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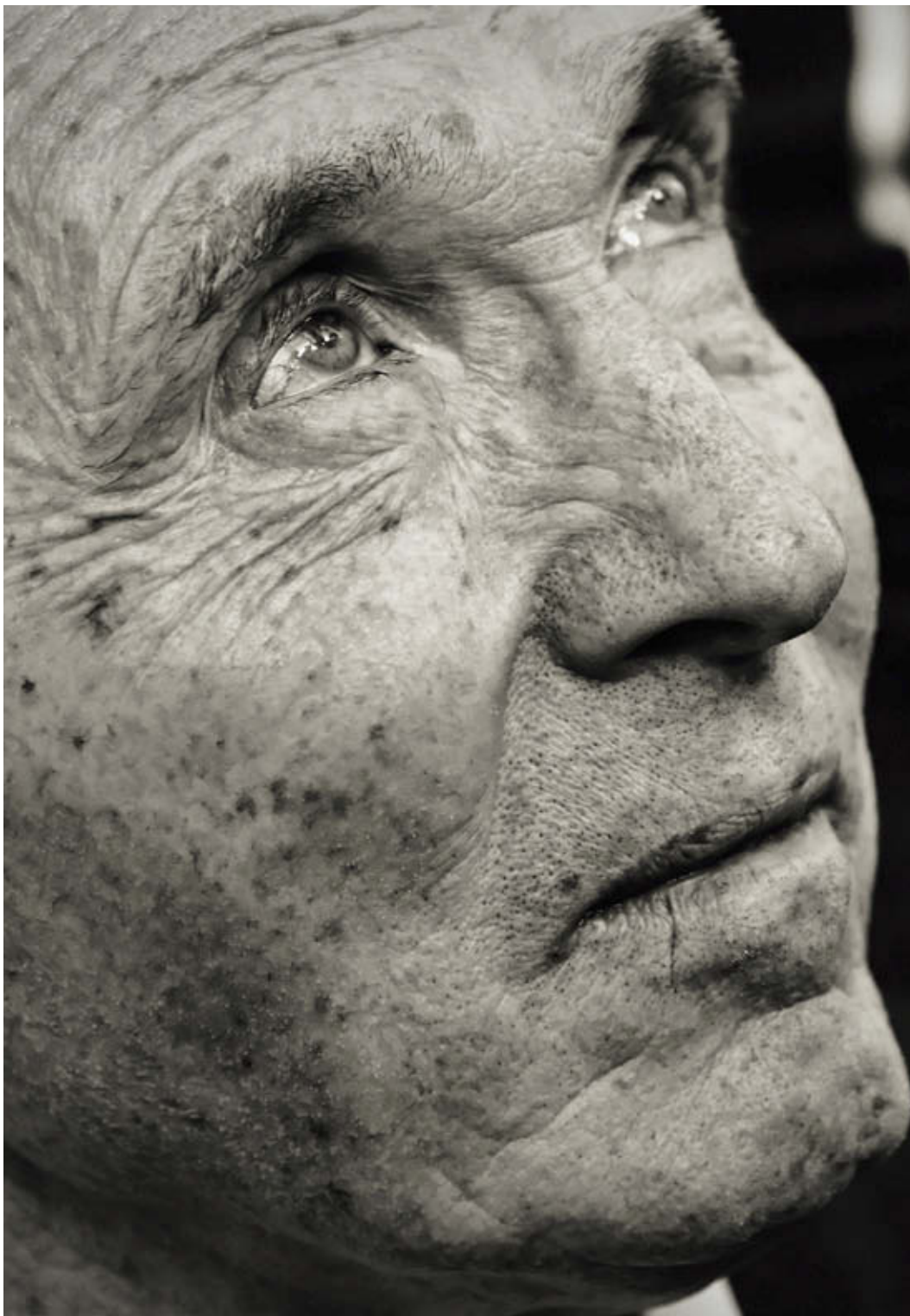
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A LIFE LESS ORDINARY

FRANK WILLIAMS ON
40 YEARS AT THE TOP
IN FORMULA ONE

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ISSUE
#10

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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.

THE WILL TO WIN

As in any sport, victory on the tracks and stages of motor sport's major championships is very rarely a solo endeavour but is the product of carefully constructed joint effort.

So, as racing and rallying's major championships kick off, this edition of AUTO looks at how some of motor sport's most successful teams have been built. We also examine how new forces in racing are preparing to take on one of the sport's biggest challenges - the World Endurance Championship. In our cover story, Formula One legend Sir Frank Williams reflects on 40 years in racing's top level, while we also learn the secrets of motor sport success from Mercedes' F1 title-winning team boss Toto Wolff, Volkswagen's World Rally Championship-winning motor sport chief Jost Capito and Citroën Racing's World Touring Car Championship winner Yves Matton.

Elsewhere, we hear from former Ferrari F1 team principal Stefano Domenicali, who is taking on the challenge of a new role at Audi while at the same time helping the FIA to redefine junior racing's pathway from entry-level single seater cars to the pinnacle of racing in F1.

Away from the track we look at how technology is shaping the future of the cars we drive, the cars we may not be driving ourselves and even how we buy them.

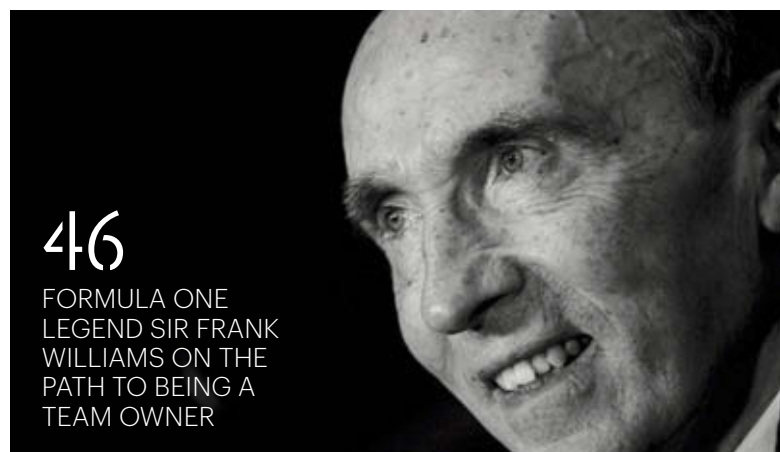
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Toyota Racing Team President Yoshiaki Kinoshita reveals more about the firm's Yaris WRC project



Middle East rally opener

SAND STORM

The 2015 FIA Middle East Rally Championship got off to a storming start in February, with reigning title holder Nasser Saleh Al-Attiyah taking a record 12th win on the QMMF Qatar International Rally.

Qatar driver Al-Attiyah's victory in a Ford Fiesta RRC, with French co-driver Matthieu Baumel, followed his Dakar Rally win at the start of the year.

Al-Attiyah was quickest on all but two of the 12 special stages to score his 55th career success in the Middle East Rally Championship. He is now just five victories shy of the 60-win record set by Dubai's Mohammed Ben Sulayem between 1984 and 2002.

"It's always a special feeling to win here in Qatar and to make a winning start to the defence of my Middle East title was important," said Al-Attiyah. "It's been a great start to the year, but this is a busy season and I must remain focused and take each event as it comes."

Despite losing time with a broken driveshaft, Abu Dhabi Racing's Sheikh Khalid Al-Qassimi and Northern Irish co-driver Chris Patterson came through to take second place in a Citroën DS3 RRC, albeit some 5m53.20s behind the victor.

This year's FIA Middle East Rally Championship includes eight rallies across the region, concluding with the Dubai International Rally on November 27.



A DOZEN IN THE DIRT

Nasser Saleh Al-Attiyah set a new record when he scored his 12th win in the Qatar International Rally as he bids to claim a ninth Middle East Rally Championship title. The 2006 Production World Rally Champion dominated the event in a Ford Fiesta RRC.



HYPER HYBRID

Battery power provides up to 700bhp of the 1,500bhp afforded to the new Koenigsegg Regera – the world's fastest production car. The \$2m machine unsurprisingly drew a lot of attention on its debut at the Geneva Motor Show in March.

Geneva Motor Show

ROYAL DEBUT

The Geneva Motor Show has always acted as a barometer for automotive trends, anticipating major shifts in motoring technology through its fascinating array of new models and elaborate concept cars.

This year's show was no exception and one trend that shone through like a glittering – if extremely dazzling – beacon was the growing number of extravagantly fast, flamboyantly equipped and insanely expensive hypercars.

At the top of a 2015 list that featured new machinery from the likes of Aston Martin, Ferrari, Bentley, McLaren and ultra-boutique manufacturers such as Zenvo, was the Koenigsegg Regera. With a name meaning 'to reign' in Swedish, Koenigsegg needed to build in some potent statistics if the car is to rule over its rivals. And they have succeeded.

The car boasts a whopping 1,500hp power



output, a 0-250mph time of under 20 seconds and a trick hydraulic coupling instead of a traditional transmission, essentially giving it just one gear.

The bonus too is that it's a plug-in hybrid, with the batteries reportedly providing up to 700hp of its power. There are a couple of catches though: first, Koenigsegg will only make 80 examples of the Regera and secondly, there's the \$2 million price tag.

UP FRONT

AUTO NEWS

In this issue, Toyota unveils details of its return to World Rally Championship action in 2017 with the Yaris WRC, Nissan provides a glimpse of its revolutionary glow-in-the-dark LEAF, the FIA World Rallycross Championship reports a huge growth in TV viewing figures in its first season, and Formula E welcomes eight new manufacturers

TOYOTA TO MAKE WORLD RALLY RETURN

Toyota will return to the FIA World Rally Championship in 2017 following a two-year development programme with the new Yaris WRC.

Toyota Motor Corporation President Akio Toyoda made the announcement in January, confirming that the world's largest car maker would return to WRC action for the first time since 1999.

The Japanese company's motor sport department, Toyota Motorsport GmbH, will develop the Yaris from its base in Cologne, Germany with the help of a trio of drivers – Stéphane Sarrazin, Sebastian Lindholm and promising youngster Eric Camilli.

"Rallying is part of Toyota's motor sport heritage and we have many happy memories from our previous WRC times, so it is a natural step for us," said Yoshiaki Kinoshita, Toyota Racing Team President. "The Yaris is one of the most popular Toyota models so a WRC project with this car makes sense from a sporting and marketing point of view.

"Our target is to win rallies and titles but it would be unreasonable to say we will do that in 2017. We are at the beginning of the Yaris project but we have high expectations for our new era."

For full interview with Yoshiaki Kinoshita, see page 78.



Toyota last competed in the World Rally Championship in 1999 with its Corolla model.



BLOOMBERG'S \$125M SAFETY BOOST

American charitable foundation Bloomberg Philanthropies has announced the names of 10 cities and five countries that will benefit from a \$125 million five-year programme to improve road safety.

The winning cities and countries were selected to participate in a new phase of the foundation's Global Road Safety Initiative, which aims to reduce fatalities and injuries from road traffic accidents.

The project aims to work at both national level to strengthen road safety legislation and at city level by implementing proven road safety interventions.

The five countries chosen to receive technical support to review and strengthen road safety legislation are China, India, Philippines, Thailand and Tanzania.

Twenty cities were invited to participate in the competition with the winners announced as Accra (Ghana), Addis Ababa

(Ethiopia), Bandung (Indonesia), Bangkok (Thailand), Bogota (Colombia), Fortaleza (Brazil), Ho Chi Minh (Vietnam), Mumbai (India), São Paulo (Brazil) and Shanghai (China).

"We can prevent millions of road traffic fatalities and injuries through stronger laws, more effective enforcement and better infrastructure," said Bloomberg Philanthropies founder Michael R Bloomberg (centre, with UN Secretary General Ban Ki-moon, left). "The 10 cities chosen to participate in our programme have demonstrated a commitment to this work."

Saul Billingsley, Director General of the FIA Foundation, added: "The investments in road safety by Bloomberg Philanthropies since 2010 have driven momentum for the UN's Decade of Action on Road Safety, energised the NGO community worldwide and led to significant legislative advances in many countries."



The all-electric Nissan LEAF has been given a new look with glow-in-the-dark paint.

PHOTOGRAPHY: DPPI

HI-TECH SAFETY FOR OLD CARS

A US company based in Silicon Valley has designed a device to bring modern safety technology to older cars.

Technology company CarVi has paired an App with a small black hockey puck camera that sits behind the rear-view mirror. It communicates with a smartphone and uses both that device's camera as well as its own to monitor the road ahead. In this way it can track how close the user's vehicle is to the one ahead and send an alert if it gets too close. It also helps with safe lane changes.

The CarVi app can record the user's entire drive and process it with onboard algorithms to determine their driving pattern. At the end of each drive it will then provide a 'SKOR' on driving technique and suggest improvements.

Funding is currently being raised to launch the product later this year.



UP FRONT

GLOW-IN-THE-DARK LEAF

Nissan has applied glow-in-the-dark paint to one of its production models – the all-electric LEAF – to make it more visible at night and therefore safer on the road.

The Japanese car maker has worked with inventor Hamish Scott, creator of Starpath – a spray-applied coating that absorbs UV energy during the day so that it glows for between eight and 10 hours at night.

While glowing car paint is

already available, the bespoke, ultraviolet-energised paint created for Nissan is made up entirely of organic materials.

Nissan Motor GB Limited EV manager Paul O'Neill said: "The Nissan LEAF is a shining beacon of sustainability. Not only is it saving our customers money in running costs but we are now seeing how it is helping people become more environmentally sensitive by reducing their carbon footprint."

INSTITUTE AGREES NEW SAFETY PARTNERSHIPS

Following its 2014 General Assembly in Doha, the FIA Institute has decided to develop its operations through a series of new partnerships.

The Institute has partnered with FIA Switzerland to handle all of its educational activities, under the responsibility of the Development Department in Geneva. This involves the FIA implementing the education programme on behalf of the Institute, which includes environmental sustainability activities, the various multi-programme accreditation initiatives and the Young Driver Excellence Academy.

In addition, the Institute has sub-contracted its safety research function to the Global Institute for Motor Sport Safety SA (GIMSS), a newly established Swiss-based corporation. The objectives of GIMSS are similar to that of the Institute: to conduct research into motor sport safety, and investigate and develop procedures, practices and technologies that will improve safety in motor sport and motoring. This includes improving safety for drivers, officials, spectators and the general public, as well as the monitoring of motor sport and automotive safety trends.

GIMSS is being governed by a five-member board of directors, with solicitor Luc Argand as its Chairman. He is joined by fellow directors Charles Firmenich, Pierre-François Unger, Colin Hilton and Garry Connelly. The responsibility for the day-to-day running of the organisation is taken by General Manager Administration, Quentin Crombie, with the research activities being handled by General Manager Research, Laurent Mekies.

The research function will be further supported by a Scientific Advisory Committee and two research working groups, all chaired by FIA Institute President Professor Gérard Saillant.

For 2015, the FIA Institute has set out the research work that must be undertaken by GIMSS on its behalf. This work will focus on a number of new and existing safety projects which span elite categories like Formula One and the World Rally Championship as well as a range of important grass-roots projects.

Professor Saillant said: "These positive changes will help to ensure the longevity of the vitally important education and research work the Institute has successfully undertaken over the past decade."



The Global Institute for Motor Sport Safety in Switzerland will conduct research for the FIA Institute.

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LEWIS HAMILTON JOINS FIA'S BETTER DRIVING PLEDGE

Formula One world champion Lewis Hamilton has given his backing to a new FIA campaign that aims to promote road safety by getting drivers to make an online pledge to obey the rules of the road.

Drivers are being invited to show their commitment to the FIA's 10 Golden Rules for safer motoring at www.fia.com/pledge.

The Golden Rules are a set of tips intended to help motorists improve their driving behaviour and remind them of their responsibilities to themselves, their passengers and all other road users.

Mercedes F1 driver Hamilton and FIA President Jean Todt were among the first to support the initiative by signing the pledge.

"As an F1 driver I feel I have a responsibility to promote safe driving outside the track," said Hamilton, right.

"The Golden Rules are simple rules that everyone should follow. I encourage my fans to show their support by signing the pledge."

Hamilton is the first in a series of high-profile ambassadors to be unveiled soon.

FIA President Jean Todt added: "Road safety is a top priority for the FIA. We are calling on all road users to be responsible and to obey the rules of the road. By taking our pledge, you are making a personal commitment to improving road safety, one of today's leading challenges. We all have a role to play and together we can all help to save lives."

The new FIA pledge has also received the support of Action for Road Safety's global partners Michelin, Coca-Cola and PETRONAS as well the campaign's official supporters – Nissan and Iveco.



WORLD RALLYCROSS ENJOYS INCREASED TV COVERAGE IN 2014

The FIA World Rallycross Championship experienced a 550 per cent increase in TV coverage in 2014, compared to the previous year when it ran as the European Rallycross Championship.

This was due to Pan-regional broadcasters such as FOX Sports in South America and BelN Sport in the Middle East and America covering the series for the first time. Subsequently, a total of 3,982 hours throughout the season were broadcast on TV by 58 broadcasters across the globe.

Europeans were the biggest viewers of WRX in 2014 with 11.4 million viewers watching television coverage of the 12-round season.

The Swedish round of the calendar in Holjes was the most viewed event of the year, with 3.3 million global viewers watching on TV.

World RX Managing Director Martin Anayi said: "We have seen a sharp increase in broadcast figures in only 12 months, but increased coverage on more widely available TV channels is

going to be our main target for 2015."

World RX also experienced huge growth across its social media platforms in 2014, with the average reach rising from 430,000 in 2013, to 6.7 million.

