.fia-grants.com>) where they can find all the necessary information relating to budgets. It’s also a window for constant dialogue between the Federation and its members around the world.

To understand what these projects are really about and what can be achieved, it’s worth looking at one in greater detail.

One of the most successful was one promoted by the AAT (Automobile Association of Tanzania) to establish and implement a road education programme for drivers of the boda-boda, the two- or three-wheeled motorcycle taxis that scurry around the streets of Dar Es Salaam and other major cities of central west Africa, as well as in the countryside in Tanzania, Uganda, Ruanda and Kenya, where they are very often the only form of transport for the overwhelming majority of the population.

The number of accidents involving these vehicles is always high, but there was a significant reduction in the figures in the coastal region of Kibaha, where in 2012 the AAT persuaded over 1000 drivers to attend an educational course relating to road safety.

Furthermore, the programme included the distribution of 20,000 fluorescent stickers, which helped improve the visibility of the boda-boda in the hours of darkness.

The success of the programme attracted the attention of the authorities in Dar Es Salaam where there are over 20,000 taxis, so that the AAT continued to work on this front, with over 4000 drivers taking part in the course in the city, the biggest in Tanzania.

“The response from the drivers was amazing,” confirmed Yusuf Ghor, the AAT CEO. “And this was also thanks to the support of all the authorities involved in the project, starting with the traffic police.”

This programme, linked to other similar initiatives, led to a 36 per cent reduction in road accidents in the Dar Es Salaam region in 2015. The Tanzanian government, Tanzania’s National Road Safety Council and various organisations representing the boda-boda drivers asked the AAT not to stop the programme. In its third phase, more than 1000 people were able to tackle a 15-day course, made up of a mix of theory and practical lessons.

Just as the FIA rests on two pillars, mobility and sport, so too the Grant Programme is split into two sections.

Alongside initiatives linked to safety campaigns and road education, there exists a parallel FIA Sport Grant Programme, created in 2015. This programme distributes financial support to projects presented by the National Motor Sport Authorities covering four areas of activity: improving safety at motor sport events, supporting the management of governance and structure within the ASN, organisation of grassroots motor sports and action relating to social responsibility. To date, 109 projects have been financed (49 in 2015, 60 so far this year) at a cost of around €4.8 million.

“The FIA Sport Grant Programme enables a large number of ASNs to develop motor sport in their countries,” says Jean-Louis Valentin, FIA Secretary General for Sport. “Whether to improve safety, train officials or to structure the administration, this programme provides new opportunities for motor sport and is proving extremely successful. Managed by a specialised Funding Review Commission (FRC) under the chairmanship of the FIA Deputy President for Sport, Graham Stoker, this programme is dedicated to ensuring longevity and strengthening access to motor sport worldwide.” ►





The Bahamas' EduKarting initiative, which had 100 participants in 2015, has had its grant funding renewed for this year.

## FUELLING MOTOR SPORT

It's another case where a practical example shows what can be achieved. In the Philippines, there is great enthusiasm among youngsters for motor sport, but there is no corresponding clearly defined path, or accessible structure for the sport. Therefore, the number of people who give up, either through a lack of preparation or because of ever-growing costs - usually down to all sorts of organisational difficulties - is constantly growing.

The AAP (Automobile Association Philippines) therefore decided to institute a proper training course for youngsters. The programme has seen no fewer than 115 participants tackling a theory and practical course, split into 10 modules. The winner will compete this season in a series of events at regional and national level, including slalom tests, time attack, endurance and one round of the national Touring Car championship. "It's only thanks to the grant that we have been able to create something that's never been done before in our country," says Mark Desales, AAP Motor Sport Department Operations Manager. The project's request for renewed finance for 2016 has been accepted.

The development by the clubs of basic initiatives is of fundamental importance, especially in countries which do not have a great motor sport tradition. In these instances the Grant Programme can provide the necessary spark to get projects underway. One example of this is 'EduKarting', a programme established in 2015 in the Bahamas, thanks to the support of

Mexico's Organización Mexicana De Automovilismo Internacional (OMDAI). The aim is to introduce youngsters from the ages of nine to 17 to motor sport, as well as providing education to ensure they drive responsibly on public roads.

"EduKarting has made a significant contribution to raising awareness of motor sport basics among youngsters in this country," said David McLaughlin, President and CEO of the Bahamas Motor Sport Association (BMA). "In particular, youngsters from the poorest backgrounds have acquired some understanding of how to drive safely on track and on the roads." With 100 participants in the first year, the programme has been deemed so successful that the Grant has been continued for 2016.

The model for the programme, based on combining karting with elements of road safety education, has proved applicable around the world, as can be seen from the fact that this year it's been taken up in Mozambique, with the Karting Academy. In this case, not only have 60 children been enrolled, but also a number of parents are taking part.

The FIA Grant Programme is a very flexible tool and a new round of applications for 2017 is about to begin, while the FIA and the clubs are evaluating how to work together on even more significant and effective projects, especially on the safety front. These projects have contributed to the promotion of values that are at the heart of the FIA, reinforcing its roots. And, as all good farmers know, the best harvest comes from good seeds. ■





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FIA Foundation

# TRAFFIC CUES

*Kenya's roads are becoming ever more clogged by older cars creating greater pollution - a problem that the FIA Foundation is striving to solve with the help of the UN and other key partners*

TEXT: SHEILA WATSON AND RICHARD CLARKE PHOTOGRAPHY: GEORGINA GOODWIN







Early morning on the streets of Nairobi, and the traffic is already at a standstill. Kenyan drivers and their passengers are used to spending hours this way. Commuters sit frustrated on crowded buses, pedestrians bustle in and out of the traffic and a brown haze of dust and pollution fills the air.

Africa has some of the fastest growing cities in the world. A huge increase in vehicle numbers, often imported and second-hand, together with poor fuel quality is causing major health and environmental challenges. The FIA Foundation, in partnership with the UN Environment Programme and other local experts, is working to address this and bring about a step change in vehicle emissions through the Global Fuel Economy Initiative (GFEI), the Partnership for Clean Fuels and Vehicles (PCFV) and the Share the Road Initiative (StR).

These are global issues. The number of vehicles worldwide is expected to triple by 2050, with as many cars in China alone as there are currently on the whole planet. The implications of this are unsustainable environmentally, but also in terms of fuel and energy use, congestion, pollution and safety. The GFEI is working hard to address one element of this through improving the fuel economy of the fleet. It does this by raising awareness of the issues, in-depth analysis and expert support to countries wanting to implement fuel economy policies. The PCFV is working to clean up fuels, with a particular focus on eliminating lead from petrol and reducing sulphur levels to help lower particulate emissions. StR is seeking to improve safe and continuous routes for non-motorised users – all part of a programme of the FIA Foundation's work to promote safe, green, clean and fair mobility globally.

#### **MORE CARS, MORE CONGESTION**

In Kenya, the vehicle population is set to double every five to six years. The resultant traffic congestion is estimated to cost the country close to USD 900 million per year. In addition, the air quality in most urban centres is deteriorating, especially in Nairobi where traffic emissions are responsible for about 40 per cent of small particulates. Joseph Nganga, Director General of the Energy Regulatory Commission (ERC), puts the cost of this at Kshs 115 billion (USD 1.12bn). He says: "Improved fuel economy is essential if we are to address the negative implications of the growth in motor vehicles such as pollution, congestion, energy and resource depletion, and environmental damage."

An important place to start is in tackling the quantity and quality of vehicles imported onto the African continent. A GFEI study in Kenya showed that 99 per cent of cars imported in 2010-12 were used vehicles. In Uganda, another study found that the average imported used car was over 16 years old. With the average age of the vehicle fleets in the region of well over 10 years old – and many therefore pre-dating some key standards in the markets of origin, even before the deterioration which comes with age – this is a major policy challenge. ►

“THE ROADS AROUND  
NAIROBI ARE VERY  
CONGESTED,  
ESPECIALLY IN  
THE MORNINGS”

DR LUCY MUHIA







## DRIVER'S VIEW

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James Kamau, 34, has seven years' experience on the streets of Nairobi as a minibus driver. "Traffic jams are the biggest problem for us working in Matatu," explains Kamau. "Traffic on Ngong Road is the worst because it can take as long as two hours to get into the city."









It is perhaps not surprising therefore that the country’s average fuel economy for passenger vehicles barely improved between 2010-12 (an average of 7.4 l/100km in 2010 to 7.7 l/100km in 2012). This imposes real costs on the country by requiring more oil imports and money spent on fuel.

**QUEST FOR CHANGE**

PCFV has been working with Kenyan officials to adopt cleaner fuels that can support less polluting, more efficient vehicle technologies. In 2005, Kenya eliminated leaded petrol and 10 years later introduced lower sulphur fuels.

In 2012, the GFEI partners entered into an agreement with the Energy Regulatory Commission (ERC) to promote fuel-efficient vehicle policies. A baseline study was undertaken involving government agencies, civil society and the private sector represented by General Motors.

The GFEI study findings were released in April 2015 by Joseph Njoroge, Principal Secretary of the Ministry of Energy and Petroleum, and Joseph Nganga, Director General of the Energy Regulatory Commission.

As a result of this work Kenya has committed to supporting the importation of more fuel economy vehicles through changes to vehicle import taxation. Further work is now underway with GFEI to consider a feebate and vehicle labelling system, which would complement the taxation by further promoting the importation of fuel-efficient vehicles.

**A GLOBAL EFFORT**

The GFEI also provides a global platform where countries can learn from each other’s successes. The feebate scheme proposal in Kenya is based on the experience of a successful scheme in Mauritius, with those involved assisting the Kenyans in developing it.

The work of the GFEI, PCFV and StR is growing in significance globally. GFEI was showcased as a model initiative of real action and impact at the recent global climate talks in Paris (COP21), where it was described by Achim Steiner, head of the United Nations Environment Programme, as “a model alliance that should inspire other sectors”. From an initial four pilot countries GFEI is now providing support to 65 nations to help them move towards a cleaner, more fuel-efficient vehicle fleet, and to make the savings in resources, fuel imports, CO<sub>2</sub> and air quality which that can generate. ■

**HEALTH EXPERT’S VIEW**

Dr Lucy Muhia is a public health specialist with more than 20 years’ experience in clinical services, research and management. She is currently Deputy Chief Medical Officer at the University of Nairobi health services. She has lived in Nairobi for 30 years and has four children.

“The roads around Nairobi are very congested – especially in the mornings from 6am. A distance that can be covered in 20 minutes may take two to three hours when the traffic is heavy. To avoid the jams I wake up at 4-5am.

“In heavy traffic, there are more emissions from vehicle fumes and more health effects on those people held up in it due to prolonged exposure. My research for the GFEI showed that over 90 per cent of respiratory diseases in Nairobi are likely to be due to air pollutants.

“There is an urgent need to develop policies and plans that enforce laws and regulations to protect health and ensure the safety of vulnerable groups, mitigating the adverse effects of vehicle emissions.”

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Women in Motorsport

# SHIFTING SANDS

*A prize drive awaited three female crews on Qatar's Sealine Cross Country Rally as part of an on-going FIA-backed programme designed to encourage more women into motor sport*

TEXT: ANTHONY PEACOCK









Qatar presents a series of contrasts that take first-time visitors some time to get their heads round. From the sumptuous glass and chrome of Hamad International Airport, the glamorous Corniche coast road inhabited by beautiful people leads to downtown Doha, characterised by its vibrant *souk* – still the focal point of the city and seemingly unchanged for hundreds of years – which surreally sits next to ultra-modern hotels and office buildings.

Keep going through the cosmopolitan city centre, down the ample highways, and you'll eventually get to the Losail circuit just outside the Qatari capital: already used for MotoGP, the World Touring Car Championship and maybe one day – if the dreams of many Qataris come true – even for Formula One, on a street circuit nearby. But that's firmly for the future.

For now, the track is also used as the starting point for the Sealine Cross Country Rally, round three of the FIA World Cup for Cross Country Rallies. The event is named after its title sponsor, with the Sealine Beach Resort on the south-east coast well known as a place where Qataris go to escape from it all.

Because beyond Losail there's very little out there, apart from miles and miles of untrammelled sand dunes and desert, occasionally bisected by the odd oil refinery, and arrow-straight roads that stretch out towards the expansive horizon.

Perfect territory, in other words, for Cross Country rallying, a form of the sport that for all but one month of every year (January, thanks to the Dakar) takes a back seat to the World Rally Championship. Yet the adventure in many ways is even greater.

### GOLDEN OPPORTUNITY

Based on endurance and stamina, this is a discipline that has been previously dominated by men, with one notable exception: 2001, when Germany's Jutta Kleinschmidt became the only woman ever to win the Dakar.

In future though, there may be a few more. Kleinschmidt was one of the key instructors, along with Italian navigator Fabrizia Pons, for a unique initiative from the QMMF (Qatar's motor sport federation) and the FIA Women in Motorsport Commission, led by Michèle Mouton, who was co-driven by Pons in her WRC heyday.

The idea was to hold a training camp in Qatar last November at the Sealine resort for 18 female drivers and co-drivers from all over the world who were new to Cross Country rallying, invited following a rigorous selection process. Out of these, the best driver and co-driver would be paired for an all-expenses paid drive in the Qatar International Rally in April, courtesy of the QMMF. In the end, budget actually became available for three driver and co-driver crews to take the start, piloting identical race-prepared Nissan Patrols in the T2 production-based class.