Last year saw a 130 per cent increase in fans attending WRX events, and a total of 112 different Supercar category drivers competed in the series.

Media interest also rose with 80 per cent more accreditations issued than in 2013. Merchandise experienced a 190 per cent rise over the previous year.



Since gaining FIA world status, rallycross has experienced a boom in interest on TV and beyond.

UNITED NATIONS HOSTS ROAD TARGETS FORUM

Governments, UN agencies and experts on road safety and sustainable transport met at the UN Headquarters in New York in early March to advance the agenda on road traffic injury in the Post-2015 Sustainable Development Goals (SDGs).

The briefing session was organised by the FIA Foundation and included 27 UN Permanent Missions, the World Health Organisation, the UN Environment Programme, UNICEF and the World Bank.

Leading the session were the UN Permanent Missions of the Government of Brazil, the Russian Federation, the Sultanate of Oman and the Republic of South Africa. The session gave governments negotiating the SDGs a chance to engage with UN agencies and experts on the proposed target of halving road traffic fatalities to be included in the post-2015 goals that will replace the Millennium Development Goals.

In the draft SDGs, road safety is included in two targets: within the proposed Health Goal, relating to reductions in deaths and injuries, and in the Cities Goal, which calls for access to safe transport systems.

The FIA Foundation presented its policy briefing '2015 – Safe Roads for All', and the session was chaired by FIA Foundation Director General Saul Billingsley.

"This session has provided a valuable opportunity to gather governments who are negotiating the SDGs together and to hear from a range of UN agencies and experts on the proposed target to halve road traffic fatalities, and how it can be implemented," he said. "We are entering the final stages of negotiations on the SDGs in the coming months so it's crucial there is support for retaining the target."



MRI PROJECT DESIGNED TO REDUCE SPINAL INJURY

Toyota World Endurance Championship drivers Alex Wurz and Anthony Davidson have been scanned in Europe's largest MRI machine to help determine how drivers' seating positions might affect their chances of sustaining a spinal injury in an accident.

It is the latest stage of a joint project between the FIA and Toyota to improve seat design for drivers by using full-size scans in a computer model to optimize safety (first reported in AUTO #7). Wurz and Davidson were chosen because of their height differences and various seating positions, especially when in the same car.

To do this they are utilising the latest in scanning technology at the UK's Upright MRI Centre, which boasts a machine that is much wider and more open than the usual

cylindrical MRI scanner. This means that a scan can be taken of a driver while he is sitting in a full-size race seat.

The results were sent to Toyota to input into a computer model of the human body that it uses for virtual crash testing. Called the Total Human Model for Safety (THUMS), it is made up of almost two million elements that accurately reproduce the human form.

The MRI scans will help researchers better understand spinal geometry when drivers are in a race seat. They hope injury could be minimised by ensuring a driver's spine is not loaded in an undesirable way.

Medical advisor Dr Paul Trafford said: "The results will help us decide on safety improvements including seat design, harness position and even pedal position."

PORSCHE CURVES MADE SAFER

Safety upgrades at the Circuit de la Sarthe ahead of this June's Le Mans 24 Hours will include extending the run-off area at the entry to the Porsche Curves.

Work will increase the run-off area by some 30 metres at the fast right-hander. Elsewhere the grass verges between Mulsanne Corner and the Porsche Curves will also be covered in asphalt.

Vincent Beaumesnil, Sporting Manager at race organiser Automobile Club de l'Ouest, told *Autosport* magazine: "We will still have white lines and kerbs, but there will be asphalt on the other side. This will make it much safer if one car has to go off the circuit to avoid another."

The latest upgrades to the 8.47-mile circuit (right) follow changes made ahead of last year's race to the citing of the barriers at the exit of Tertre Rouge, an increase in the run-off area at Corvette Corner in the Porsche Curves and new kerbing at the Ford Chicane.

Further upgrades will be made to the Porsche Curves section over the next three to four years, while changes to the local roads that would make the section from Indianapolis to Arnage permanent race track will not start until next winter.

PHOTOGRAPHY: DPPI



Dmitry Maksimychev, Deputy Permanent Representative of the Russian Federation to the UN, spoke at the event

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<p>04 CHECK MY TYRES</p>	<p>03 OBEY THE SPEED LIMIT</p>	
<p>05 DRIVE SOBER</p>	<p>06 PROTECT MY CHILDREN</p>	
<p>07 PAY ATTENTION</p>	<p>08 STOP WHEN I'M TIRED</p>	
<p>09 WEAR A HELMET</p>	<p>10 BE COURTEOUS AND CONSIDERATE</p>	

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F1 TO BENEFIT FROM IN-CAR CAMERAS

All Formula One cars are set to be fitted with high-speed cockpit cameras from 2016 to help with accident investigation.

The cameras, running at a minimum of 400 frames per second, will be focused on each driver's torso and head. In the event of an accident, safety researchers will be able to study what happens to the driver's body in super slow-motion to assess the forces involved at each stage and the performance of safety equipment.

The footage will complement the data from in-ear accelerometers, which all F1 drivers are using this season. A sensor is implanted in the driver's earpiece and inserted directly into his ear canal.

It measures acceleration across three axes and captures data about the forces acting on a driver's head.



EIGHT NEW MANUFACTURERS FOR FORMULA E

The Federation Internationale de l'Automobile has announced the names of eight manufacturers who will enter the second season of the all-electric FIA Formula E Championship.

Ten teams have competed in the inaugural 2014-2015 series – designed to be a testbed for the development of electric vehicle technology – using identical Spark-Renault SRT_01E single-seaters (above) with a McLaren Electronic Systems powertrain.

But the series will become an open championship for 2015-2016, allowing manufacturers to pursue their own in-house innovations including the development of bespoke powertrains.

Development will initially be limited to the powertrain – specifically the e-motor, inverter, gearbox and cooling system – in order to limit costs and promote investment and innovation in the most important areas.

Following a tender process, the FIA has selected the following eight manufacturers

to be included in the series: ABT Sportsline, Andretti, Mahindra, Motomatica, NEXTEV TCR, Renault Sport, Venturi Automobiles and Virgin Racing Engineering.

The next regulation progression – scheduled for season three – will see manufacturers extend their efforts to the batteries, with the objective being the use of a single car per driver during races from the fifth season.

FIA President Jean Todt said: "The launch of the FIA Formula E Championship has been a great success. This innovative and spectacular discipline is in the process of gaining its sporting and technical credibility, and the arrival of manufacturers for its second season is the next stage in Formula E's development."

Alejandro Agag, CEO of Formula E, added: "It's fantastic for Formula E to have this many manufacturers wanting to be a part of the championship after just four races and it shows great confidence in the series."

MERCEDES FIRST TO TRY NEW PIT CREW HELMETS

A new Schubert helmet designed to offer greater protection for Formula One pit crews got its debut with the Mercedes AMG Petronas Team at the season-opening Australian Grand Prix.

The helmet, developed in conjunction with Mercedes, has a Schubert-patented seamless layer inside and carbon-fibre outer layer designed to ensure the highest levels of safety and head protection.

Its launch coincided with the German helmet manufacturer's announcement that it has become an official supplier to the

Mercedes team for 2015 and beyond.

Jan-Christian Becker, Schubert Managing Director, said: "Working together with Mercedes, we have developed a tailor-made helmet to the highest levels of safety. Our commitment in F1 enables us to keep improving our products."

Mercedes-Benz Motorsport Executive Director Toto Wolff added: "The development of safety protection and procedures in F1 is at the forefront of our business; to partner with one of the world's leading helmet makers is a privilege."



PHOTOGRAPHY: DPPI

UP FRONT

AUTO ASKS

IS EXPERIENCE BEING OVERLOOKED BY THE TOP MOTOR RACING TEAMS?

With drivers competing at the peak of international motor sport at ever-younger ages, are teams beginning to overlook the importance of experience? We gathered three of the most experienced drivers in motor racing to get their opinions.



Four-time Champ Car title winner

SEBASTIEN BOURDAIS

FORMER F1, CURRENT INDYCAR AND SPORTS CAR DRIVER

There is no rule in racing. If a 17-year-old turns out to be a really valuable asset, then fine. Things have evolved dramatically in Formula One, as I can say from my experience. There is less testing and the cars have become more complicated with energy recovery, but the trademark of a really good driver is someone who can absorb, understand, adapt and apply things really quickly.

If you find the pearl and you know he's a driver who is going to make it, then fine. You have a set of skills that are required if you are to be an exceptional factory go-kart driver, such as testing engines and chassis and steering the ship in the right direction. If you can do that at world-level go-karts there is a good chance – if you have the driving technique – that you'll be good in single-seaters. I don't think that is age-dependent. Age helps to refine these skills, but I don't think you need 15 years of preparation to reach the peak.

Some kids are going to take a lot longer than others to reach their potential and that is why it's so hard to evaluate where they will be. Some will stall and some will carry on getting better and better. There are many aspects of racing that are difficult to grasp and explain, so it's very difficult to be judgemental.

I would say I reached my peak in my second season of Champ Cars (in 2004, aged 25) and have maintained that level ever since. My weakness is that I am not very comfortable in an oversteer-heavy car and that is why I struggled at Toro Rosso in Formula One.

The one thing that is very different from 15 years ago is there are a lot of F1 teams where a driver's input is not as important as it used to be. The team will evolve in a certain way and, if an upgrade is quicker, the driver just has to find a way to use it. If you are not capable of extracting the performance out of it, you'll go backwards.

It isn't about favouring one driver or another, it's about making the car constantly faster. Some guy likes a car one way and his team-mate another way. Depending on the development it will favour one guy or another, but that's not because of the team consciously favouring one driver over another.

Now, F1 teams need drivers who can adapt to the car and extract the maximum out of it. That is a big change from 15 years ago. The pace of car development is so fast that they can't help the driver by developing parts of the car to accommodate him.

Most experienced F1 driver

RUBENS BARRICHELLO

FORMER F1 DRIVER, STARTED 322 GPs, CURRENT SPORTS CAR DRIVER

I think the evolution of the sport in general is that teams are having the chance to prepare drivers at a much younger age. I didn't have access to a simulator when I was younger or any physical preparation on the level that is seen nowadays. I feel if I was 17 years old and had had that preparation, then I don't feel I would have been faster than when I was 30, but I would definitely have been better prepared.

Drivers do the physical training; they are mentally a lot stronger now. They do 1,000 laps on the simulator so they know a track even when they have never raced there before. Perhaps they lose some of the excitement of going to new tracks and learning it in the car, but that is the modern world. I can see my boys – they are nine and 13 – are much more prepared than when I was younger.

We all have to write our own story anyway and the world is changing. The engines are getting faster yet more fuel-efficient, and that is the world and technology developing. That's the same for the younger drivers.



Racing veteran and 'racing dad'

JAN MAGNUSSEN

FORMER F1 DRIVER, CURRENT SPORTS CAR DRIVER AND FATHER TO MCLAREN'S KEVIN MAGNUSSEN

Obviously I have just been in and around the driver situation [at McLaren] with my son Kevin, so I would say the opposite is true! But you have to look at what Jenson Button did on the track last year and his experience definitely counted for a lot – he got the most out of it.

It would be nice to see one of the bigger teams taking a bold decision with one of the younger guys, as it is exciting to watch and follow. I think you need to get as much experience as possible at a young age though, as that is what all the top teams look for. Unfortunately, a 21-year-old Formula One driver doesn't have a lot of experience, but that is the challenge.

I hate using this phrase but luck counts. You need to be in the right place at the right time with the right people around you and be in the right car to have success in Formula One. Otherwise it is a real uphill struggle. Not many guys get that opportunity, however, so the main thing is to grab it when you are given it. You have to work hard when you have it but sometimes it's just not possible if you are in an underfunded team, or the people around you are not helping you.

It was a tough one for Kevin to accept but he is still part of McLaren, which is important. There is still something really good to build on and the goal for him now is to be ready for 2016, whatever the situation is then.



Car makers versus tech giants

A FUTURE DRIVEN BY TECHNOLOGY

With motor manufacturers making the big statements at this year's Consumer Electronics Show, the age of digital driving has truly arrived. However, with the world's tech giants ramping up their automotive plans, it may not be the established car makers' vehicles we'll be using in the future...

TEXT BEN BARRY



Mercedes chose to unveil its autonomous F105 Luxury in Motion Concept at this year's US-based Consumer Electronics Show.

In January 2007, not long before Apple launched the iPhone, Ford debuted an in-car technology that enabled hands-free phone calls, paired with MP3 players and offering SMS and GPS functionality. Called Sync, the new technology was launched at the North American International Auto Show, the biggest motor show in the United States.

This was to be expected. More surprising, however, was Sync's near-simultaneous appearance at the Consumer Electronics Show (CES) in Las Vegas. It was a bold, unusual strategy for a car maker, but Ford wanted to position itself as a technological innovator, and CES gave it access to a younger, more tech-savvy audience that had been falling out of love with the car.

The manufacturer's strategy proved prescient. As smartphone

technology has exponentially progressed over the intervening years, so consumers increasingly expect their vehicles to become an extension of it. Consultancy firm Accenture surveyed 14,000 drivers in Europe, Asia and North America, and found in-car technology to be the primary consideration driving purchase decisions for 39 per cent of all buyers, compared with 14 per cent for whom a car's performance was key.

Manufacturers have raced to respond to demand, including Bluetooth audio streaming, multiple auxiliary inputs, WiFi hot-spots, voice recognition, in-car internet and an ever-increasing array of gadgets.

And the trend shows no sign of abating: another consultancy firm, IHS, predicts that internet-enabled cars will almost quadruple ▶

from today's 36 million to 152 million in just five years; automotive electrical engineering teams are expanding at an unprecedented rate, with Jaguar Land Rover's department more than doubling to 1,500 employees in five years.

And the showcase venue for all of this new technology is CES. At this year's event, Ford's display stand was two storeys tall. CEO Mark Fields gave the show's keynote speech, and the Sync 3 infotainment system debuted. The touchscreen system's long list of features includes smartphone-like pinch-and-swipe logic, speak-to-text functionality and conversational voice activation. Sync 3 is a quantum leap over the system shown just eight years earlier.

A record 10 car manufacturers exhibited to CES's 140,000 visitors at the 2015 show, and floor space dedicated to automotive exhibitors has doubled to 165,000 square feet in the last five years. What's more, the car makers drew in electronics companies that specialise in developing automotive hardware and software – a \$11.3 billion business according to CES.

Only a few years ago, automotive companies were a novelty act at CES; now they are leading the agenda. As *Forbes* magazine reported, 'Car Tech Was The Only True Source Of Innovation At CES 2015'.

But the boundaries between auto makers and technology companies are increasingly blurring. Manufacturers are not only offering more advanced systems of their own but are increasingly inviting third parties into their space in collaborative projects.

Both Audi and Hyundai announced vehicle systems integration with smartwatches at CES, while Ford Sync 3's AppLink and Jaguar Land Rover's InControl Apps allow occupants to sync smartphone apps with a vehicle's infotainment system.

The logical endgame is Apple's CarPlay system, which Apple dubs 'the best iPhone experience on four wheels'. Compatible with iPhone 5 models onwards, CarPlay effectively takes over the car's infotainment system in its entirety once an iPhone is connected.

CarPlay is compatible with all dashboard interfaces, including touchscreens, rotary dials and buttons. As Apple puts it, 'if it controls your screen, it controls CarPlay'. CarPlay integrates Apple's Siri Eyes Free voice control system, telephone functionality, iTunes library, satellite-navigation and enables drivers to listen to and dictate text messages. Users can download other approved apps too, including music-streaming services and digital radio stations.

Android Auto debuted a few months after CarPlay in 2014, and offers similar functionality for Android smartphones. Both systems have been widely adopted by the car industry – 31 car brands for CarPlay, 28 for Android Auto – but the capability must be built-in by the car manufacturer at source.

These collaborations, however, raise crucial questions regarding both brand identity and the extent to which control is handed over to a third party. In effect, the car manufacturers' hand has been forced by the technology giants: they'd prefer to retain the familiar identity evolved by in-house infotainment systems, but are all too aware that offering CarPlay and Android Auto might make the difference between a consumer buying its car or one of its rival's.

"We want to collaborate and satisfy that desire of the customer," explains Fields, "but at the same time not give up control of the vehicle, things like the climate control and mission-critical things like acceleration and braking. The safety of our customers is the most critical thing. We want to make sure there's a true bifurcation and a firewall between that."

Mercedes was one of the first companies to offer CarPlay integration, and its CEO Dieter Zetsche echoed Fields's sentiments. "When we talk about high safety with Mercedes, it does not apply specifically for protection from accidents, but this means safety of personal data as well," said Zetsche recently. "To be able to provide that, we have to keep control, and we can't do that when it is collected by Google."



As proof of automotive technology's growing importance, Ford CEO Mark Fields gave the keynote speech at this year's CES. Below: Apple's CarPlay system.

"WE WANT TO SATISFY THE DESIRE OF THE CUSTOMER BUT AT THE SAME TIME NOT GIVE UP CONTROL OF THE VEHICLE."

MARK FIELDS, FORD CEO



The F105's cabin includes six interactive screens. In autonomous mode the front seats turn to face the passenger seats.

Electronic content is continuing to proliferate within cars, and not solely for the purposes of entertainment. Electrically assisted – rather than hydraulically assisted – power steering removes the need for an engine-driven power-steering belt, saving fuel and reducing harmful emissions. But it has also enabled hands-free parking and lane-keeping functions that automatically nudge a driver back into their lane should they start to drift out of it. Adaptive cruise control uses cameras to judge a car's distance to the car in front. This enables it to not only maintain a set gap in traffic, but also warn the driver of an impending impact and trigger the brakes if no action is taken. As these systems become increasingly integrated, so the capability to produce fully autonomous cars becomes feasible.