The crews selected were: Emma Gilmour from New Zealand, paired with Lisette Bakker from the Netherlands; Spaniard Cristina Gutiérrez together with South Africa's Sandra Labuschagne; and Frenchwoman Charlotte Berthon, who was matched with Jordanian co-driver Yasmeen Elmajed. Unfortunately, Elmajed was unable to take the start for personal reasons, so she was replaced at the last minute by the experienced Antonia de Roissard from France. Also originally selected were Australia's Molly Taylor and Belgian co-driver Lara Vanneste, but they were unable to take up the prize drive because they secured factory deals elsewhere, reinforcing the QMMF's philosophy of handing the opportunity only to female drivers and co-drivers who would not otherwise have had it.

And they all capitalised fully upon the chance, benefitting not only from the incomparable experience of doing the rally itself, but also from comprehensive training designed to give them a head start in an admittedly complex form of motor sport. The co-driver's display alone, for example, would not look out of place at NASA Mission Control in Houston. ▶

Despite getting stuck in the sand, French crew Charlotte Berthon and Antonia de Roissard completed most of the rally route.



Emma Gilmour and Lisette Bakker prepare their Nissan for the rally start.



QMMF General Secretary Majid Al Naimi with Labuschagne.





AUTO FOCUS

“CLEARLY THESE SIX WOMEN HAVE REALLY ENJOYED THE CROSS COUNTRY EXPERIENCE AND HAD FUN”

MICHÈLE MOUTON

Cristina Gutiérrez and Sandra Labuschagne en route to success. Above: New Zealander Gilmour. Left: signing in and pre-rally briefing.







Gutiérrez and Labuschagne, also pictured right, were the Sealine Rally's top female crew.



As Mouton said afterwards: "I cannot thank [former QMMF President] Nasser Al-Attiyah enough for his vision and enthusiasm for this project, and also the new president of QMMF, Mr Abdul Rahman bin Abdul Latif Al Mannai, for his on-going support. We are absolutely delighted to have realised this dream for six young women and clearly they have really enjoyed the Cross Country experience and had fun. Now we have to consider how we can continue to support these types of activities and give more women a chance to compete in motor sport."

### THE ADVENTURE BEGINS

The first stage was the selection process, which took place in Qatar last November. Drivers and co-drivers were generally split into two groups led by Kleinschmidt and Pons respectively, although there were a number of activities that took place jointly, such as physical training sessions and the inevitable lessons that concentrated on how to dig a car most effectively out of a sand dune...

As Lisette Bakker (co-driver to Emma Gilmour) put it: "During the selection week, Fabrizia taught the co-drivers how to use the GPS system and how to use the information given in the roadbook: for example, the heading mentioned in each drawing is the exit heading, not the entry. Jutta gave us important information on surviving in the desert and warned us about dehydration. In theory, all the lessons seemed clear and I was looking forward to get in the car and giving it a try. But in the car, the real lessons started."

All three crews came home with adventures they will remember for life from the five-day, 1,633-kilometre event. Just before the start of the rally, the final nine selected benefitted from a second training course, which concentrated on the specifics of the Sealine Rally and also mechanical training on the Nissan Patrol, to put the crews in a position to fix minor problems as they occurred on the stage. These were to prove among the most valuable lessons of all. There was an extra bonus, when the eventual rally winner Nasser Al-Attiyah (no relation to the former QMMF President) gave practical tuition by taking the finalists out in his Toyota Hilux before the start.

Cristina Gutiérrez commented: "My biggest adventure was probably when Nasser placed me in the co-driver's seat of his Toyota and taught me many things, because it's so different driving the top cars compared to the others."

In fact, 24-year-old Gutiérrez emerged as the top female finisher on the rally, also placing 24th overall despite getting stuck in the sand on day one, having an engine problem that ruled her out of most of day two and finally breaking a front differential.

Co-driver Sandra Labuschagne recalled the value of their preparation: "My training assisted me during the rally to overcome many challenges: we got stuck in sand, changed flat tyres, we were faced with the extreme heat and had to stay focused for hours. Cristina is a young lady with an enormous amount of talent and I think she will achieve a lot of success in Cross Country racing in the future. We really hit it off from the start in the car and had fun no matter how difficult things got, staying motivated. We kept our heads, especially in the dunes when navigation and driver skills were tested to the maximum."

### AN INVALUABLE EXPERIENCE

Emma Gilmour and Lisette Bakker so nearly joined them at the rally finish but retired on the final day after a wheel fell off, quite literally stopping them in their tracks. Previously they'd had to deal with a total GPS unit failure - every Cross Country co-driver's worst nightmare.

"Not finishing was disappointing but it was still an amazing opportunity, especially for our first time out," said Gilmour, who like all the other candidates was having her very first experience of Cross Country rallying. "To get to where we did from more than 80 initial applications, to come to the first training camp in November and then the start of the rally is fantastic, and I'm just so grateful for this wonderful chance. There's no way I would have got to experience this otherwise."

Charlotte Berthon also got to within 40 kilometres of the end, having suffered brake problems that ultimately led to her missing out on the finish ramp, despite a heroic effort to get there.

"That doesn't matter though: the main thing is that I did all the stages, leaving aside the last 40 kilometres - that's really nothing in Cross Country terms!" said Berthon. "I started rallying in France through the Rallye Jeunes scheme - which also launched the careers of Sébastien Loeb and Sébastien Ogier - and then I was an Opel factory driver for two years but recently the opportunities have dried up. As a girl, it maybe starts off as an advantage as you get yourself noticed, but then it can be really difficult. So it's fantastic to see a scheme like this supporting us."

"I would like to think that it could help open up a new chapter of my motor sport career," added Berthon. "It wasn't only the driving that was valuable, but I also made a lot of useful contacts in Qatar that hopefully might help me to progress in Cross Country rallying in the future. I have a real taste for it now and definitely want to do more!"

Mission accomplished, which quite rightly has given Qatar's famously proactive motor sport federation a lot to be proud of. As a force in Cross Country rallying, one of the smallest states in the Middle East in terms of population has just got a lot bigger. ■





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REAR  
VIEW

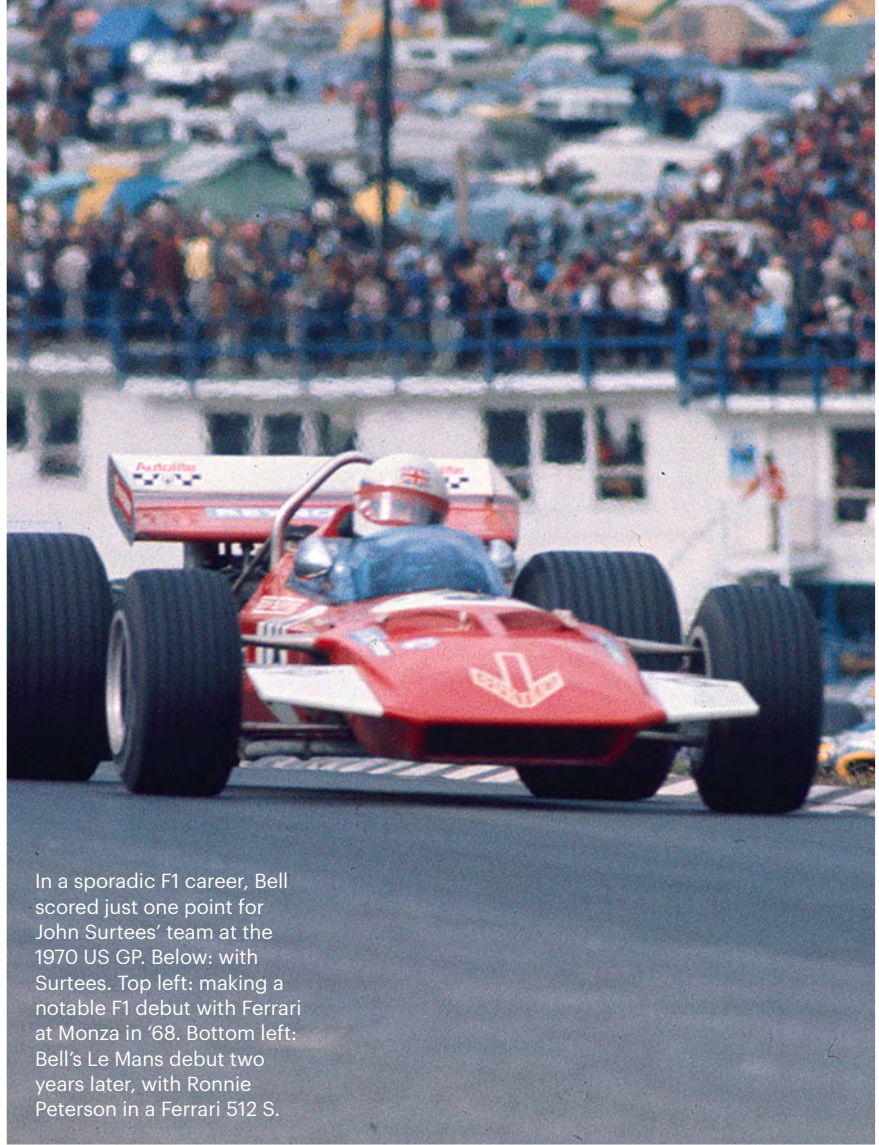
Legend

**“I would never have dreamed that I’d have the dedication to carry on for so long. But in the end, yes, I just love driving bloody racing cars”**

*He’s famed for his success in sportscars, particularly at Le Mans, but with the right opportunity Derek Bell could just have easily been an F1 World Champion*

TEXT: TONY THOMAS





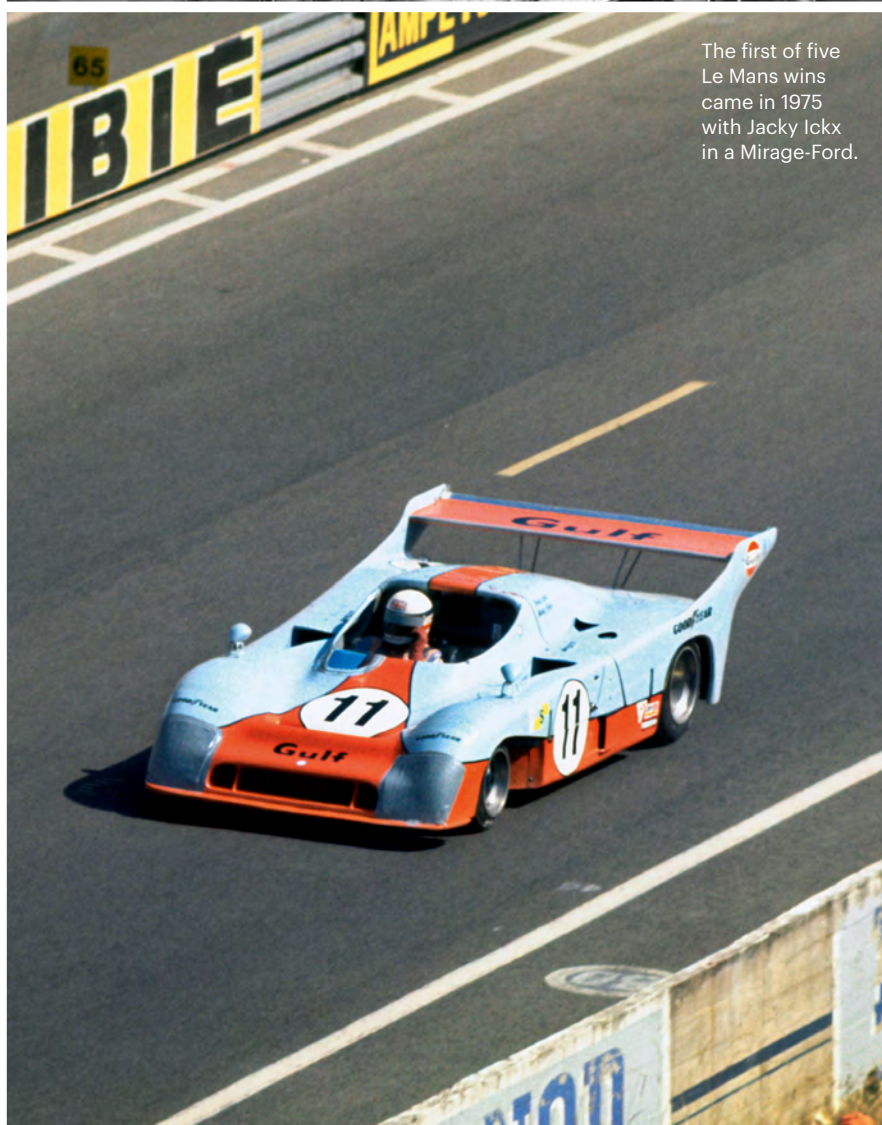
In a sporadic F1 career, Bell scored just one point for John Surtees' team at the 1970 US GP. Below: with Surtees. Top left: making a notable F1 debut with Ferrari at Monza in '68. Bottom left: Bell's Le Mans debut two years later, with Ronnie Peterson in a Ferrari 512 S.







With Gulf Porsche team boss John Wyer in 1971. Above: Le Mans win number two with Ickx in '81, this time for Porsche.



The first of five Le Mans wins came in 1975 with Jacky Ickx in a Mirage-Ford.

# D

erek Bell is complaining of understeer – the racing driver’s eternal lament. “The 917 I drove at the Goodwood Members’ Meeting this year... It was like a bloody speedboat going down the straight. Porsche go to all that trouble of rebuilding it and then it’s not set up properly. The bloody thing was pushing like hell when I was pressing on.”

Seventy-four and still hard on it. It’s somehow life-affirming that racing drivers, like dogs, never really slow down; their legs just don’t spin quite so fast as the years advance.

That essential competitive zeal is what carried Bell through an active racing career that lasted more than four decades, despite its not starting especially early; he was 23 when he stepped from the dusty perches of the farm machinery he’d been driving to earn a living, into the cockpit of something a little more racy: a Lotus 7.