In fact, autonomous vehicle programmes are already well under way: Mercedes and at least six other manufacturers are currently testing advanced prototypes; an autonomous Audi drove 500 miles from Palo Alto in Silicon Valley to Las Vegas for the CES show; and BMW displayed its self-parking i3 electric car, emphasising the extra productivity that could be unlocked from employees freed from performing this mundane task in over-crowded urban environments.

The autonomous car will be big business: Vince Cable, business secretary of the UK government, recently claimed the driverless car industry could be worth £900bn by 2025. But ultimately it may not be the traditional manufacturers who reap that rich reward, as once again the tech giants seek to invade that space.

Google, valued at six times more than General Motors, has clocked up around a million miles of autonomous vehicle testing on California roads in modified Lexus, Toyota and Audi cars. However, it began evaluating a car of its own design on public roads in early 2015.

With the appearance of an egg on wheels, the Google car features a 64-beam Velodyne laser that allows it to generate a 3D map of the surrounding environment and cameras that keep it a set distance from the car in front. Google would out-source production and the first examples could be on sale in less than 10 years.

Reports suggest Apple, which ended 2014 with \$178bn in cash and marketable securities, is also working on an autonomous car.

At the time of writing, Apple had not confirmed that rumours of the so-called project Titan were correct, but certain facts are undisputed: that electric-car battery manufacturer A123 Systems is suing Apple for poaching its engineers; that Apple executives have visited Magna Steyr, a contract vehicle manufacturer; that Apple has recently recruited the head of Mercedes-Benz's Silicon Valley R&D unit, and that adapted Chrysler Voyagers with boxes and sensors on their roofs have been photographed and traced back to Apple. Nothing is conclusive, but the evidence is beginning to mount up.

What Apple is planning is far from clear at this early stage, but Google is clearly creating an anti-car, a transportation device that brings mobility to people who may not have the inclination to learn to drive or the physical ability to turn a steering wheel and press pedals. It also offers a viable alternative to the millions of motorists who see cars as white goods and driving as a chore. As such, the implications for the car industry are quite profound.

But will Apple and Google's autonomous cars actually make production? We've seen well-publicised U-turns in the past – Google Glass being the most recent example – and perhaps the factor most likely to count against these staggeringly ambitious projects is, ultimately, the business case.

"It doesn't sound plausible," says Egil Juliussen, automotive technology analyst at IHS Automotive. "The profit margin in the auto industry is not great. A 10 per cent margin is considered very good. But technology companies expect 20 per cent."

Another likely outcome could see Apple and Google become key parts of the automotive supply chain. In this scenario, the firms would act as software developer and supplier to automotive companies unwilling to invest the time and resources in autonomous vehicle developments. Either way, CarPlay and Android Auto look to be just the beginning of a long road into a fascinating future. ■



TECHNOLOGY

Hitting the right regulations

NOSE TO TAIL

In a field somewhere in southern England, a series of Formula One nosecones have been smashed against a spinning rear wheel in a 150km/h collision - and it's all in the pursuit of racing safety

TEXT: MARC CUTLER PHOTOGRAPHY: WILL THOM

The FIA Institute has been testing different nosecones from F1 2014 to see how they perform in a collision.



Tests at RAF Membury involved firing a race car at a spinning wheel to simulate a 150km/h crash.



Left: the aim of the tests is to prevent nosecones from going airborne. Right: varying nosecones from four of the big teams – Ferrari, McLaren, Mercedes and Red Bull – were used in the tests.



We're standing on a breezy airstrip at RAF Membury in Berkshire, England. A machine is about to fire a full-size race car nose-first at a spinning rear wheel assembly to simulate a 150km/h crash.

It's all in the name of safety. Andy Mellor, consultant for the Global Institute for Motor Sport Safety (GIMSS), the FIA Institute's new research partner, is conducting a series of tests to inform rule changes for the 2016 Formula One season and beyond. This involves testing the relative merits of 2014 nosecones from four different teams: McLaren, Mercedes, Red Bull and Ferrari.

"We've collected the four to cover the variety of designs that we had last year, so we'll only have a complete picture once we've tested all four," explains Mellor. "It's actually coincidental that these are the big teams because in terms of performance they were chosen to cover the full spectrum."

With the implementation of sweeping changes for the 2014 season, F1 saw diverse interpretations of the rules, particularly with regard to the design of nosecones. This is why these have been chosen to help inform future nosecone regulations.

The main aim is to prevent a car from being launched into the air by reducing the risk of the nose being lifted off the ground by the rear wheels of the car in front. This solution aims to provide the most protection possible to the driver.



The Institute also looked into the benefits of an IndyCar-style rear bumper.

In this latest series of tests, Mellor and his team are investigating which interpretations of the 2014 nosecone rules best meet the safety objectives. The main difference between the various interpretations of the 2014 rules is geometry.

"If you compare Red Bull with Mercedes, the nosecones look different cosmetically but they are also very different in terms of performance and strength. They all met the regulations and were fully compliant but did so in different ways."

The test itself is full scale; a Formula-BMW chassis with an F1 nose attached is pulled at 30km/h into a GP2 wheel and suspension assembly, fitted with F1 tyres, spinning at 120km/h, simulating a typical nose-to-wheel impact at 150km/h.

"Like [Mark] Webber's accident at Valencia in 2010," explains Mellor. "We're simulating nose-to-wheel impacts because the two types of contact that have happened historically are nose-to-wheel and wheel-to-wheel. Nose-to-wheel is the contact to which re-designing the nose has brought a solution."

In the test we witnessed, the tip of the nose slammed into the centre of the rear wheel of the target-car and generating a balance of forces to slide underneath the spinning tyre.

"Basically it behaved in a textbook style, where everything we had put in place for the regulation change was followed, so it did everything it was supposed to do: it prevented launch."

The wheel did ride up over the nosecone towards the driver, but this would be less likely to happen in an actual collision because the leading car would be propelled forward and the driver of the bullet car would be applying the brake. Either way, "going under is better than going over", according to Mellor.

The teams involved are understandably cagey about the sensitive technical details of their designs and Mellor emphasises that there are many different ways of interpreting and meeting the regulations. His focus is on identifying which interpretations provide the greatest safety levels.

"After we've analysed the data, we'll make the proposals for the 2016 regulations. That might be very similar to what we have this year, or we might propose some detailed changes to the regulations."

The second phase of the testing will look at the potential use of an anti-launch beam, somewhat similar to IndyCar rear bumpers, to further prevent launching. In 2012, IndyCar introduced a carbon-fibre rear bumper designed to prevent the front tyres of the following car from contacting and catapulting that car over the rear tyres of the leading car. The bumper goes across the rear wheels to prevent this scenario.

If introduced into F1, this would allow noses to be higher in future regulations because the bumper anti-launch beam would mitigate vertical forces acting on the nosecone to prevent launching.

"The anti-launch beam would go across the rear wheels, in a slightly higher position than you see in IndyCar," says Mellor. "In IndyCar the nose goes into the bumper, whereas our concept is that it goes below it. It doesn't prevent the nose from hitting the tyre, but as the tyre starts to push the nose up it engages with the underside of the beam, so the car can't launch. The concept could allow future regulations to permit again high noses,

This concept might never find its way onto an F1 car, but like many of the other innovations tested by the FIA Institute it is important to explore all potential areas that could improve safety. Even if that solution is not taken forward the results often influence the development of other safety devices.

For instance, in 2012 the FIA Institute tested the safety benefits of a jet-fighter canopy to be added over an F1 cockpit to protect drivers from airborne debris. While this is unlikely to make its way onto an F1 car any time soon, it has helped to inform other potential developments in this area such as a frontal roll-hoop.

Other tests have led to more direct change. Last year, F1 adopted improved side-impact protection systems as a result of FIA Institute tests in close collaboration with the F1 teams.

As for the nosecone tests, Mellor is confident that they will provide important feedback for the 2016 regulations.

"If everything is fine it indicates that the current regulation is robust," he says. "But in 2014 there were no limited requirements, rather geometric. So we're trying to determine what the structural requirements should be for future noses. We will study the results to see if we can draw a conclusive and robust solution" ■

Street circuits

FAST LANES

Formula E is bringing top-level racing to major cities worldwide. But how does it set up a street circuit in the centre of a city? AUTO heads to Miami to find out

TEXT: MARC CUTLER PHOTOGRAPHY: SHIVRAJ GOHIL



It's Thursday in Downtown Miami. The cars zip along the main road running down picturesque Biscayne Bay as commuters head to work and tourists flock to the many attractions along the harbour.

The famous Miami Heat basketball team played its latest match the night before with 20,000 fans cramming into the American Airlines Arena. It is around this stadium and along that main road that Formula E will host a race. In less than 48 hours time...

The main parts of the track along Biscayne Boulevard are yet to be built. But Kevin Still, Formula E's Director of Operations, is not worried. At least, not yet.

He is responsible for all event planning, including circuit construction, technology infrastructure and broadcast operations. "Everything you see on the track on the day, my team has constructed," he says.

So far he has overseen successful events in Beijing, Putrajaya, Punta del Este and Buenos Aires. But this is his biggest challenge yet.

"We're basically shutting down a part of the city for two days," says Still. "We're blocking roads here at about 10am on Friday morning, reopening them sometime around 5pm Sunday evening. And we're on one of the major roads running through South Miami, which is used by over 100,000 people each day. So this is a big deal for the city and the very future of this sport."

Of course, the planning for the event starts well in advance and involves a lot of buy-in from local government and authorities. To help with this Formula E brought in a local big hitter.

"In Miami we have a local operator, that's Andretti Motorsports, who we are working with. They are obviously very well known here in the US and they are one of our teams as well, so it's an additional part of their involvement."

The man in charge of the project for Andretti is Chuck Martinez, who was appointed General Manager of the Miami ePrix at the start of the process. His job is to oversee the local production of the event, including promotion, marketing, operations and sales, working in conjunction with Formula E organisers.

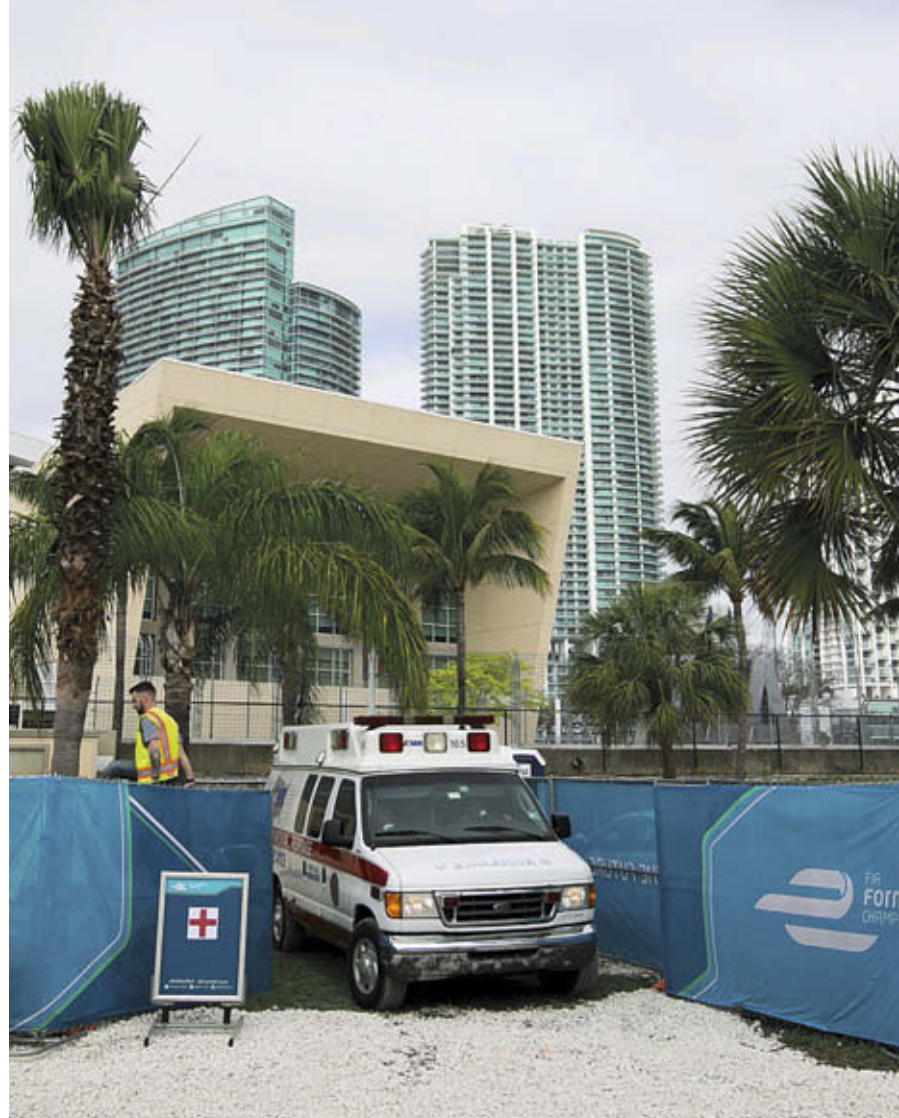
Martinez worked on the 2002 and 2003 Champ Car races that also took place in downtown Miami. But this race is a very different proposition as the area has built up hugely over the last 10 years.

"When a race was held here in '02 there were no museums, there were no performing arts centres, and there were not 40,000 residents within four blocks of the event," says Martinez. "All of these are new so you're dealing with various constituencies, stakeholders and permits."

Martinez has had to deal with both Federal and State entities when planning for the event as the track and paddock crossed areas that are controlled by different departments. So it was important that the city authorities were 100 per cent behind the project.

"It was very good for us that this is a sustainable event and the city is embracing sustainability and technology," says Martinez. "That's one of the reasons why I think it was much easier for us to make this happen. Working with the county they've been super helpful. The mayors of both the county and city have been behind the event from the beginning."

Miami Mayor Tomás Regalado was a huge proponent from the ▶



Miami authorities closed down a number of major roads to host the event. But the main part of the construction took place just 24 hours before the race.



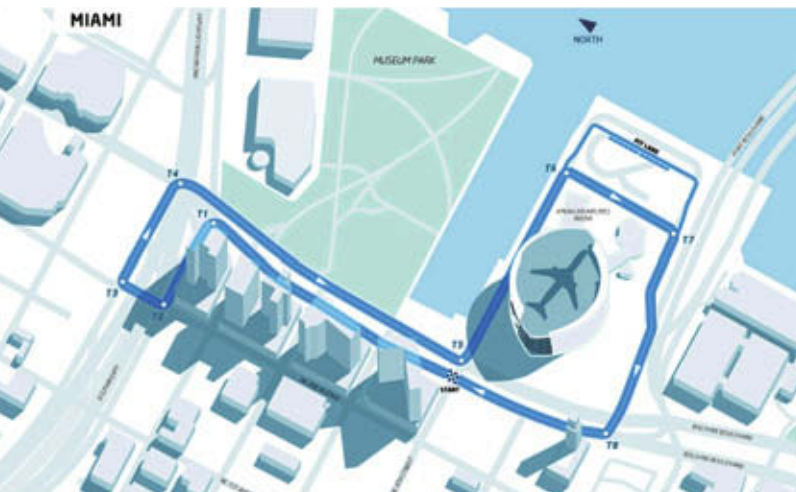
FOCUS

Chuck Martinez, General Manager of the Miami ePrix, oversaw the local production of the event, including promotion, marketing, operations and sales.



“WE NEEDED HUNDREDS OF PERMITS. NOT DOZENS, HUNDREDS.”

CHUCK MARTINEZ



start and was instrumental in agreeing a five-year agreement between Formula E and the city.

“From a political standpoint there are a lot of stakeholders but it really has been a transparent and smooth effort from the city, the county, the state, and the Florida Department of Transportation.”

The sustainability message was also very important for the viability of the event. “I don’t know that a traditional motorsport event would have been as warmly embraced by the city,” admits Martinez. “The city really is embracing that entire message of sustainability.”

To help further smooth the process, Martinez and his team met with all of the businesses, residents and local schools. “The reaction was mostly positive,” he says. “There have been some complaints and some people that would rather there was nothing but generally speaking everything has been positive, the complaints have been at a minimum.”

“We have been as accommodating as possible in terms of minimising disruption. All the construction of the track happens late at night so that people are sleeping. We have even disabled all of the reverse beepers on the trucks so as not to interrupt people when they’re sleeping.”

Interrupting traffic on a major highway has been the biggest hurdle for the organisers. “That really has been a challenge about how you go about even getting permission to do that,” he says. “We needed hundreds of permits. Not dozens, hundreds.”

In all, 163 permits were needed across construction, electrical, roads and infrastructure.

LEAVING IT LATE

It’s Friday afternoon in Downtown Miami. Biscayne Boulevard is unusually quiet as the local police close down the main road to allow construction on the circuit to be completed. All hands are on



Kevin Still, Formula E's Director of Operations, is prepared for all eventualities, including an unexpected rain storm the day before the race.

deck as teams of builders prepare to work through the night to get the track ready.

Unlike other events, the Miami track build did not start until just a few weeks before the event. The first blocks were laid down just over three weeks before the race itself. But a huge amount of work is still left to do over the next 24 hours.

“In other locations such as Beijing, where the track was in a park, you can actually construct in a much more relaxed manner,” says Kevin Still. “Here we’re building very quickly, closing the roads, finishing and getting out, so this is very much a compressed timescale within which we are working. There will be really long nights on Friday and Saturday to finish and leave.”