And it’s what carried him to five Le Mans wins, three Daytona 24-Hour victories and two World Sportscar titles. It’s also what keeps him coming back to events like the Goodwood Members’ Meeting, among others, just to keep his eye in and – no shame here – for the love of racing. “I would never have dreamed when I started out that I’d have the dedication to carry on for so long,” he says. “But in the end, yes, I just love driving bloody racing cars.”

He’s driven a fair few over the years.

Leaf through the Bell back catalogue – let’s peek at 1970, by which time he’d broken into Formula One and was emerging as top-line talent – and you’ll find a calendar crammed with race weekends. Not in the way that a current F1 driver’s calendar is packed, mind you – with 21 different flavours of essentially the same ice-cream. No, Bell’s schedule was a veritable motor sport smorgasbord: Le Mans with Ferrari; F1 with Team Surtees; placing second in the European F2 championship against other junior hot-shots such as Clay Regazzoni, Emerson Fittipaldi, Ronnie Peterson, François Cevert, Carlos Reutemann, Vittorio Brambilla and Jean-Pierre Jabouille (all future grand prix winners); three rounds of the Tasman series and one UK F5000 outing.

That’s probably enough ‘racing car love’ for any single season, although as Bell is quick to note: “We were all doing it. There were so many of us doing these ‘international racing programmes’. It was like freelance motor racing – we were all tarts! We would just drive where we could.”

There was no plan, no thought given to a long-term career or anything so modish as progress up a structured racing ladder.

“I didn’t have a manager or anyone to guide me. I didn’t have enough money to pay one anyway. I thought I might race for five or 10 years, maximum,” he says. “So we didn’t bother with things like life insurance policies, because we never thought we’d need them. I always thought I would have quit by the time I was 40.” ▶



Quit or... “Well it was a dangerous time, yes. And there were guys getting killed. Sometimes you’d arrive for a race, be shown your car, and it would be: ‘Well, who was driving it last week?’ But somehow you never really thought about that. You know, I’m the kind of guy who gets upset watching some stupid TV show – I’m very emotional – but when it came to racing... When the helmet was on, that side of it never affected me. There was probably just too much else to think about. I’d arrive at a track I’d never seen before, to drive a car I’d never sat in, and I’d be up against someone as good as Jody Scheckter [1979 F1 World Champion]. That was just how it was.”

### A CAREER FILLED WITH PROMISE

Bell’s love of the sport to which he has devoted his adult life is evident in the relish with which he talks about the past – evoking easily, in an instant, a more free-wheeling era when drives and cash came fast and loose, so long as you were quick enough to stay in the game. Drivers bounced off each other like beach pebbles: some would settle in a top drive; some were flung to far away shores; others... washed out to sea.

He recalls his first Formula 2 race in 1968 – that fateful Hockenheim round where Jim Clark was killed on a damp and brooding April Sunday.

“We were staying in the same hotel – me, Jimmy and Graham Hill – and we had breakfast together. We drove to the track together and I remember sitting on the grid with Jim Clark, *my hero*, alongside me, and those huge Hockenheim grandstands full of people. Ten minutes later, Jimmy was dead. I think about that now as a man in my seventies and it brings tears to my eyes.”

This direct exposure to the perils of racing did nothing to diminish Bell’s F2 form. Strong results in his Brabham BT23, entered by his stepfather’s Church Farm Racing team, attracted attention in all the right places – most notably from Maranello. By September Bell was lining up in a third works Ferrari for his F1 debut, at Monza, no less. He turned in a fleet P8 in qualifying, although his race lasted only four laps before retirement from a fuel system failure. It should have been the start of something big, but Bell’s F1 endeavours never bore fruit: just one more race for Ferrari that year, then a handful of drives over the next five seasons, eliciting a single point, for sixth place, with Team Surtees at the 1970 US GP.

Given the weight of subsequent achievement and a junior career filled with such promise, why didn’t it work out?

Bell draws breath before weighing a point he’s been asked to consider maybe a thousand times: “I should have done well in F1,” he says, “and as a driver you do analyse it. I’d been winning in F3 for a couple of years, then it was F2, and Ferrari called after a couple of races, to ask me to drive their car. Cooper were offering F1 at the same time, but I chose F2 with Ferrari and that did lead to my Grand Prix debut. But they also had Jacky Ickx and Chris Amon as their lead drivers, who as well as being top guys were also a couple of years ahead of me. And at that stage it’s like being a year or two behind at school – it makes a big difference.”

The right place, then, but at the wrong time – as Ferrari’s chief engineer Mauro Forghieri had the grace to concede: “I remember him saying to me: ‘It’s such a pity you are joining us now.’”

Bell’s problem, in F1 terms, was that he hadn’t had the opportunity to prove himself, despite that impressive debut speed. “I’m not saying that I would have been world champion,” he reflects, “but I knew I was good enough to compete. Anyway, leaving F1 might well have saved my life.”

### A SPORTSCAR LEGACY

Indeed, for in dodging the bullets of F1’s ‘killer years’, Bell was able to flourish during the burgeoning golden era of sportscar racing.

And while his name was destined to become inextricably linked with Porsche, once again it was Ferrari – then a powerful force in

sportscars – that would provide the launchpad into a parallel universe. A drive in a privately-entered 512 in the 1970 Spa 100okms led to a works drive that year at Le Mans with Ronnie Peterson.

This was serious stuff. Ferrari’s four-car factory entry boasted Jacky Ickx/Peter Schetty; Nino Vaccarella/Ignazio Giunti; Arturo Merzario/Clay Regazzoni and Bell/Peterson. Against them was a works Porsche squad with a similarly handy driver roster – Richard Attwood, Vic Elford and Kurt Ahrens among their number.

It was from here that the Derek Bell sportscar legend began to grow. The first of his five Le Mans wins came in 1975, in a Mirage-Ford shared with Jacky Ickx; two more for this starry pairing, with Porsche, would follow in 1981 and ’82, earning them a reputation as something of a Lennon/McCartney partnership.

Quizzed as to what made them so effective, Bell is unable to pinpoint any specific facets of their driving styles, personalities or method. Indeed, he notes that they are “quite different people”.

“But I always had an incredible respect for Jacky,” says Bell, “and although I’m a couple of years older I felt I was the junior partner. He started before me and had more success early on. He was always the star of the future and I was just the old tigger from Sussex, who managed to stay with him. I was always in his shadow.”

While there’s a degree of self-deprecating banter in Bell’s comments, his regard for Ickx is sincere: “He was The Man as far as I was concerned and it was always obvious that he was a star. He was very, very special, particularly in his amazing ability to get the best out of a car and out of a team.

“He wrote me a letter once,” Bell continues, “hand-written, when we were going for our third Le Mans win in 1982. It said: ‘To win this race we need the best designers, the best engineers, the best preparation – the best of everything.’ It was extraordinary really, but it tells you a lot about him.”

### THE GLORY YEARS

‘The best of everything’ that year included the new Porsche 956, which Bell and Ickx drove to their third and its first Le Mans victory. Its success encouraged Porsche to spin off a customer car business that soon flourished and made it the bedrock of Group C-era sportscar racing. It’s a model Bell believes would add further lustre – and depth – to the present-day World Endurance Championship.

The 956 and its 962 successor were swift, efficient and hugely popular with privateer teams such as Joest, Kremer and Brun, each of whom modified the factory chassis with bodywork and ‘under the hood’ tweaks. More than 90 962s were built, to race in Group C and the US IMSA series. Bell drove one to 21 victories between 1985 and ’87, judging it “...a fabulous car, and considering how thorough Porsche were, really quite easy to drive.”

These were Bell’s glory years, as he won the World Sportscar Championship in 1985-86, Le Mans in ’86-87 and Daytona in ’87. The victories, he reckons, blur into one, but the experience of racing for 24 hours leaves indelible physical and mental impressions: “I never slept at Le Mans. Couldn’t do it – I wish I could have. I’d have showers and massages through the night and by Sunday morning my eyes would want to close, but I still didn’t sleep. Then you start to worry about whether you can put in the same amount of effort. You think you aren’t as sharp, but in fact you are. You get to such a level of concentration that you just carry on through.”

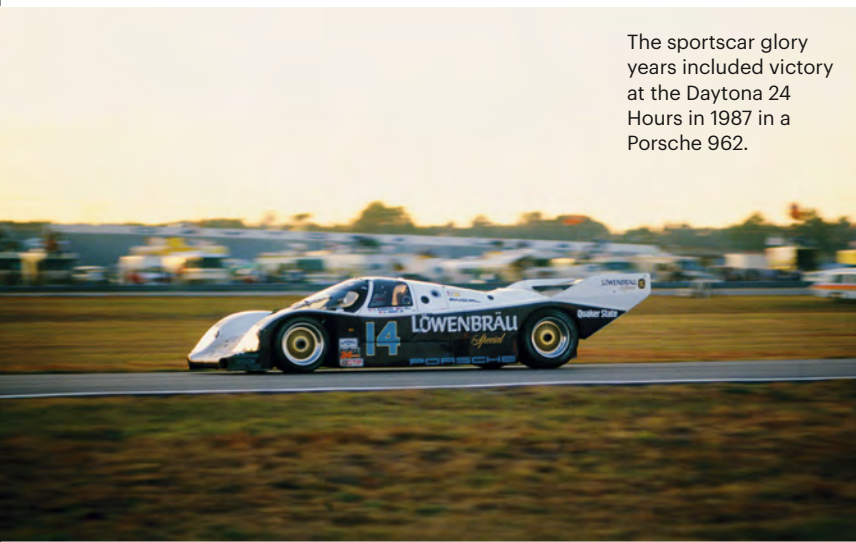
There was one more ‘24’ win to come – Daytona ’89 – plus the satisfaction of sharing a Le Mans podium with his son, Justin, for third in ’95, an experience he says was the equal of any victory.

Bell’s last truly competitive outing was in 2010: a one-off drive at Brands Hatch in the VW Scirocco R-Cup. But you know that somewhere out there, on a dark desert highway near his US home, Derek Bell is still chasing understeer, still nudging 230 down the Mulsanne Straight. Still racing. ■

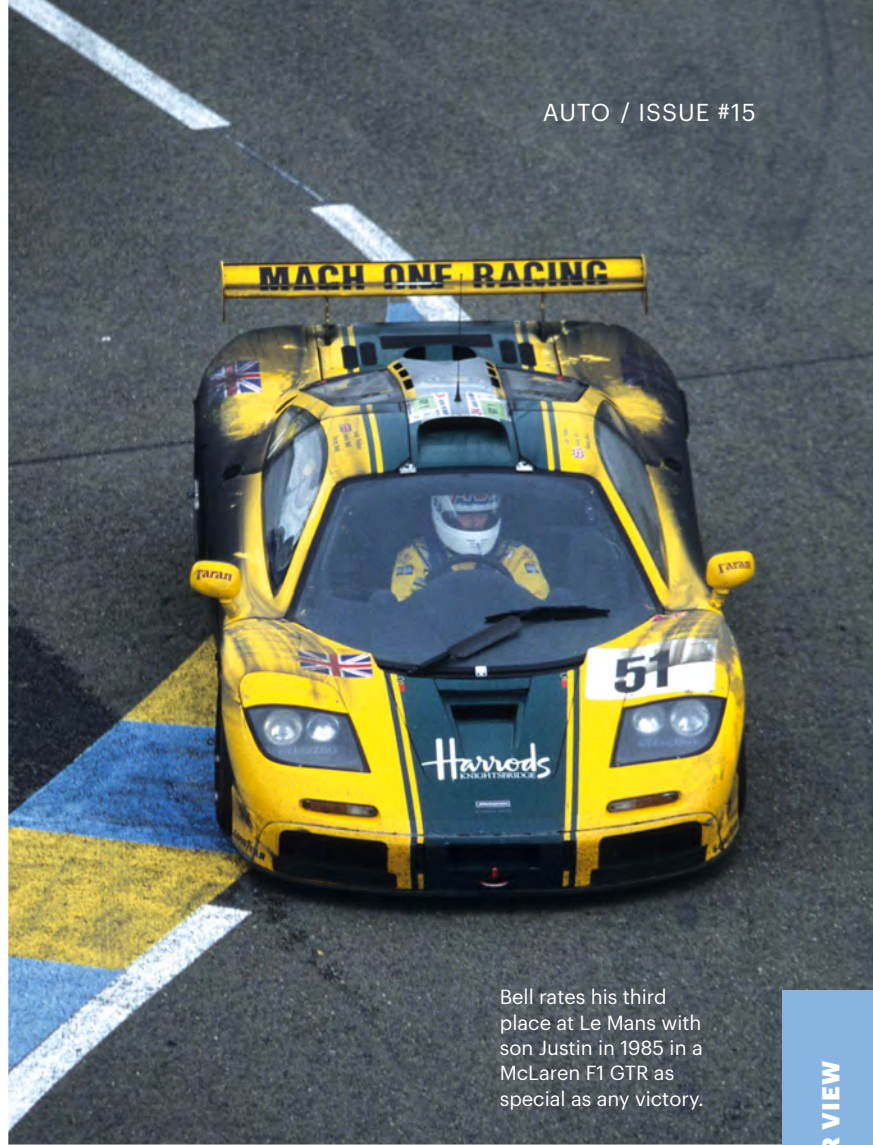




Keeping his hand in at this year's 74th Members Meeting at Goodwood, Richard Attwood is in the other Porsche.



The sportscar glory years included victory at the Daytona 24 Hours in 1987 in a Porsche 962.



Bell rates his third place at Le Mans with son Justin in 1985 in a McLaren F1 GTR as special as any victory.



Bell, pictured with Ickx after winning the 1982 Brands Hatch 1000kms in a 956, always held his famed co-driver in high esteem.