In addition to the track build, the other elements of the show are being put in place. The TV crews are putting the cameras up, the timing teams are inserting timing loops, the sponsor branding is going around the track and the sound system is being integrated.

Music plays an important role in Formula E so it is essential that all spectators hear the sound system.

“We use ‘line array’ speaker systems throughout the grandstands so there is a lot of cabling and a lot of graft that goes into installing it,” says Sam Cannon, Formula E’s very own Music Specialist. “The speaker systems are separated out equally so that everyone in each grandstand gets the same experience from one end to the other.”

HOMOLOGATION TIME

Its Saturday morning in downtown Miami and the FIA inspectors are out on the track. They have agreed to leave it until the last minute to give constructors as much time as possible to complete the track before the final inspection.

But this is the last stage of a longer process. The FIA has been involved in the design of the track from the beginning so the

inspectors are just checking that the final construction meets the standards that they have already approved.

“There’s a whole process of initial design work which goes to the FIA first,” says Still “They’ll approve the circuit then we’ll go into detailed design then lot’s of minor changes need to be made just to make the track safe to race on, culminating in that final racing license just hours before the race itself.”

Usually for a Formula E race, the FIA would do the final inspection on a Thursday or a Friday but in Miami it is on Saturday morning because of the time constraints. For homologation, the FIA is mainly looking at the safety of the track for the drivers. Inspectors will look at where the barriers are located, the chicanes and the run off areas. They will make sure that the driver is safe regardless of a mistake during the race.

At 8am on Saturday morning the stamp of approval is given from a safety point of view but work is still ongoing to finish the track. After a couple of unforeseen issues overnight, this work was delayed and the start of the event has been pushed back.

In the end it is just first practice that is affected. By 1030am all of the cars are out on track and the event is back on schedule.

BREATH OUT

It’s Saturday afternoon and Nico Prost has just lifted the race trophy to mark his first win in the series following an action packed ePrix.

The crowds flocked to the event with grandstands virtually full and hospitality sold out days before the race. Lucky locals with a view of the track from their balconies filled them with friends to get a first glimpse at this unique event in their city.

One man is happier than most. “The last 24 hours have been incredibly challenging,” says Martinez. “We had to finish about 20-30 per cent of the track in about 20 hours. We had road cars running in Miami at around 10am yesterday morning and today at ►



The cars raced on one of the major roads running through South Miami, which is usually used by over 100,000 people each day.



The grandstands were packed and hospitality sold out days before the race but some lucky locals had the best views of all from their balconies.

PHOTOGRAPHY: SHIVRAJ GOHIL / CURRENT E

For video, visit: www.fia.com/AUTO

about 1030am we had race cars on the same road. So to do that in about 24 hours is a feat. Ultimately we lost one practice session but we ran the race on time and everything else went well.”

He is especially pleased that the locals embraced the event. “I think people were very excited about it. You saw the balconies were full, you saw the grandstands were sold out, and hospitality was sold out. Andretti Sports Marketing is thrilled to be partnering with Formula E on this really unique event and we look forward to many more years of this.”

But before thoughts can turn to the future there is the small matter of putting things back to the way they were.

“We will take everything down and then restore it the way we found it,” says Martinez. “Our museum park has almost two acres of grass, which we’ll re-sow to leave that park the way we found it. In fact we’re going to leave things in better condition because we replaced all the paving and it will be brand new grass. This event is going to be here for five years and hopefully longer so we want to make sure there are no issues. We don’t want people to say something was damaged and it wasn’t repaired.”

For Kevin Still this is just one stop on a longer road. Next up is Long Beach, followed by Monaco and Berlin. Then there is the small matter of organising a race around Moscow’s Red Square before heading to London for the final event.

“We’re in a location for one day then we’ll move on and do the same thing somewhere else,” says Still. “We have six events in four months until the end of the season and of course these operations are all organised in parallel. We’ve got parallel teams working on different races, so there’s a lot of planning going on already.”

It’s Monday morning in Miami. The cars zip along the main road running down picturesque Biscayne Bay as commuters head to work and tourists flock to the many attractions along the harbour. Few would know that a major international event was held along the same stretch just 48 hours earlier.

But for the men and women who worked on the event, there is the quiet satisfaction of a job well done. ■

World Endurance Championship

THE LONG ROAD TO GLORY

With a fourth major manufacturer on board in the top LMP1 category, a revitalised grid in LMP2 and a tight battle in prospect in the GT class, this year's World Endurance Championship could well prove to be the most fascinating yet

TEXT: JUSTIN HYNES



At the close of an emotionally draining day in Sao Paulo last November, a day that saw one of his cars blown apart in a huge but thankfully injury-free smash and the other take a first win for his team, Porsche team principal Andreas Seidl summed up the World Endurance Championship project the company had initially described as a homecoming in brusquely simple terms. "Our 2014 mission is over," he said. "Now we're looking forward to 2015."

It might have seemed like a coldly matter-of-fact assessment of the team's rollercoaster first season back in the top level of sports car racing, but it ideally summed up the speed at which modern sport championships move.

Within two weeks of the Sao Paulo race Porsche were back in testing, grinding out hundreds of laps covering more than 1600km at Spain's Motorland Aragon circuit in preparation for the fast-approaching new season. A month later and 2014 WEC champions Toyota Racing were powering the team's updated TSO40 around the Paul Ricard circuit in the South of France. Audi, too, were soon in action, running their revised R18 e-tron Quattro at Aragon. The 2015 development arms race was well and truly on and with entry lists to be confirmed and season programmes to be finalised there wasn't a moment to lose.

Fast forward three months and those moments, all too brief, are gone, counted down in either a positive cycle of refinement and improvement or burned in a spiral of frustration and retrograde steps. And all the signs are that this season, which kicks off at Silverstone on 12 April, could be one of the WEC's most competitive and fascinating yet.

THE POWER PLAYERS

In the top LMP1 class four major motor manufacturers will battle it out for honours, all fielding radically different engineering solutions in their pursuit of glory.

At the head of the list are defending champions Toyota. The company's naturally-aspirated, 3.5 litre, hybrid V8 TSO40 won five of last season's eight rounds, four of those victories going to the pairing of Anthony Davidson and Sébastien Buemi.

The duo raced for much of the season without a third teammate but this year they will be joined in the number one car by last year's Le Mans polesitter Kazuki Nakajima. The second crew, featuring Bahrain 2014 winners Alex Wurz and Stéphane Sarrazin, will be joined by Briton Mike Conway.

Following the TSO40's maiden 2015 outing at Paul Ricard and a second test at Aragon, Toyota Motorsport technical director Pascal Vasselon explained that the new car had completed "some decent mileage".

"We have made some gains and we are happy that everything is going well," he said.

Vasselon also revealed that the 2015 version of the TSO40 is a substantially different machine from last year's title winner.

"We have revised 80 per cent of the car," he said recently, admitting also that the team is targeting the Le Mans win that has so far eluded it. "It would be great to win [Le Mans] because it's clearly a gap in our track record, but it shouldn't be an obsession. If we put too much pressure on ourselves, the stress at the track gets out of hand and that's not good. Our philosophy is to take each race as it comes and always have a goal in mind and that is to win. We hope, of course, that when we look at our victory tally at the end of the season that Le Mans is among them."

What the 80 per cent Vasselon refers to constitutes is, at the time of writing, still something of a mystery. WEC's rules governing the mandated hybrid systems allow teams to employ anything between 2 megajoules per lap and 8 MJ, with fuel restrictions applied as the amount increases, and Toyota, which ran in the 6 MJ class in 2014, is believed to be pursuing an 8 MJ solution, the benefit ►



coming from free power from the ERS and a smaller, lighter traditional fuel load.

“In an ideal world, the most efficient system will be an 8 MJ within the weight limit. There’s no mystery about that,” Vasselon said last season. “The question is really [if] we’re able to implement an 8 MJ system within the weight limit. I think we are all working to try to stretch our development to fit the highest possible hybrid class within the weight limit.”

Toyota’s target of adding Le Mans winners’ trophies to its cabinet means taking on the might of Audi, winners of the 13 of the last 15 Le Mans races, including the last five in a row.

Last year perhaps represented the team’s sternest challenge for some time, with Toyota taking pole position and leading until half distance. Following an electrical issue Audi swept into the lead but came under pressure from Porsche late in the race. However, despite two turbocharger failures, the Ingolstadt squad were able to take a one-two finish, the number two car of Andre Lotterer, Marcel Fässler and Benoît Tréluyer finishing ahead of the number one car of Tom Kristensen, Marc Gené and Lucas Di Grassi.

Fässler, Lotterer and Tréluyer return this year to defend their Le Mans title in the number seven Audi R18 e-tron Quattro, while following the retirement of nine-time Le Mans winner Kristensen the team’s number eight car will be driven by Di Grassi, Oliver Jarvis and Loïc Duval.

Audi hasn’t rested on its laurels either, building a new version of its 3.7-litre, V6, diesel-powered R18 e-tron Quattro that it says is hugely different to the 2014 iteration of the car. “[We] dug deep into areas of development that showed potential,” Audi’s head of LMP1 Christopher Reinke told Britain’s *Autosport* recently.



Last year’s champions Anthony Davidson and Sébastien Buemi (top) will return to defend their title with a substantially modified version of Toyota’s TS040.

LMP2: RETURN TO THE BIG TIME

After a 2014 season in which the LMP2 class, dedicated to teams independent of manufacturers and/or engine suppliers, was contested by just four cars, the grid is revitalised this year and boasts a 10-car entry that features five different manufacturers – Alpine, Ligier, Morgan, ORECA and Strakka Dome.

Last year’s LMP2 runners-up G-Drive Racing return with a two-car team, racing the Ligier JS P2-Nissan that proved so successful for them last year. Four-time race winner Roman Rusinov and Colombian Gustavo Yacaman are the two lead drivers named for the Russian team. Meanwhile, 2013 LMP2 champions OAK Racing return to the WEC in 2015, with team owner Jacques Nicolet named in the number 35 Ligier.

After claiming three LMP2 victories last year, KCMG will also return in 2015 with the new Nissan-powered ORECA 05 driven by Matt Howson.

Following two successful outings in 2014, American team Tequila Patron ESM will compete with a pair of Ligier JS P2 cars being readied for the 6 Hours of Spa-Francorchamps. The team had planned to race brand new HPD ARX 04B coupe chassis but have decided the chassis still requires further development.

After a difficult year of development in 2014, Strakka Racing will at last showcase the new Strakka Dome S103–Nissan this season, while double European Le Mans Series Champion Signatech Alpine is bringing the Nissan-powered Alpine A450B to the competition. Another team moving up from the ELMS is Team Morand. The Swiss team has formed a partnership with Japan’s SARD Racing to form a two-car entry for Team SARD Morand.



Last year’s LMP2 runners-up G-Drive Racing will return with champion Roman Rusinov at the wheel of its Ligier-Nissan car.

“I honestly believe – and it is more than a hope – that we have addressed thoroughly the weaknesses of the car and therefore we will be much stronger generally,” he added.

If that sounds ominous for Audi’s rivals then Le Mans winner Lotterer’s assessment of the new machine as “a good step over last year’s car” after testing at Sebring in the US is likely to cause sleepless nights in the design departments of Toyota’s Cologne base and at the Stuttgart headquarters of Porsche. Last season Audi ran in the 2 MJ class but is believed to be seeking a step up to 4 MJ this year.

Like Toyota, Porsche ran in the 6 MJ class last year and like the Japanese marque it too is also believed to be investigating a move to 8 MJ for its second full season in the WEC.

For the Stuttgart team, 2015 is a crucial year. The fanfare and goodwill surrounding the team’s return to top-level sports car racing at the beginning of last year after an absence of 16 years granted it a latitude in terms of performance it will not have this year. To coin some old racing parlance, there’s a year to learn and a year to win and Porsche’s learning curve is now over.

It’s a situation acknowledged by Wolfgang Hatz, Porsche AG’s R&D chief who also has responsibility for motor sport. “In 2015 we want to compete with an able-to-win package,” he says.

Hatz believes the team has the tools to do just that – a squad of heavily revised versions of its 919 Hybrid car.

“In 2014 we introduced a very brave powertrain concept for the 919 Hybrid and it instantly proved itself.” He says. “This enabled us to make the car’s second generation a comprehensive evolution instead of an entirely new development.”

One of those new developments is a third car, to be run at Le Mans. The two full-season cars will be driven by unchanged line-ups, with former F1 star Mark Webber, Timo Bernhard and Brendon Hartley racing the number 17 car and 2014 6 Hours of Sao Paulo winners Neel Jani, Marc Lieb and Romain Dumas lining up in the number 18 car.

NEW KID IN TOWN

Porsche’s third car, though, will bring a twist to Le Mans not seen for six years – an active Formula One driver racing at the Circuit de la Sarthe.

The last driver to mix a Formula One programme with an assault on the 24-Hour race was Le Mans native Sébastien Bourdais, who in 2009 raced for Toro Rosso in F1 and at Le Mans with Peugeot. The latest entrant in the category is Force India F1 regular Nico Hulkenberg, who will join fellow Le Mans rookie Earl Bamber from New Zealand and Briton Nick Tandy in Porsche’s number 19 car.

Hulkenberg’s first taste of top-level sports cars came back in 2011, with a test day for Peugeot, but since then the 27-year-old has focused solely on Formula One. Over the past couple of years, however, the German’s interest in sports car racing has been sparked once again.

“Being perfectly honest, it’s not something I’d wanted to do forever, like a childhood dream or anything, but over the last couple of years my interest has been raised and now it’s a really great championship, with good brands, good drivers,” he says.

“It’s a great challenge. An opportunity like this, to race in one of the most famous races in the world, one of motor sport’s most prestigious races, with a brand like Porsche, which has so much history there, was impossible to resist. It’s a unique opportunity.”

It’s also a unique test of his ability to adapt. After just a handful of tests, Hulkenberg will race F1’s Bahrain Grand Prix on April 19 before being blooded in the WEC at the 6 Hours of Spa-Francorchamps on May 2. He’ll then switch back to F1 with races in Spain, Monaco and Canada before he takes on the big one – Le Mans in June.

“It’s a pretty crazy schedule,” he admits. “And you’re switching driving styles all the time, but I think it’s doable. It is quite different. The two main differences are that it’s four-wheel drive and there’s ▶



F1 racer Nico Hulkenberg gets to grips with Porsche's 919 Hybrid during testing earlier this year.

traction control. That's pretty much a game-changer. Testing has been good so far, though, and I'm pushing hard. It's a different kind of racing and I'm really enjoying myself."

The new Porsche recruit admits that he has few expectations of his first Le Mans but says he is excited by the challenge.

"It's so new to me, I don't know what to expect in the race," he says. "I know what the car is like, I know what it's like in testing but I have no idea what to expect in racing. It's a massive challenge.

"I think the speed differential is definitely part of that challenge," he adds. "It's not something you experience in Formula One. I imagine that it's quite difficult; that you need to have a really good eye and very good judgement. It won't be so easy but it should be exciting."

THE REBEL FORCE

If Hulkenberg slotting into an evolution of a proven race-winning machine can be ranked as a "massive challenge" then Nissan's arrival into the top class can only be viewed as a task of Herculean proportions.

Not only has the Japanese manufacturer given itself a short time frame in which to upgrade its involvement from that of engine supplier in LMP2 (with its 4.5-litre V8 VK45 powerplant) and experimental race team (with its ZEOD electric race car that competed at Le Mans in 2014) to fully-fledged LMP1 manufacturer, but it is also intent on doing it in a radically different way.

The company's GTR LM NISMO takes established prototype sports car thinking and turns it on its head, firstly by being based in the US (well outside the LMP1's European heartland) but more importantly being both front-engined and front-wheel drive.

Powered by a twin turbocharged, 3.0 litre, direct injection petrol engine allied to a Flybrid energy recovery system, the car looks utterly different to any other LMP1 vehicle and approaches LMP1's technologically forgiving regulations in a unique way, as the team's technical director Ben Bowlby explains.

"We could have copied what Audi, Porsche and Toyota are doing, but it would have been difficult to beat them doing that," he says. "They've got more experience than we have and they have put a lot of resources into their cars.

"However, if you look at the regulations you'll see that while the aerodynamics at the rear of the cars are very controlled in terms of the wing you can run and the underbody diffuser, they're much more open at the front. There are opportunities in the regulations."

The result, half-race car, half-Batmobile, is a fascinating departure from established thinking, with the bulk of the weight and the aero shifted forward. It is in effect a traditional sports



prototype flipped 180 degrees. Huge amounts of air are shovelled through the dining table-sized front splitter, generating massive downforce. The air underneath the car is then channelled through two enormous tunnels created by removing bulky ancillaries such as radiators from the sidepods and moving them forward of the driver. The tunnels run the length the car and channel the air around the cockpit and out from the highly tapered tail section.

With all the downforce at the front, it makes sense in theory to put all the heavy bits there as well and with all that downforce at the front end, driving the front wheels makes sense too.

The ERS, meanwhile, recovers energy from the front axle, though it remains to be seen if it will deploy to the car's larger front wheels or the smaller rears.

It's a monumentally complex machine but one Darren Cox, Global Head of Brand, Sales and Marketing at Nissan's NISMO motor sport arm believes needed to be done.

"We had already had a very successful LMP2 programme at that point, the Delta Wing project we had been involved with had created a huge amount of headlines, and we were working on ZEOD," he says. "So the brief came down: if you wanted to go and win Le Mans what would you do? And between Ben and I and the engineers in Japan we came up with this direction.

"Nissan is a brand that focuses on challenging convention and we knew that motor sport had to be at the edge of that, pushing the boundaries," he adds. "We also had the right people in the right places and the regulations were there to support innovation."