REAR VIEW



FINAL  
LAP

Freeze frame

# BIRTH OF A LEGEND

In the history of the automobile there is surely no city, save perhaps Detroit, so inextricably linked to motor manufacture as Turin, host of this year's FIA Sport Conference.

From the earliest days of the automobile the northern Italian city quickly grew to become a powerhouse of auto production, giving rise to plethora of companies that helped define the shape of the industry. FIAT, Abarth, Lancia, the design houses of Pininfarina, Bertone and Giugiaro, all were founded in the city.

Turin's love affair with motoring naturally extended to motor sport and through the 1930s and after World World II, the city's Valentino Park echoed to the sound of racing machinery at the Torino Grand Prix. It was in 1948, however, that Turin hosted its biggest motor sport event - the Italian Grand Prix. The event was made even more historic by virtue of it being the first time Ferrari entered a grand prix under its own name - with three 125 F1 in the hands of Raymond Sommer, Giuseppe Farina and Prince Bira.

Sommer, who had won the previous year's Turin sports car race for Ferrari, was the only finisher of the three, taking a memorable third place behind Alfa Romeo's victorious Jean-Pierre Wimille and Maserati's Luigi Villorosi. A pattern was set. A year later Ferrari won the Italian GP at Monza and by 1950 it was embarking on a Formula One adventure that, 226 wins later, continues to this day.



Above: Cars line up to take the start of the 1948 Italian Grand Prix in Turin...



... Where Raymond Sommer (left) and Giuseppe Farina both drove Ferrari 125 F1.





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## Manufacturer involvement in FIA series

Car manufacturers are involved in every FIA championship from Formula One and World Rallying to Hill Climb and Cross Country. But which manufacturer competes in the most championships?

Ford wins this particular race, competing in a remarkable 14 out of the 22 FIA-governed international series, with Mitsubishi in 12 and Citroen and Renault contesting nine each. Conversely, major car brands such as Toyota, Mercedes and Fiat each compete in just three or less.

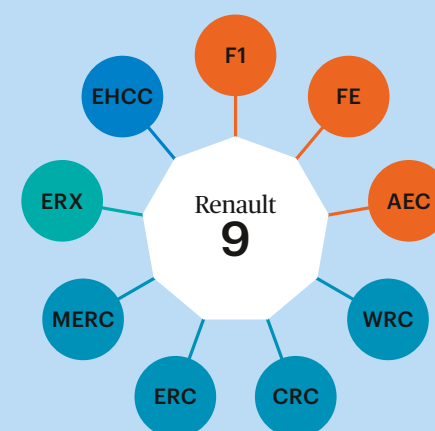
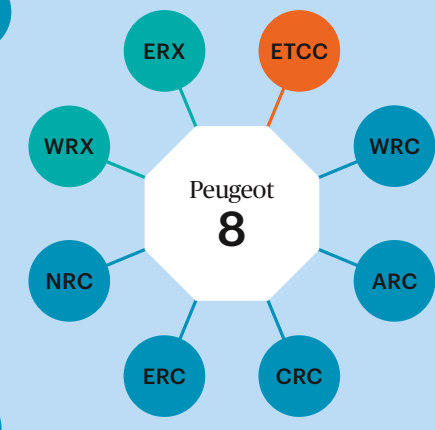
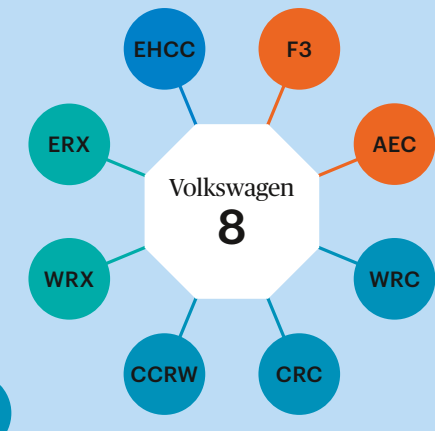
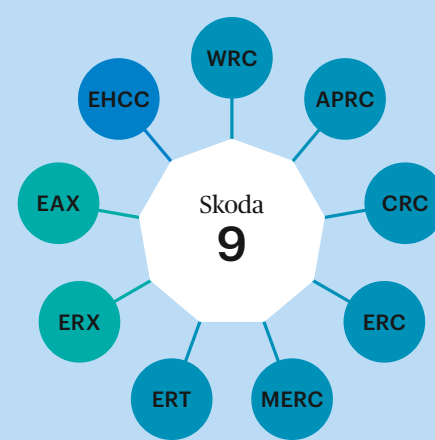
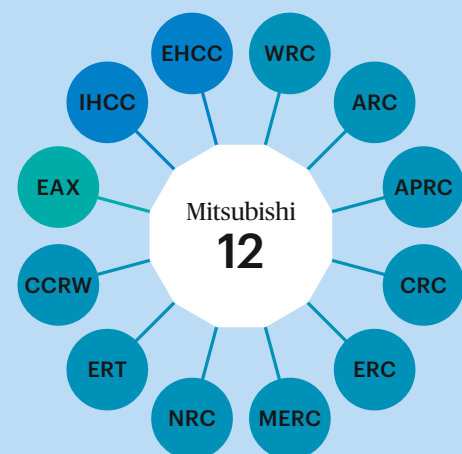
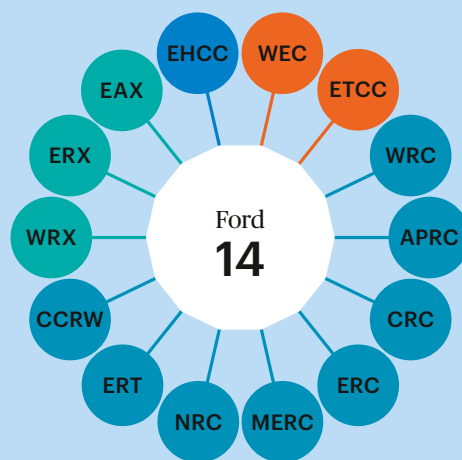
### RACE TYPE



### CHAMPIONSHIPS

<b>F1</b> Formula One World Championship	<b>CRC</b> CODASUR Rally Championship
<b>WTCC</b> World Touring Car Championship	<b>ARC</b> African Rally Championship
<b>ETCC</b> European Touring Car Championship	<b>WRC</b> World Rally Championship
<b>FE</b> Formula E Championship	<b>MERC</b> Middle East Rally Championship
<b>WEC</b> World Endurance Championship	<b>ERC</b> European Rally Championship
<b>AEC</b> Alternative Energies Cup**	<b>CCRW</b> Cross Country Rally World Cup
<b>ETRC</b> European Truck Racing Championship	<b>ERT</b> European Rally Trophy
<b>F3</b> F3 European Championship	<b>APRC</b> Asia Pacific Rally Championship
<b>WRX</b> World Rallycross Championship	<b>NRC</b> NACAM Rally Championship
<b>ERX</b> European Rallycross Championship	<b>IHCC</b> International Hill Climb Championship*
<b>EAX</b> European Autocross Championship**	<b>EHCC</b> European Hill Climb Championship