Indeed, both Cox and Bowlby are quick to praise the regulations in force within the WEC as a strong factor in Nissan's decision to enter the top category.

"We're hugely supportive of this set of regulations," says Bowlby. "I think it is a very impressive opportunity and I'm not surprised that manufacturers are spending money in this series because I think it is newsworthy and fascinating and there is truly the ability to innovate.

"A lot of it is around hybridisation but frankly you've got a V4 direct injection, you've got a V8 port injection, as far as I know, you've got a diesel and you've got a V6 twin turbo direct injection," he adds. "It's not as if there has been one route chosen as the way to go. Maybe there will be some convergence in the future but right ▶

Nissan's GTR LM NISMO flips conventional sports car design on its head with a front-wheel drive, front-engined layout.



“IF YOU GENUINELY HAVE A FASCINATING TECHNICAL BATTLE GOING ON, THAT IS QUITE COMPELLING”

BEN BOWLBY, NISSAN

now the engines are different, the energy recovery systems are different and now our car sets apart some of the layout of the vehicle. That's great. It makes it so much more interesting; to sit there and wonder 'is that clever or is that stupid?' Or to say 'I kind of hope this one wins because I think this one's cooler than that one'. That's a debate you want to have.

“You don't want it to be a predetermined result. You want it to be a credible technical challenge. Creating spectacle holds people's attention for a very short time but if you genuinely have a fascinating technical battle going on, that is quite compelling and it's very important in motor sport that we recognise, and so do the rulemakers, that we need to create places for manufacturers, or anybody, to compete in a technically interesting area. There are places for spec series and there are places for open innovation and the excitement here is that we are innovating and that's why we



LMGTE PRO: CAN ANYONE TAME THE PRANCING HORSE?

Triple World Champions Ferrari return to defend their title with a two-car entry run by AF Corse and featuring champion Gianmaria Bruni (above) and fellow Italian Davide Rigon. The Italians will face fierce opposition from a two-car entry by Porsche Team Manthey and a three-car assault by Aston Martin Racing.

Two race wins and second place in the manufacturers title last season gives Porsche a strong foundation on which to launch its 2015 campaign but nothing less than the world title will be good enough for the 2013 24 Hours of Le Mans class champions. It will race with lead drivers Richard Lietz and Patrick Pilet.

Aston Martin Racing will race three cars after partner Young Driver's entry, which won the LMGTE Am category in 2014, moves to the Pro class. The all-Danish line-up of Nicki Thiim and Christoffer Nygaard are joined by newcomer Marco Sørensen.

have such a committed group of people that are working so hard and are so motivated to get an end result.”

Then danger with cramming radical innovation into such a compressed time frame and with a limited budget is that somewhere along the line something is bound to give.

In Nissan's case it has been several somethings. After first running at the Circuit of the Americas in Austin, Texas in January and then conducting straight line tests at the Michelin Proving Grounds in South Carolina, the team took its barely-built racer to Florida's Palm Beach International Raceway, with drivers Olivier Pla and highly-regarded youngster Harry Tincknell set to give the car a workout. It didn't go according to plan, however, as brake problems, difficulties with the ERS and the brake-by-wire system kept the car garage-bound for long stretches.

Fast forward a couple of weeks and at the team's final pre-WEC Prologue test at Sebring, component failure with engine mountings led the team to halt running.

With development behind schedule and homologation problems brewing, the painful decision was eventually taken to abandon plans to race at the first two events of the WEC season and to delay the GTR LM's debut until Le Mans.

Missing the deadline was a possibility Bowlby was aware of at the test in Palm Beach.

“The challenge with a hybrid racing car is extreme,” he said in Florida. “The technology is not something that anyone is very comfortable or used to, so it's very challenging to get all the systems that support it right.

“We're horribly short of time but at the end of the day Nissan

made a decision to get going on it and they're to be applauded on it. They've done a wonderfully innovative car and that's a very brave and exciting step but innovation can be tough and it can hurt sometimes. I'm sure we'll lose a lot of sleep but at the end of the day we all have an expectation of ultimately being successful. However, how quickly we get there is the challenge.”

The team principal insisted, however, that stretching the deadline to breaking points is a necessity.

“If you're completely comfortable months before the start of the first race you've probably got a slow car,” he said. “It's your duty on the design side to use every last moment for development and picking the best technology directions.”

Cox, meanwhile, insists that Le Mans has always been the team's focus.

“We are very much focused on Le Mans this year and then we will turn our attention to the WEC post-Le Mans,” he says. “We want to be credible, we want to show that we are not there with a garage 56 philosophy, that we are there to compete, and that means being credible. If we can get one of the cars to the end without a reliability issue we will be very happy. And then who knows. At that point if it has rained, if everyone else has fallen off, if Porsche's redesign hasn't worked, who knows? All we can do is what we can do and that is get one car to the end without a mechanical issue and we would be very happy.”

PRIVATEER RAIDS

The presence of Nissan's envelope-pushing GTR LM later in the season and the potential it might have to alter the balance of power in the top category is just one thread of a potentially fascinating LMP1 season.

As well as the four major manufacturer teams, two privateer teams will also compete in the category with last year's runaway privateer champions Rebellion Racing returning to defend their crown, though like Nissan they will late to the party, with the team set to miss the opening round owing to the time needed to switch its R-One cars from running with naturally aspirated Toyota RV8K-LM 3.4 litre V8 engines to new and highly regarded AER P60 V6 GDI twin-turbo engines.

They'll be challenged by the new ByKolles team, born out of the old Lotus squad. They'll enter a single CLM P1/01 car, driven by former F1 racer Vitantonio Liuzzi, Simon Trummer and Pierre Kaffer.

With four wildly different engineering solution used by the major manufacturers and with two privateer teams battling it out with more conventional, though no less advanced, technology, the 2015 season in WEC's top category is set to be an enthralling battle. ■



The ByKolles team will compete in LMP2 with former F1 driver Tonio Liuzzi at the wheel of its CLM P1/01 car.

FOCUS

PHOTOGRAPHY: CHRIS GARRISON, DDPPI

Legends

**"I WAS NUTS
ABOUT RACING
AND THERE
I WAS, IN MY
TWENTIES,
RIGHT IN THE
THICK OF IT"**

From young dealer-wheeler to legendary Formula One team boss, they don't make them like Sir Frank Williams any more. And at 72 years old, he still feels 'the need for speed'...

TEXT: TONY THOMAS



Michael Cave – a very posh stockbroker, a very funny guy, a lovely man – and another guy called Nigel Pilkington. They shared it. It was a real boy racer car – made a lovely noise and had big stickers on, with circles on the side, and I was off flashing around in it.”

A predictable series of young tyro scrapes ensued, during the course of which Frank came across another racing Williams – Jonathan (no relation), who would become a “fierce competitor”.

And propitiously for the sweep of F1 history, JW and FW became buddies beyond their track rivalry – so much so that when the somewhat wealthier Jonathan decided to undertake a European racing campaign in 1963, he offered Frank a lift to a new life. Williams, F needed no prompting.

“All I wanted to do was go racing and get to single-seaters and see how good I was or wasn’t,” Frank remembers. “I ran out of money in ’62, and although by the beginning of ’63 I’d got the Austin together, I couldn’t afford the fuel to get to the first race.”

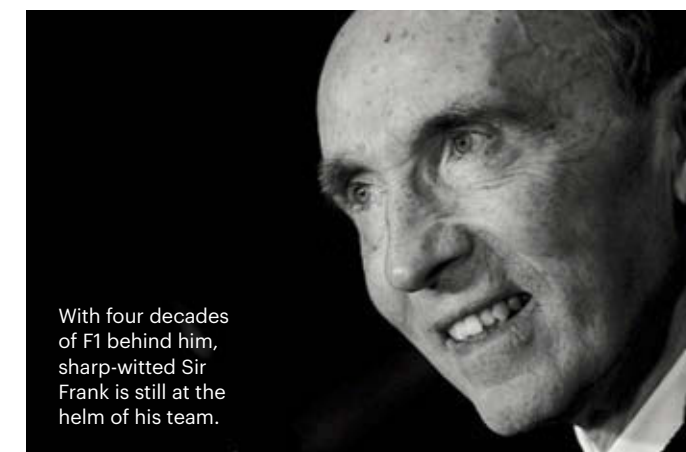
“Jonathan came to me – he knew I’d have to sell the car – and said: ‘Look Frank, I’m going on a tour of European races in my VW pick-up. Do you want to come with me?’

“He didn’t say I’d be his ‘gopher’ because the term wasn’t used then, but I said ‘terrific’. It helped me escape my creditors... I had a canvas roof over my head, somewhere to sleep. And that’s where this place [Frank rolls his head to indicate the many acres of land now occupied by Williams’ HQ in Grove, Oxfordshire] began if you like.

“I met all sorts of foreigners, continental guys, and every time we went back I was ‘hoarding’, so to speak. I’d get four sets of Dunlops from *him*, two sets of Hewland gear ratios from *him* – and it went on. More tonnage in the VW for the FW sales department than for the Jonathan Williams racing department! And that’s how this business started. It was easy to survive a summer living in a hotel a couple of nights a week and the rest under canvas. When you’re 20 it’s fantastic. I was nuts about racing and there I was, in the thick of it.”

Deal-followed-hustle-followed-deal and by late ’68, Frank was ready to shoot for the stars and become an F1 entrant. He’d spotted a Brabham BT26 in identical spec to that raced by the works F1 team, being used by a hill-climb entrant. FW reckoned he’d be able to employ it more gainfully as a circuit racer and persuaded its owner to sell, “for £5000 exactly”.

The details of the transaction are lost in the fog of combat, but one version has it that Jack Brabham, triple world champ and team owner, understood Williams would be using the Ron Tauranac-designed chassis in the non-world championship Tasman Series: i.e. away from direct competition with the works team. Frank had a slightly different understanding and bolted a Cosworth DFV to the monocoque, added Dunlops (better than the works team’s Goodyears) and dropped the splendidly talented Piers Courage into the cockpit. This was a potent package – and Brabham knew it. ▶



With four decades of F1 behind him, sharp-witted Sir Frank is still at the helm of his team.

here’s a picture of Frank Williams, from the 1970 Austrian Grand Prix, that can’t fail to raise a smile.

A very youthful FW, just 28, in his second year as a Formula One team boss, is dressed in a too-tight T-shirt that proclaims ‘Jochen Rindt Fan Club’ (see right). His toothsome grin is wide enough to crack a camera lens and there’s a twinkle in each eye that leaves no room for doubt: he’s having the time of his life.

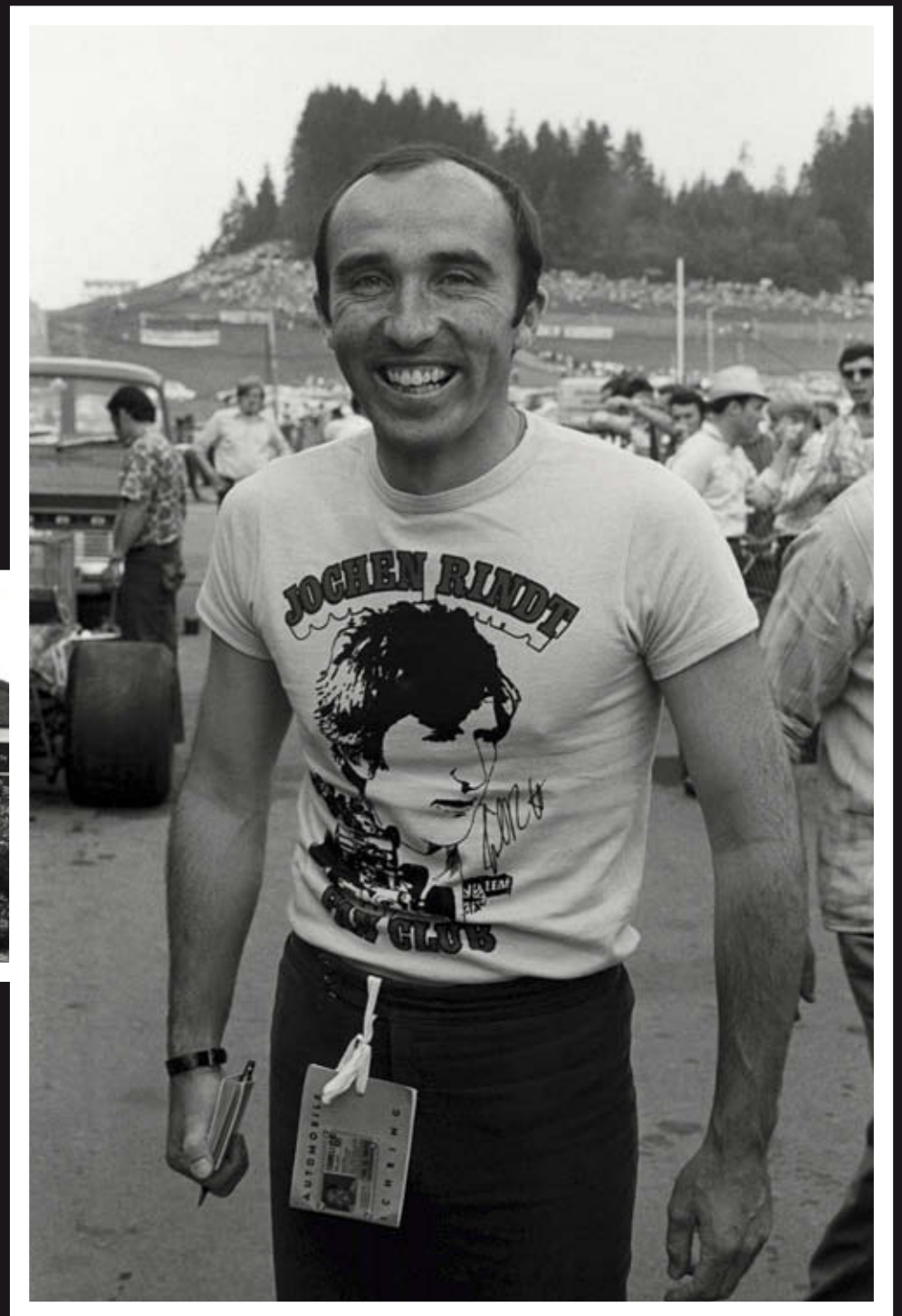
It was year two of the Frank Williams F1 adventure and this shoestring privateer, a multi-lingual buccaneer with whip-crack wits and engaging charm (still happily evident over 40 years on, at age 72), can’t quite believe his luck. A lad from South Shields, in England’s north-east, who’d earned his first pennies selling crumpets from a bread van (“Yes, crumpets,” insists Sir Frank, “no sniggering at the back”) was rubbing shoulders and trading paint with F1 legends who just a few years earlier had been untouchable gods. “When I was in F3 or Formula Junior as it was then,” he says, “just 19 or 20, I’d find myself staring and saying ‘wow, that’s Jack Brabham, that’s Jackie Stewart.’”

He would become one of their peers soon enough, using languages and barter skills to buy and sell spares at the centre of the whirl that was the early ’60s continental racing scene.

But in those early Romany-Gypsy racing days, F1 was still a few years off for a boy who’d first developed a fascination with cars reading *The Autocar* and *Motor* while incarcerated at a Scottish boarding school. Duly smitten and with life-path set, he found himself bunking off to campaign a mash-up Austin A35 fitted with A40 mechanicals in saloon car racing.

“I don’t remember the precise sequence,” says Sir Frank, in that unmistakable clipped whisper, “but certainly I bought for £400 in 1959 an Austin A35, registration number UYX 930, from a guy called

Right: FW at the 1970 Austrian GP – living the dream... Below: The Iso-Marlboro F1 team truck resides outside the Frank Williams Racing Cars factory at Slough, Berkshire, in 1973.



“ALL I WANTED TO DO WAS GO RACING AND GET TO SINGLE-SEATERS AND SEE HOW GOOD I WAS OR WASN’T.”



Far left: with long-time Williams collaborate Patrick Head. Left: talking shop with 1992 world champion Nigel Mansell. Below left: Sir Frank in '81.

“PIERS WAS A FANTASTIC PERSON. IN THE RIGHT CAR HE COULD HAVE BEEN CHAMPION.”



Piers Courage showed his and Williams' potential in 1969 with two second-place finishes in a Dunlop-shod, Cosworth-powered Brabham BT26, much to Jack Brabham's ire...



Above: Alan Jones, viewed by many as the archetypal Williams driver, was the team's first world champion in 1980. Below: Ayrton Senna tested an FW08C at Donington in 1983.



“The day we bought the car,” says Williams, “Black Jack really was a black Jack that day, I can tell you. He was *furiosus*. Livid. He knew we'd have an advantage as Goodyear were new to the sport. And it was a remarkably good season for us.”

From 10 starts, Courage took two seconds (Monaco, USA) and two fifths (Britain, Italy) flaunting the fabulous car control that had caught Williams' eye in junior racing.

High times – almost unbelievably so for a plucky new boy who less than a decade earlier had been living off little more than his wits – to be followed by a desperate low.

Five races into the 1970 F1 season, Courage, by now driving a less competitive Williams-entered De Tomaso, was killed in an accident at the Dutch GP. Forty-five years on, Sir Frank still feels that loss keenly.

“I was broken-hearted,” he says, “very tearful. Piers was a fantastic person and at the funeral there wasn't another racing driver who had a dry eye. Even Jack Brabham was a bit sort of... you know. Because Piers was just that sort of guy. A charming, charming man. They don't make people like that any more, a bit of old England and with his beautiful wife and background [Courage was an Old Etonian and heir to the Courage brewing dynasty] he was a bit of a dream for the newspaper boys.

“He was a happy-go-lucky guy and very amusing. Just a great guy. Jochen and Jackie Stewart were that bit quicker then, but in the right car Piers could have been a world champion.”

For all the anguish – these were, after all, F1's ‘killer years’ – never once did Sir Frank doubt that he wanted to remain in the sport.

“I was deep in it, in every sense of the word,” he says. “I had to keep going. I suppose I was born with a certain dollop of irresponsibility and in those days it was easier. And I was always... what's the word... ‘optimistic’ about the future, so I thought I would stick at it a bit longer. Formula One was burgeoning at that time, you see, so I never thought about stopping.”

TRAGEDY TO TRIUMPH

Stick at it he did, surviving taunts of ‘wanker Williams’ from those who mocked his impecuniosity and the indignity of having to field work calls from a phone box after the factory landline was cut off. The early- to mid-'70s were difficult years indeed for Frank Williams Racing Cars, as it was then, with the team forced to campaign a series of sub-prime customer March cars, the unlovely Iso-Marlboro and an ex-James Hunt Hesketh 308. By this stage, 1976, Sir Frank had sold a major stake of his team to Canadian oil entrepreneur Walter Wolf and come season's end their partnership faltered.

Frank, however, already had ambitions to establish a new team, one that during different periods of the next two decades would dominate F1: Williams Grand Prix Engineering.

This titan of a team, one that would go on to win nine constructors' titles (to date), was founded on the partnership forged between Sir Frank and the equally legendary engineer, Patrick Head, these days retired from front-line F1 duties.

“I realised,” Frank reflects, “that I was not competent to be in charge of a competitive Formula One team that needed to develop every season and design a better car every year. We just didn't have the people. I didn't have the know-how to find the right people, either. But I was introduced to Patrick by [ex-F1 driver] Guy Edwards. He said, ‘Patrick's pissing around building boats, but he's a very clever man. Lola rate him very highly indeed. And they said it was a shame he wasn't in F1.’ Guy was right. We met and we got on pretty well straight away.”

They went racing in 1977 with a March 761, driven by Patrick Nève, but the first true fruits of their partnership were seen a year later in the form of the elegant, neat and efficient FW06 – a car that would come to be viewed as a clear statement of the team's intent. ▶

FOCUS



“PATRICK WAS AN OUTSTANDING ENGINEER. HE SET UP DISCIPLINES HERE WHICH STILL STAND.”

With the o6, Williams were for the first time competing as a constructor and while the chassis was trumped in 1978 by rival Lotus's pioneering introduction of ground-effect aerodynamics, the FW07, introduced for '79, proved to be a masterpiece and a winner through to '81.

Those late-'70s-early-'80s years confirmed Williams as winners, then champions and established a beach-head from which to essay still greater success in the '80s and '90s. A few stats bear inclusion, for any who may have forgotten Williams' creds: 114 wins since the first at the 1979 British GP; nine constructors' titles since 1980; seven world champions: Alan Jones, Keke Rosberg, Nelson Piquet, Nigel Mansell, Alain Prost, Damon Hill and Jacques Villeneuve.

Pretty bloody starry.

Sir Frank, with remarkable generosity for a man whose name remains above the door, says Head deserves the greater share of credit for the team's success: "Patrick did a fantastic job for himself and for Formula One and for Williams," he says. "I mean he made this company, not me. I was pretty handy at finding the dosh – but on the back of his success and beautiful cars."

And he offers an amusing insight into the dynamic of their enduring relationship: "I talk to Patrick as often as I can. He comes in about once a fortnight and he sits in that chair right *there* [opposite Frank, across his expansive desk] and I think: 'Right, I'm going to get a bollocking today!'"

The anecdote is shared with great warmth and Sir Frank's affection-laced respect for Head is obvious in every word: "He was an outstanding engineer, you see. And a very forceful person. He set up a number of mechanical engineering disciplines here which still stand, in terms of inspection and rigorous procedures governing the way in which parts are manufactured."

'He knew his role and I knew mine' is the essence of Sir Frank's exposition and he colours it thus: "I'll have to get this story right... Once, there was some must-have component that was in very short supply. Patrick had said 'we need that stuff', explaining some of his worries, so I thought I'd be a smart Alec and went out and bought a lot of these things.

"When Patrick found out he shouted: 'You f**ing idiot! I've got quite enough and you don't need to be pissing company money away!' He gave me *such* a bollocking about it. But he was right: I was trying to be helpful about something about which I knew nothing. It's probably still in the stores now."

The strength of the Williams-Head alliance was stress-tested to the limit in 1986, of course, when Sir Frank was involved in a car accident that has left him quadriplegic and wheelchair-bound since that fateful March 6.

"It was at night, we were on a country lane," he recounts. "There were no road lights coming... All the road's yours... We were on our way back from the French test at Ricard [near Marseilles] and I lost it.

"I remember [team manager] Peter Windsor, who was in the car with me, saying two minutes earlier: 'Frank, do you always drive like this?' We were late for the plane. And he was actually saying in a nice way: 'For f**k's sake, slow down', which I didn't and I lost it and went off and we ended up upside-down in a ditch, car on its roof, with my head supporting the roof."

Williams' recollection of the accident remains completely clear: "I remember when it hurt. There was a sharp pain when rolling – and I'd rolled lots of times before – and I thought 'it shouldn't hurt like this.'"

He was hospitalised in France for nine weeks, "with no second thought that I would go back to work", and even in his life-threatening condition the restless energy that had taken Sir Frank to the top of the motor sport world needed an outlet.

"After five weeks, I got a visitor to take me out," he grins, eyes a-twinkle. "They don't like you lying in bed all day and all night, because you get bed sores and very stiff and so on, so they got me out of bed every day for a few hours. And I went off with a mate and one of the nurses... And the surgeon who fixed me up couldn't believe it, whereas I didn't think it was anything unusual at all. He said: 'You get straight back in your bed immediately or I'm not going to look after you any more.'"

Sir Frank's family took his injury less lightly and he recalls his late wife Ginny being "not very impressed, because she had a problem on her hands". His three children were also understandably disturbed by what had happened to their dad: "My kids were a bit surprised and tearful to begin with," he says. "But they got used to it, you know... It's a bit like when the dog dies. You go out and buy another one. And I was a bit worried about that, but of course you can't go out and buy another one of me, so it was no problem."

One of those 'kids', Frank's daughter Claire, has risen through the team to become deputy team principal and ensure the presence of a senior 'Williams' at Williams long after its founder departs the hot seat. Son Jonathan also works 'in the family business', overseeing heritage operations, among other roles.

For now though, as Sir Frank is delighted to confirm, he's "still in charge" and "not going to go anywhere just yet".

Why would he? "I've had a fantastic life," he says. "I bet few people have a life as good as me. It's like *Top Gun*, my favourite film: 'I feel the need... the need for speed.' And that's what it's all about." ■

PHOTOGRAPHY: LAT, SUTTON IMAGES, DPPI, WILLIAMS F1 TEAM



Daughter Claire, above, works alongside Sir Frank as Williams' deputy team principal. Right: with Head of Vehicle Performance and fellow northerner, Rob Smedley.



Valtteri Bottas in last year's Mercedes-powered FW36, when the renamed Williams Martini Racing enjoyed a return to form, finishing third in the team points.

Click-and-collect cars

THE SHIFTING SHOWROOM

With research suggesting that car-buying priorities are undergoing a radical shift, auto makers are responding by moving sales out of traditional dealerships and into shopping malls.

Is this how you'll buy your next car?

TEXT: JUSTIN HYNES



BUY NOW

The traditional car-buying experience has always been a strange mix of pleasure and pain. The former arrived in the sensory overload of pin-sharp paintwork, plush upholstery, glowing dashboard lights and, of course, the unmistakable new car smell that instantly turned even the most casual browser into a potential buyer.

The pain, unfortunately, routinely stemmed from the exclusive, often disdainful atmosphere of many traditional dealerships, an environment in which commission-hungry salesmen (and by and large they have always been male) heaped pressure on customers, deluged them with technobabble and bewildered them with a plethora of confusing extras packages and complex finance options.

That experience may be about to change, however, as potential buyers desert the traditional model for a new world of pop-up, digital-first showrooms staffed mainly by women, and internet-based car purchases founded on model choices made at home with hard bargaining conducted via comparison sites.

The leading edge of this potential sea change in purchasing habits is a shift by manufacturers from out-of-town dealerships – traditionally visited in bulk on a weekend by a family seeking to compare models and prices – to the more casually friendly retail environment of shopping malls.

Last November, in the UK, Hyundai entered into a partnership with digital sales operation Rockar to open a showroom in one of Europe's largest shopping centres, Bluewater in Kent. Wedged in between shops selling beauty products and children's toys, the store aims to give customers the chance to view Hyundai's product range in a low-pressure environment, where through the use of screens they can configure the car of their choice, book test drives or even complete a purchase without the need to talk to a salesperson.

Of the initiative, Rockar founder Simon Dixon said: "Our independent research has revealed that almost 40 per cent of Britons are more likely to buy a car if they can avoid talking to salesmen. Almost half say they'd be more likely to buy a car if it was as easy as buying clothes, food and gadgets." ▶



Colour it your way.



The Hyundai store at Bluewater shopping centre offers a digital and more female-friendly experience.



“IN SIX MINUTES, 120 PEOPLE WALKED PAST THE STORE. AND THIS WAS A THURSDAY AT 11AM.”

TONY WHITEHORN, HYUNDAI UK

FOCUS

If advice is required, customers can turn away from the Apple Store-influenced interactive screens and consult one of 18 ‘product angels’ – 13 of them women – and take a test drive from the service centre downstairs: on their own, if they like, thanks to GPS tracking.

The approach appeals to Hyundai. “In six minutes, 120 people walked past,” Tony Whitehorn, head of Hyundai in the UK, told the *Financial Times* on the store’s launch. “This was a Thursday at 11am.”

With the shopping mall generating 27 million visitors per annum and footfall declining at traditional dealerships in recent years the positive aspects of the equation are obvious, especially in light of figures from market researcher Nielsen, which suggest that over the last 10 years in the UK the average number of dealer visits has dropped from seven to 1.5 per purchase.

That reduced number is emblematic of a decline in the appeal of traditional dealerships. According to a recent report by Wall Street trading analyst Bernstein Research, the number of European car retailers has dropped by 12 per cent from a peak in 2007, with the number of main dealers in Western Europe falling from nearly 54,000 in 2007 to 48,000 in 2013.

That decline does, of course, coincide with the global economic downturn and does not reflect recent upswings in car sales worldwide, but the contraction is unlikely to be reversed and according to automotive research organisation ICDP a “pragmatic” estimate is that a third of dealerships in Western Europe – the equivalent of 14,000 outlets – will close by the end of the decade.

The shift away from dealerships is not solely predicated on fluctuating sales, however. The whole way in which people view car purchase is changing.

In a recent report on auto trends for 2015, research company Strategy&, part of the vast PwC group, offered the following: “Consumers want a seamless car-buying experience that includes the purchase decision, financing and insurance — and both customers and dealers are motivated to speed up the transaction.

“Most vehicle purchasers browse online to gather information, and although they may still want a test drive, many have said they would like an online ‘buy now’ button and a no-pressure purchasing experience. Obviously, even as the Internet gains in importance as a shopping channel, dealers will still want to use the test drive as a way to get face-to-face with consumers and close a sale. Accommodating these shifting attitudes about buying a car will require equal changes to dealers’ processes, including investment in new technology.”

That “no-pressure” experience is particularly relevant for female customers, a segment that has historically felt excluded from the car-buying process, with some 43 per cent saying they felt patronised by dealers during the purchasing process and more than 40 per cent saying they would not buy a car from a dealer unless accompanied by a male associate. However, according to consulting firm Frost & Sullivan, women are considered an “influencer” on a massive 80 per cent of all new-car purchases. There is clearly a costly disconnect.

Car makers are responding with another shift away from the traditional dealer experience. Last year Nissan debuted its ‘Ladies First’ dealership, mostly managed and staffed by women. The dealership, in a Tokyo suburb, features stylish interiors, a nursing room and an area where children can play, and aims to make the shopping experience more inviting to women and first-time buyers.

The concept is not a one-off either and the firm is this year set to roll out 300 such dealerships across Japan, with expansion to overseas markets being considered.

It is not just negative experiences at dealerships that are hurting traditional models, however. With cars becoming ever-more reliable both mechanically and in terms of the quality of the driving experience, customers are less inclined to demand a test drive or a pre-purchase hands-on experience, instead relying on Internet research to give them the car performance clues they need.

PHOTOGRAPHY: SHUTTERSTOCK

According to research conducted by Google, 59 per cent of car buyers did their vehicle comparison online in 2011, and that number will only increase as cars move from being a purchase centred on automotive performance to an extension of a user’s smartphone.

A study released by US research firm GfK Automotive found that five of the top 10 features consumers seek when shopping for their next vehicle are infotainment-related, including USB ports, hands-free calling and portable music adaptors. With 50 per cent of the deciding factor of car purchase revolving around equipment that can be selected without a hands-on experience, the rise of showrooms that eschew traditional vehicle presence and test drives in favour of digitally-based comparison and customisation seems inevitable.

In this regard the mall experience represents a halfway house between pure Internet purchase and real-world shopping, and Hyundai is not the only manufacturer venturing into the retail world.

US electric car brand Tesla has resolutely avoided the dealership model and instead opted to focus on shopping centre showrooms and online sales.

“Traditionally a car company designs, engineers and builds a car it thinks the public will want,” said George Blankenship, Tesla’s VP of Sales and Ownership Experience, in an interview with US website *AutoTrader.com*. “But even though that company has invested all this energy in the process, when they hand it off to the dealer the customer experience is out of their hands, and the dealer’s motivations are driven by the desire to sell as many cars as possible every day, which doesn’t lend itself to a happy customer.

“We want to engage with people when they are not thinking about buying a car,” he added. “Our goal is not to sell a person a car, but to educate them on what electric cars and particularly what ▶



“WITH AUDI CITY, WE ARE CREATING A ONE-STOP-SHOP FOR EXPERIENCING OUR BRAND.”

PETER SCHWARZENBAUER, AUDI

The Audi City digital showroom in London has out-performed its best-selling dealership since opening.

Tesla electric cars can provide. At a mall, people are already relaxed and out shopping on their own. Most of them will likely never have heard of Tesla, and so we are becoming part of their daily routines.”

The mall experience is also being keenly eyed by established brands such as Lexus, whose US Group Vice-President Jeff Bracken recently said that the concept is one it may look at in the future.

“The model that Tesla has to open up their outlets in shopping malls is a clever one, [and] I think they’re getting a lot of folks to stop in and learn about Tesla,” he said. “We’re interested to watch what [Tesla does], how the business model works and what kind of customers wander into their outlets. That’s really interesting to us.”

In most cases the shopping centre outlet exists as an extension of firms’ online retail presence, with the hi-def screens and interactive experience being linked to an eventual online purchase.

Audi was one of the first manufacturers to pioneer digital showrooms. In 2012 the firm opened its first digital-only showroom, Audi City, at its flagship UK store in central London. Twenty more have been opened worldwide since then.

“Audi City combines the best of two worlds – digital product presentation and personal contact with the dealer,” said the company’s marketing chief Peter Schwarzenbauer.

“People are placing greater emphasis than ever before on a direct and personal bond of trust with their vehicle brand – especially in respect of the increasing variety of products and available information. With Audi City, we are creating a one-stop-shop for experiencing our brand. It is right in the midst of our customers’ lives, yet seamlessly connected to the online range offered by Audi.”

As with so many other areas of retail, it may ultimately be the online shopping experience that becomes the norm as the trend for customers to do their research online grows and car ownership increasingly parallels white goods purchase.

Frost & Sullivan predicts that online car sales will increase eightfold between 2011 and 2025 to reach a value of \$4.5 billion, accounting for just under one in every five new car purchases. The firm adds that in high-value markets such as the US and UK, online sales could make up a quarter of the market in 10 years’ time. Research by GfK Automotive recently revealed that a third of those aged under 35 would buy a car online.

The message has not been lost on manufacturers, with Nissan, Jaguar Land Rover, Mini and Mercedes rushing to develop digital showrooms linked to online sales platforms. And if proof were needed of the success of such a model, Audi reported 60 per cent more sales in the first 10 months of operation of its London digital store and a higher price achieved than at its best-selling dealership.

However, the rush to embrace alternative sales points doesn’t quite amount to a death sentence for traditional dealerships, with most insisting that, for the moment at least, these new outlets will exist in parallel with their dealer networks.

“If we were to consider [mall showrooms], we would keep our dealers as part of the solution,” Lexus’s Bracken insisted. “But it’s intriguing if young folk are telling us they don’t look forward to going to a dealership, but they still have an interest in buying a vehicle. [If] that’s an outlet that could work for them, we need to look at that.”

Hyundai’s Whitehorn insists likewise, saying that its shopping centre presence is “an exciting addition to our existing dealer network”, although the company admitted it had identified seven other malls it felt could host similar digital showrooms.

Regardless of how manufacturers wish to position themselves in the transition, it seems clear that a gradual shift is taking place. The days of a family of 2+2 adults and children spending a Saturday afternoon touring an industrial estate complex of cathedral-sized showrooms and being bamboozled by sales patter may, after more than 60 years, be coming to an end, to be replaced by an era of comparison sites, customisation and click-to-buy motoring. ■

Stefano Domenicali is dovetailing his Single-Seater Commission role with an as yet unspecified job at Audi...