Number of championships each car manufacturer competes in



\* (2016 list made up of most recent winners)

\*\* (data taken from 2015 championship)



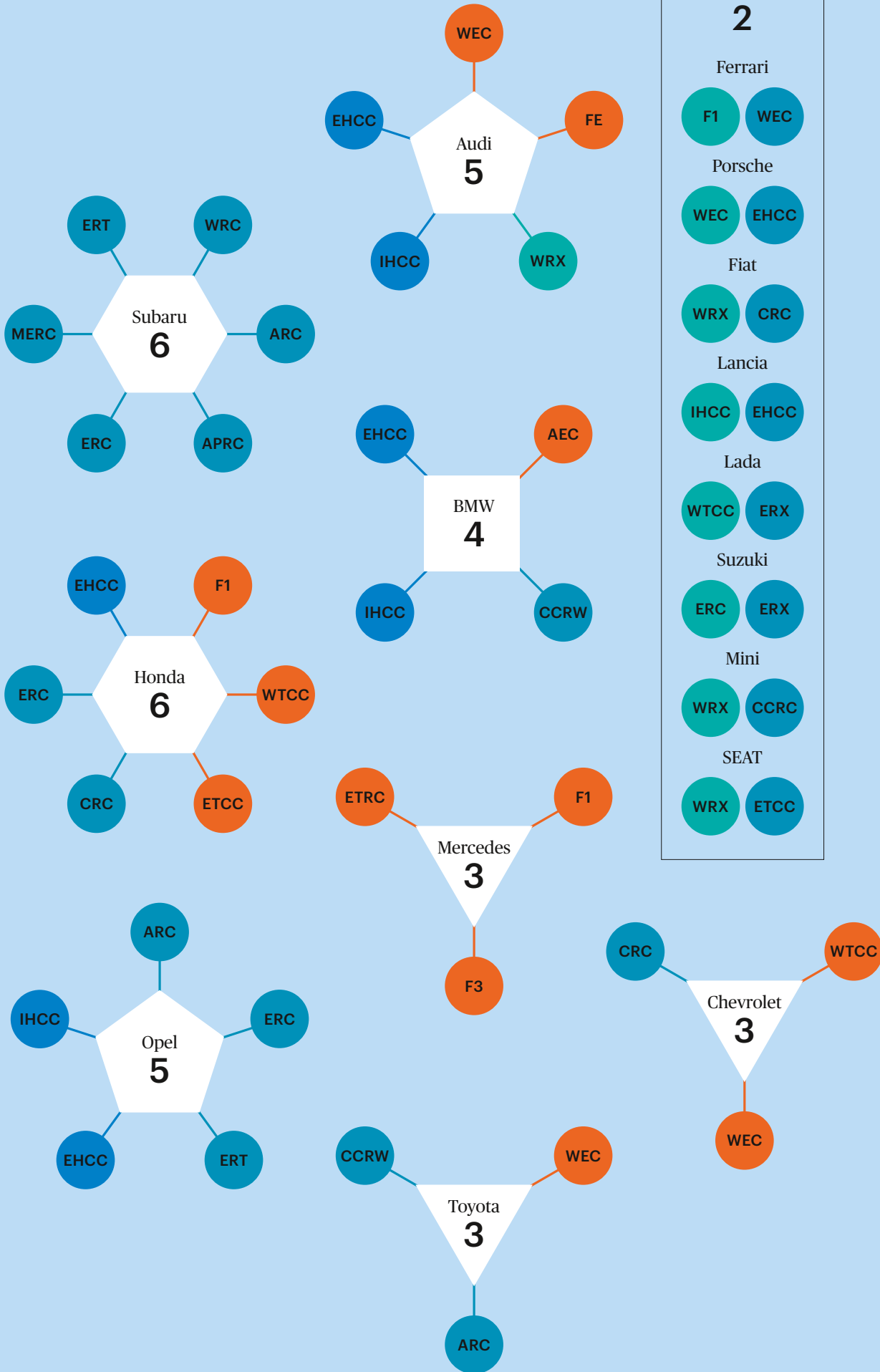
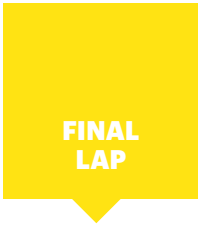


ILLUSTRATION: FRASER LYNESS





The last word

# DRIVEN BY THE LAW

*The proliferation of automated vehicles is a much-heralded event, but is the law ready? Automotive legal expert Bryant Walker Smith says the regulation process is likely to be ‘organic’*



**Q With regard to automated cars, where are we currently at in terms of legislation, as people such as Tesla’s Elon Musk are saying we will have driverless cars on the road within a few years.**

A Well, governments already have robust regulatory tools to regulate many aspects of automated driving. Vehicle safety authorities generally already have the power to order that a vehicle be recalled. Depending on the country those regulatory bodies may have the authority to approve a vehicle before it’s sold. Motor vehicle agencies generally have the authority to grant or deny registration of vehicles based on their safety and enforcement officers – the police – have the authority to ticket or order off the road unsafe vehicles or vehicles that are being driven unsafely. Those are just some of the existing regulatory tools that can be used to address unsafe situations.

What I have been doing is encouraging companies to do legal R&D commensurate with their technical R&D and increasingly I have the sense that they are doing that – identifying areas of uncertainty and potential conflicts, and developing strategies for addressing that. Although the public sector should understand its laws, a lot of change may come at the request of the developers of specific applications.

**Q Is this then a largely organic process and will meaningful legislation only arrive in the wake of technological development?**

A Yes, it’s a very organic process. It’s a dialogue between law and technology.

**Q What about the area of liability? Volvo has said they will accept liability for their technologies. Is that going to be the model or is there a lot more talking to be done?**

A I would say that liability is even more organic. A lot of that legislation only ever develops in response to particular



situations, after the fact. Whereas a lot of traditional regulatory law needs to anticipate technologies and applications and problems, civil liability is reactive and responsive and once something has happened it then figures out who or what bears the liability.

Criminal liability we can set aside. The fact is, someone doesn’t have to be criminally liable in the event of a crash, and existing criminal law principles generally apply.

In terms of civil liability – when people are injured from whom they can recover – existing liability law has answers to those questions. It’s not the big unknown that many people talk about it as.

With respect to Volvo’s statement – which some others have made as well – that’s really saying nothing. Essentially they are saying ‘we will be liable in the situations in which we

are liable’. Very little changes in terms of the mechanics of product liability.

**Q How do you see the technology and the legal framework developing over the next five to 10 years?**

A There will be a company that will publicly announce that their technologies have reached a demonstrable level of socially acceptable risk within narrow conditions, for some subset of driving. At that point that company will do a couple of things. First, they will make a public safety case. They will say why they think their technology is ready. The second thing it will do is say what legal changes, if any, it needs in order to deploy its technology. The fact that companies have yet to do that is telling. They are still trying to figure out their technologies and applications.



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