Stefano Domenicali

SINGLE MINDDED

Far from stepping back from motor sport, former Ferrari F1 Team Principal Stefano Domenicali is taking on broader challenges - working for Audi while redefining junior racing's pathway to the top as President of the FIA's Single-Seater Commission

TEXT: JUSTIN HYNES PHOTOGRAPHY: THOMAS BUTLER

To say that Audi has its headquarters in the town of Ingolstadt in Bavaria is something of an understatement. To a greater or lesser degree Audi is Ingolstadt. The company's vast complex of manufacturing facilities, office blocks, research campuses and training facilities dominates the landscape, giving the city the feel of a 21st-century version of a model town thriving off the munificence of an industrial powerhouse.

In the midst of this enormous city within a city is the Audi Forum, the brand showcase. Here is Audi's spectacular museum, charting the growth of the company from late 19th-century engineering curiosity to globe-spanning automotive giant through a multi-level display at the centre of which is a massive revolving tableau of constantly refreshed historic models.

It's in a nondescript office in Audi's financial services building that Stefano Domenicali waits. After last year's parting of ways with a Ferrari Formula One team going through a convulsive period of change, the former team boss has taken up a role at Audi under the vague title of new business manager.

In a world fuelled by the addition of two and two into a resultant five, F1 paddock speculation has naturally ascribed to Domenicali the role of point man for a future Audi F1 project.

In the blank canvas of Domenicali's office on the board-level floor of the company there are no clues as to his current role and the genial Italian laughs when the irresistible, off-hand question of "so what are you up to now?" is launched.

"At the moment it's about getting settled in," he says, pointing to a whiteboard littered with post-it notes featuring key German words

facing his desk, which is bare save for an Apple MacBook, a must-have map of the Audi facility and a phone. "There is a lot to learn when you come to a company like this, it takes time to find your feet."

While Domenicali's Audi role is unspecified as yet, the task he will pursue in parallel is defined, and it's his position as new President of the FIA's Single-Seater Commission that he wants to discuss today.

The commission is the body within the FIA structure that sets the agenda for all formula category racing outside of Formula One and over the past four years, under the stewardship of former grand prix great Gerhard Berger, the commission began a monumentally ambitious project - the redefinition of the racing ladder for drivers moving on from karting with a view to climbing all the way to the world's premier single-seater championship, F1.

The first fruits of that labour have already been delivered in the form of a remodelled and reinvigorated Formula 3 European Championship. It is aimed at drivers with experience of 'slicks and wings' racing but in need of a step towards greater power and a more involved racing process - dealing with complex car configuration changes, a greater number of engineering staff and ultimately a more rarefied level of competition.

The series, which runs on the same weekends as Germany's hugely successful DTM touring car series and rounds of the FIA's World Endurance Championship, has already proved its potential, vaulting it's pre-eminent drivers farther up the ladder than many expected. Raffaele Marciello, the 2013 winner, is racing in GP2, the current rung just below Formula One, and is part of Ferrari's driver academy, while 2014 winner Esteban Ocon recently tested F1 machinery for the Lotus team and is expected to make the step up to the premier series sooner rather than later. ▶

It's last year's third-placed driver who has really put the series on the racing map, however. Having only moved from karting to the new FIA F3 championship at the start of last season, Max Verstappen went on to claim 10 race wins and immediate promotion to Formula One with Red Bull's junior squad, Toro Rosso.

Last year, the next step in the racing reformation had begun with the launch, with the launch of the Formula 4 category with an Italian championship. Designed as a nationally-based championship for youngsters making the transition from karting to single-seater racing the format has proved enormously successful, with seven new championships – in the UK, Japan, Australia, Spain, Germany, China and north-eastern Europe – set to begin this year.

It's into this evolving landscape that Domenicali arrives, and he's excited about the challenge.

"You do these things because you love motor sport and motor sport has been part of my life since I was a child," he says. "My job is to make sure that my experience and vision of motor sport can influence the work of the commission in order to present to the World MotorSport Council – and to the world of motor sport – ideas to make sure single-seater racing has a well-structured platform that can enable not only drivers but also young engineers and teams to develop a career and their business."

"I am enthusiastic about the task and also about the people working with me in the commission – they are very passionate guys, young professionals with a lot of motivation."

BUILDING ON F3'S SUCCESS

And Domenicali is pleased with the landscape that Berger mapped during his three years in charge of the commission.

"The FIA F3 European Championship has been a great success," he says. "Last year's was a superb championship with some really exciting talent coming through and I think this year's will again be very interesting. It's looking like we'll have a good number of competitive drivers and teams."

"That means that the base the FIA has built over the past few years is very good," he adds. "Of course, we need to make sure that the championship will be good in terms of the technical challenge and visibility. There we have a very good basis with a good organiser and promoters that place the championship alongside regular large-scale events. F3's place in that is well balanced with the other events and the visibility is good. The platform is solid and [as of February 2015] we're working on the renewal of this agreement."

However, while the championship is now firmly established as a credible feeder series for the top level through the graduation of drivers such as Ocon and Verstappen, Domenicali is insistent that the FIA's role goes beyond simply birthing the series.

"It's fundamental that the FIA is seen as the reference of the championship," he says. "We need to make sure that the FIA is represented, that the rules are well respected – to make sure that the game is the same for everyone. It's a technically very competitive environment and the more we steer towards a technical challenge, the more you need to be professional."

"I know from my previous experience of Formula One that we have the thousands of engineers whose job it is to challenge the position of the regulator, that's part of the game. Therefore, you need to make sure that everyone can play this game on the same level, at the maximum level, and that there is a good referee moderating the situation."

He is also keen to see the FIA presence move beyond regulation to encompass driver development.

"It's the same for F4 too and for our future championships: we need to make sure that the stewards are not only viewed as adjudicators but also that they are seen as an agent of development,

"WE WOULD LIKE TO MAKE SURE THE UNITED STATES GETS INVOLVED. F4 WOULD BE PERFECT THERE."

STEFANO DOMENICALI

helping these guys to grow as drivers, teaching them to be good racing drivers," he adds. "That means there has to be a group of very dedicated FIA people who have the time and the knowledge to carry out this kind of tutorial role."

So far the FIA's F3 efforts have been confined to Europe but Domenicali is sure that the championship and its model can be applied to other continental series.

"Absolutely. One of the projects we would like to present to the World MotorSport Council is a larger engagement in geographic areas that are very important to motor sport but perhaps under-represented in some ways," he explains.

"I know, for example, that in Japan there is a fantastic situation in terms of racing, very strong," he adds. "What we would also like, and we are starting the talks very soon, is to make sure that the United States – North America – gets involved. I think that the perfect base to start there would be F4."

"I spoke with [US national motor sport authority] ACCUS to organise a meeting with the company that is working on the basic formula. We need to involve an engine manufacturer and a chassis manufacturer, and that's really the starting point. That meeting is set to happen in March."

Rolling out the entry-level national F4 series to an ever-growing number of territories is a key component of the commission's work going forward, but Domenicali is adamant that any growth in championship numbers should be matched by keen adherence to the format's stipulations in terms of power output.

"It's a national series, with a number of different models of operation," he says. "You have championships where everything is owned and run by the national sporting authority, series in partnership with promoters, many different forms of organisation. There are different chassis providers and engine suppliers."

"In those circumstances we need to consider maintaining the same performance from the cars in order to establish a reference for drivers racing in different parts of the world, so that their achievements translate."

The regulations governing the championship are firm on such issues and, if applied rigorously, Domenicali believes that a world final could be developed.

"It's a point on the table of course, because it would be fantastic," he says. "But we need to make sure that the level of car performance is there. It's something we are working on, we will monitor the various championships this year but it is on the agenda to think about in the future."

With F3 and F4 established the next major project on the path to completing a new racing landscape is the creation of Formula 2, the final step before the big league. The task is one that will likely define Domenicali's time as commission president but he is certain that it must be built soon, especially in light of Max Verstappen's rapid progress to Formula One. ►



Domenicali's Team Principal role at Ferrari came at a tricky time following the glory years of the Schumacher era.



Max Verstappen has jumped from the new F3 European series to F1, but there is a gap in the racing ladder for a new-look F2.

“I WANT TO SEE DRIVERS DOING F4, F3, F2 AND THEN F1. THAT IS WHAT OUR GOAL SHOULD BE.”

STEFANO DOMENICALI



“This is just my personal opinion and there’s always a lot of discussion as to the rights and wrongs of certain situations,” he says. “But I believe that from a federation point of view what we want to do is make sure we create the right steps so that from an experience point of view, drivers arrive in F1 well prepared.”

“Therefore, I don’t think in the next two years I will see any drivers jumping straight from Formula 3 to Formula One. I want to see the drivers doing Formula 4, Formula 3 international, Formula 2 and then going to Formula One. That is what I believe our approach should be.”

He is pleased therefore that tighter regulations are set to come into force in 2016 regarding the awarding of the racing Superlicence needed to compete in F1, with a range of junior career criteria needing to be met to qualify to compete at the top level.

“The intention there is really good,” he asserts. “For me, there is maybe a little bit of fine-tuning to be done, but at least we have a solid base from which we can work.”

The F2 project begins in earnest now, with Domenicali stating that the first steps towards defining the championship are now being taken, though he admits that as the rung just below Formula One positioning the new championship will be tricky.

“If you ask me – because of the step-by-step approach of getting close to the top level – whether Formula 2 drivers have to race on tracks used by F1 then my answer would be yes. Do they need to race in the context of an F1 weekend? There are pros and cons. Yes, because there is fantastic visibility and for drivers there will be the touch of what are you going to do next if you do a good job. On the other hand, you know that during the weekend you cannot occupy the best slot, because Formula One is at the centre of everything.”

“Therefore you may have another approach, saying that F2 should be in a different context where it is the pinnacle of that weekend. But are we able to have that kind of situation in the circuits with the right media coverage, with the right attention? It’s debatable. These are elements on the table for the work we want to do now.”

One option could be to package the new F2 championship with F3, building a bespoke platform in partnership with a promoter or event partnering with an existing manufacturer motor sport programme. Again Domenicali says all options are on the table.

“We need to see all the elements that are available,” he says. “We need to make sure that everyone who is interested in these new projects has the freedom to come and discuss them with us. There is no agenda for us beyond building what we believe to be the best, most competitive, affordable series possible to allow drivers to make the final step and to create a clearly understandable path.”

He is certain of one aspect, however – that the series needs to connect with fans at an emotional level.

“Yes, we need to be current: there’s no logic to say F1 has a V6 turbo hybrid 1.6 and F2 has something completely opposite. However, if you ask my opinion, I believe that current Formula One cars are perhaps too easy to drive.”

“The perception – and I know it’s not the case because I know how hard F1 drivers work in these cars – is that a lot of people can go into F1 and drive a simulator and it’s easy – that is not what Formula One should be in my view. Therefore, with F2 it should be a difficult car, physical, something that transmits the passion of racing. People need to see it is tough, that drivers are getting out of the car tired.”

“Don’t misunderstand me, it is bloody difficult when you are driving an F1 car at 300kms per hour, but the perception among fans is still there. We need to agree a package, we need to find the right platform and of course the third element is the cost – that’s fundamental. We know what the cost of a certain other series is and the objective has to be lower than that. There is a need for it.”

The track ahead is clearly complex but Domenicali remains excited by the task. “We know that the context is not easy but this is what we stand for. So when the FIA President, Jean Todt, asked me I said OK, thank you very much, let’s go. Now I’m starting to work towards presenting something that can be good for the benefit of motor sport.” ■



Canadian Lance Stroll is proving the ladder works – he won last year’s inaugural F4 series in Italy and steps up to F3 in 2015.



Mercedes Executive Director Toto Wolff says today's F1 teams must function more like mid-size companies, with no one person in charge. Right: Mercedes' world champion, Lewis Hamilton.

Changes in management

FIRST PRINCIPALS



FOCUS

As major championship seasons kick off, three of motor sport's most successful team bosses define just what it takes in the 21st century to build an outfit capable of winning racing's glittering prizes

TEXT: STUART CODLING

Motor racing has moved on from the days when team principals were wheeler-dealers who owned outright the teams they ran. The modern generation of super-managers are more accountable than ever before; with hundreds of jobs and millions of Euros at stake, winning has never been more important.

That's because manufacturers now wield immense power in motor racing, and racing teams – once totally independent – are more likely to be wholly owned subsidiaries of larger empires; delicate, uniquely complex components of a larger mechanism. This suits our panel of motor racing's most successful senior managers, whose teams won 45 out of 55 world championship races in 2014, just fine.

"You need the background of a manufacturer to become successful," says Jost Capito, head of Volkswagen Motorsport's World Rally Championship team, winner of 12 out of 13 WRC events last year. "We work very closely with the engineers at Volkswagen AG, and without that sort of close relationship it would not be possible to ►



Capito has helped to guide Sébastien Ogier to two WRC drivers' titles, and the French driver has won three out of three events so far this year, including Rally Sweden.

“YOU NEED TRUST IN THE RELATIONSHIP BETWEEN THE TEAM PRINCIPAL AND ALL THE DRIVERS.”

JOST CAPITO, VOLKSWAGEN WRC TEAM



make such a competitive car. We need the resources, knowledge and expertise – whether that’s in materials science or engine development. All the knowledge that’s in a big company we have access to and get huge support, even though we’re independent.”

Rallying has always been manufacturer-dominated but this phenomenon is relatively new to Formula One, where only Sir Frank Williams remains from the old guard of owner-principals. But there have been several recent examples of manufacturers failing to win in spite of investing heavily; the most successful ones, such as Mercedes, have demonstrated the benefits of observing the subtle distinction between ownership and control.

“Today’s teams are more like high-performing companies,” says Toto Wolff, head of Mercedes-Benz Motorsport, which won 16 out of 19 grands prix in 2014. “It’s not a 100-person organisation like it was many years ago, where you would have the founder and team principal controlling everything. That’s not possible any more.”

“Daimler made the decision to have managing partners who are also shareholders – that’s what Niki [Lauda] and I are, so in effect we’re a very entrepreneurial company. Mercedes recognises that in this sport a team is more like a mid-size company, and it doesn’t function if you try to impose a corporate structure like a multinational giant. But at the same time we know we represent the brand. I like the analogy that they leave us a very long leash – we never feel it as a tension around our necks but we know it’s there.”

“Toto is right,” says Capito, “this is absolutely needed. Without this a race team cannot be successful. I report to Dr Heinz-Jakob Neusser, board member for technical development for Volkswagen, and he is very interested in the sport – he comes to lots of rallies during the year – and he fully understands it. We have huge freedom; we get our budget and then what we do with it is up to us. That’s the ▶



The VW WRC team has got used to enjoying podium celebrations since it entered the sport and has taken over from Citroën as the dominant force.

FOCUS

“YOU HAVE TO DRAW A LINE SO THAT THE DRIVERS KNOW THE RULES ARE THE SAME FOR EVERYONE.”

YVES MATTON, CITROËN RACING



With Yvan Muller, Citroën Racing has the most successful WTCC driver in its ranks, with four drivers' titles to his name.

advantage we have as a standalone company 100 per cent owned by Volkswagen – flexibility. We work to all the rules Volkswagen AG has, but I would say we have a certain freedom of interpretation.”

Even when teams have a healthy degree of autonomy, championship-level organisations are now at such a scale that people management is one of the major challenges. As Wolff alluded, the days of the team principal and all the engineers driving to the track in one car are long gone. Managing the scale of a team is more than a matter of funding.

“The main thing for me is the people,” says Yves Matton, team principal for Citroën Racing in both the WRC and World Touring Car Championship (17 wins from 23 races in 2014). “When you don’t have the budget it’s difficult; if you don’t have the people then you have no chance to reach the target. Alone, it’s impossible to manage so many people, to keep everybody motivated and to keep the messages flowing from the top all the way through the organisation, so you’re all following one line. I was fortunate that when I joined Citroën Racing as team principal it had been winning for a long time [in the WRC]. Guy Fréquelin had set it up very much like Jean Todt did at Peugeot. It was just a matter of assembling the right management team to move on, now that we are involved in two championships.”

“The WTCC was a completely new project,” he adds. “Citroën has never been involved with racing outside rallying. When you have the right method of working you can carry the organisation across, but you still need people with specific knowledge. So for touring cars one of the priorities was to have a driver with great knowledge of the discipline and the first person who joined us was Yvan Muller. Then we recruited some people with experience in circuit racing and that helped us develop a strategy.”

A GROUP EFFORT

Creating the most competitive car possible within the constraints of budget and the regulations is fundamental to the process of winning. In F1 the cars have grown so complex that no one person can exert an authorial hand over every part of the design, but all the engineering disciplines – particularly the aerodynamics – are interdependent.

That still requires a technically minded leader, communicating and delegating and making informed decisions about the necessary compromises. This person is not necessarily the team principal; at Mercedes, Ross Brawn began a process of restructuring the technical organisation before the arrival of Wolff and Executive Director (Technical) Paddy Lowe completed the job.

The team now has three individuals in senior engineering roles (Lowe, Engineering Director Aldo Costa and Technology Director Geoff Willis), who have previously worked as technical directors of other teams; without the right reporting lines that could make for a top-heavy top table.

“As the person who is, let’s say, ‘in charge of’ the Formula One programme, you have responsibilities, but they are divided among many competent people,” says Wolff. “I would say my role is to structure a group of individuals to create a team that is best in class – to give guidance, to be a sparring partner, without interfering in the detail of the business. They are world-class engineers and you have to let them get on with the job.”

“I need to provide them with the right environment, the right resources – I need to give them a set-up that enables them to focus on doing what they do best.”

“Forget job titles – they’re not important,” he adds. “The way we’re structured is that there’s an engineering side of the business that needs to be taken care of, and there’s a political and economic side. I see Paddy as a friend and sparring partner and as someone who has knowledge of areas I don’t have. The two of us have different skill sets but we function very well together. And let’s not forget Andy Cowell, the MD of the engine business. I’m very happy ▶



People management is still key to the team principal's job, as Citroën Racing's Yves Matton has found. Right: WTCC podium success with Ma Qing Hua, López and Muller.

Matton points to the new TC1 rules as a major contributor to the WTCC's stability, while the financial collapse of the WRC's previous promoter has promoted peace among the world rally teams. "When we need to talk to each other we can get all the team principals together inside 30 minutes and we meet at every rally," says Capito. "All the manufacturers are completely aligned on what the future should be and where the regulations should go."

That's a scenario Wolff can but dream about. F1 teams are the least likely to band together for the common good.

"Whether you're the one who's trying to catch up or the one who's leading, the political environment is always a minefield," says Wolff. "Each of the teams will try to lobby in a way they believe will suit them. You need to understand where the particular assets of your team lie and then you can try to anticipate where the regulations might go, or how the sport develops. That's not to be underestimated, because while we're a team, we're also part of a global entertainment business. So we can't be totally focused on ourselves and take a hardline view against all opposition, because the sport has to be able to grow and satisfy our audiences."

Perhaps the team principal's most publicly conspicuous role is in managing the often rancorous relationships between their prize human assets: the drivers. Wolff took a notably hard line over the course of 2014 as Lewis Hamilton and Nico Rosberg clashed both on and off the track. Matton, meanwhile, found his multiple world touring car champion, Yvan Muller, growing increasingly irate at being beaten by newcomer José María López, while WRC convert Sébastien Loeb struggled to get to grips with some elements of circuit racing discipline. Capito had to juggle the fast but mercurial Sébastien Ogier, Jari-Matti Latvala and young hopeful Andreas Mikkelsen. Few things can be as toxic to a driver's relationship with his team than the perception – justified or otherwise – that he is somehow not receiving equal treatment.

"The main difference in touring cars is the fact they're fighting door-to-door," says Matton. "You're close to the battle – and they're quick to come back to the pits and, let's say, make contact! But I have been following what Toto was doing last year because he also had a great challenge. Communication is important between the drivers and we have to address it straight away when things happen."

"It's also a battle between characters – a mental battle about who is the last to brake. People told me last year that our driver choice – with two guys who have been champions many times – would give me some hard work, but it was OK. You have to draw a line and be consistent so that the drivers know the rules are the same for everyone, and once you've set those rules you won't make a U-turn."

"You need trust in the relationship between the team principal and all the drivers – and, in rallying, the co-drivers," says Capito. "Our three drivers are completely different characters so they need different treatment. I think part of the success of our team is that the drivers respect each other highly, and when one of them wins, the others know he did a better job. They know we'll never give an advantage, a benefit, to just one of them."

Ultimately, while the team principal's status has changed over the years and the organograms they appear on have sprawled outwards, people management has remained fundamental to the role. Identifying, recruiting, developing and retaining the best talent is the key to winning – that, and a little humility.

"I'm lucky enough that I've been involved in motor racing for 20 years," says Wolff, "so I understand the basics of the sport and how a car drives in a competitive environment. But, having said that, it makes me puke to describe what I think I do well. Once you do that, you're on the road down. The reason for [Mercedes] performing as it is at the moment, and winning titles, is not that there's one individual who *thinks* he's clever but many individuals who *are* clever." ■



to be able to work with two engineers who have great expertise in their fields and I just provide them with the right environment."

While F1 cars are bespoke and continuously evolving machines, built to the letter of the FIA law and linked in part with road machinery, the connection between WRC and WTCC machines and their road-going equivalents is much more clear. That, and the restrictions on development imposed by homologation, provides team principals – and their corporate paymasters – with stark choices.

"You have options," says Capito. "For instance, at Volkswagen you have the Polo and the Golf. You have to look at the regulations and what will give you the most competitive car, and you have to consider the marketing angle; if the competitive and marketing sides match then you have the ideal programme for the company."

"The Polo offered us the best platform for the WRC regulations, and from a marketing point of view it occupies the fastest-growing sector globally – and it's the most global car Volkswagen has [it is on sale in most markets outside the USA]. So it is the perfect match."

Matton agrees. "We had two choices about the [WTCC] car," he says. "One was more marketing; the C-Elysée [marketed in Central and Eastern Europe, the Middle East, Africa and South America] was the right choice from a technical point of view. A lot of things about it are right for use as a touring car."

MANAGING CONFLICT

Technical and marketing pressures have a huge influence on sporting politics, so it's no surprise that F1 – where engineers always push the boundaries of the rules – is a more challenging political environment.

Freeze frame

FROZEN IN TIME

Hidden away for decades, the astounding car collection of French entrepreneur Roger Baillon sold for €25m in February

In the world of classic automobiles the romance of so-called 'barn finds' is the stuff of legend, invariably revolving around tenacious collectors dragging open the doors of long-sealed out-buildings to find an impossibly rare and remarkably well preserved automotive beauty in restorable condition.

Few such tales can compare, however, with that of the Baillon collection. Last year, two experts from auction house Artcurial – Pierre Novikoff and Matthieu Lamoure – heard of a hitherto undocumented collection hidden away in the countryside of western France.

"The discovery of these cars is actually due to a friend of the [selling] family. The crazy thing is it [the collection] was unknown by motor car specialists," Novikoff told the *Daily Telegraph*. "When they mentioned a Ferrari California SWB, I thought it was a joke. Then she gave me his name – it was one of the oldest collectors in France."

That collector was Roger Baillon, a transport company magnate with a passion for cars, whose dream was to conserve the heritage of classic automobiles in museum surroundings, in particular pre-war models. Between 1953 and 1966 Baillon amassed some 200 cars, all of them rare in some way. In 1978 he was forced to sell about half of his collection, which still left another 100 cars jammed together in barns and makeshift shelters. Sixty were eventually deemed in restorable condition and put up for sale at February's Retromobile show in Paris.

And when the bidding was complete the sale exceeded all expectations, netting a total of €25.15 million. The bulk of that figure was secured for the Ferrari California, one of just 58 made, with the ultra-rare convertible selling for €16.3m – a world record for its type. A 1956 Maserati A6G 2000 Gran Sport Berlinetta Frua was the next biggest sale at €2m, while the Type 57 Bugatti, pictured right, sold for the bargain price of €298,000.



The Baillon collection had lain undisturbed for over 40 years.

PHOTOGRAPHY: DPPI



This 1937 Type 57 Bugatti, one of just 710 made, was one of 60 rare classic cars that sold for a combined €25m at Paris' Retromobile show.

FINISH

FORMULA ONE TV 2014

The audience in numbers

Although Formula One has lost millions of viewers in recent years, following its switch to pay TV in a number of markets, it still remained one of the most watched sports in the world in 2014. The total viewership last year was 425 million people, down from 450 million in 2013 and 600 million in 2008. But the numbers are still impressive.

F1 is televised in 200 territories, via 119 broadcast partners, including eight pan-regional broadcasters. In total they broadcasted 31,000 hours of coverage, which equates to 3.53 years of television time in 2014.

Web statistics are also remarkable with internet traffic for Formula1.com increasing 24 per cent to 50 million unique users last year.

VIEWERSHIP DECREASE (2008-2014)

Viewership 2008

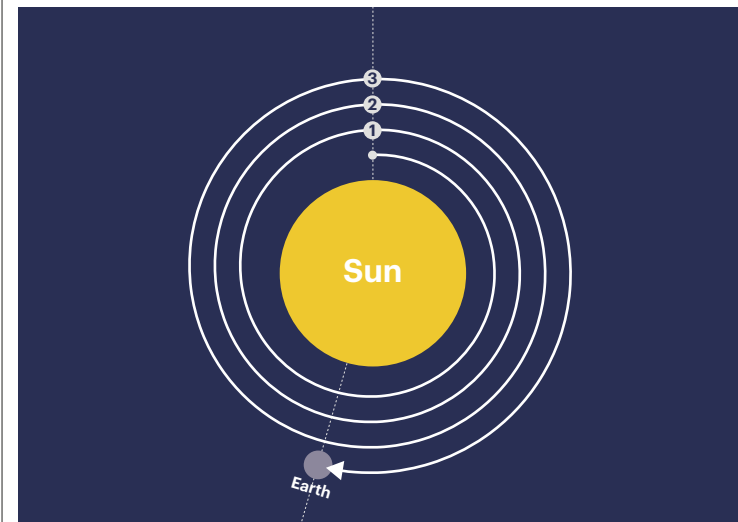


Viewership 2014

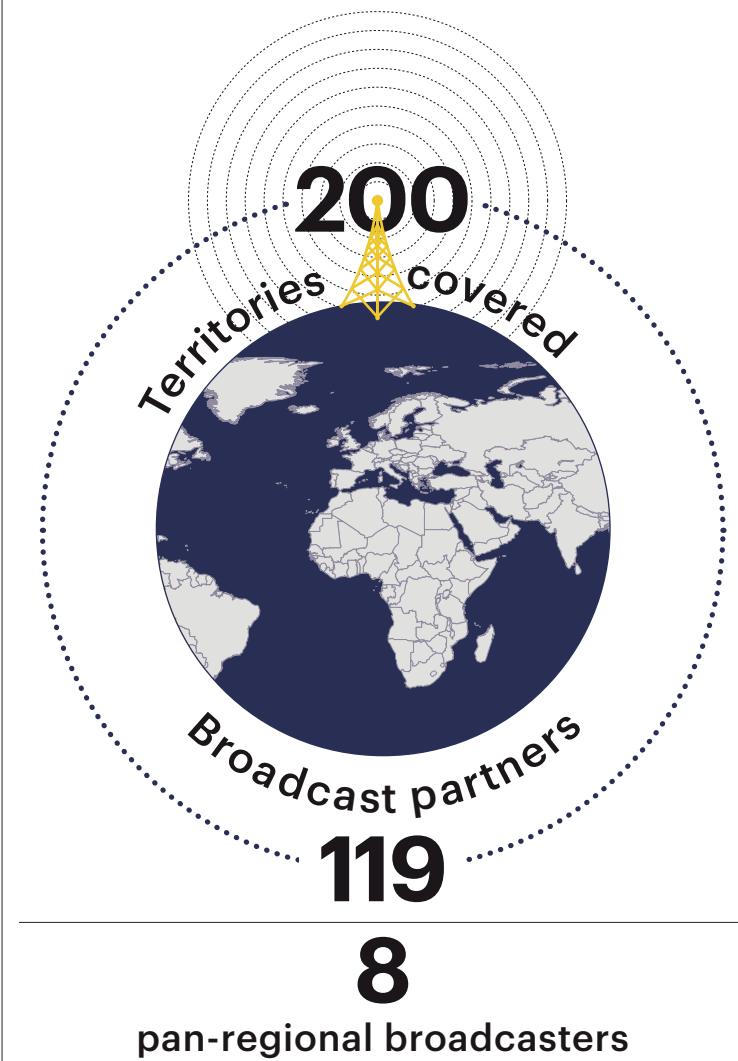


TOTAL FILMING COVERAGE

3.53647
years of coverage



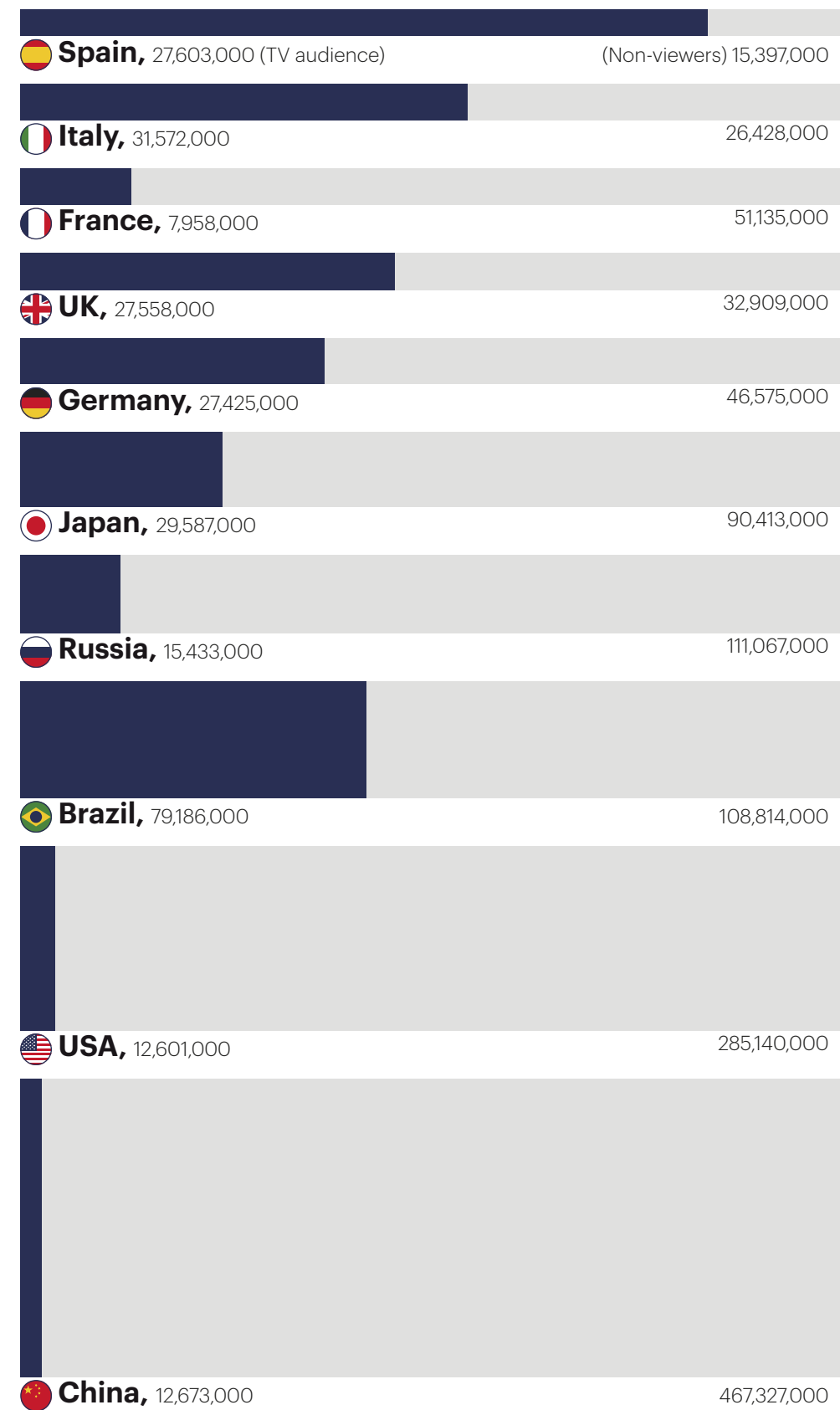
GLOBAL BROADCASTING



OVERALL GLOBAL TV FIGURES

TOTAL SEASON REACH 2014

● F1 TV audience (season) ● Non-F1 viewers (from total TV audience)



GLOBAL AUDIENCE, F1.COM

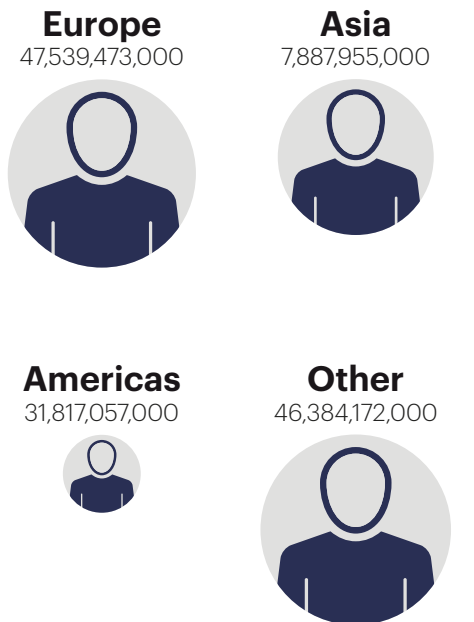
50million
unique individuals

+24%
year-on-year increase

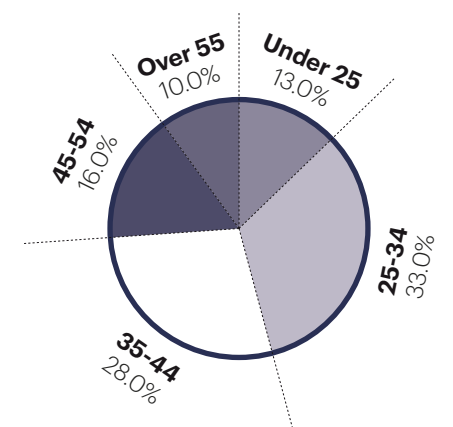
FORMULA1.COM STATISTICS

REGISTERED USERS

Regional analysis



Age analysis



Final lap

STAGE ENCORE

Toyota is returning to the FIA World Rally Championship in 2017. Yoshiaki Kinoshita, Toyota Racing Team President, talks to AUTO about the manufacturer's hopes for the championship and why it already feels good to be back



Q Why is Toyota returning to the World Rally Championship?

A Rallying is part of Toyota's motor sport heritage and we have many happy memories from our previous WRC times, so it is a natural step for us. The Yaris is sold around the world and is one of the most popular Toyota cars, so a WRC project with this car makes sense from a sporting and marketing point of view. As our President Akio Toyoda says, the interest in a Toyota WRC project has been huge; the fans are asking for us to return and we are really happy to finally be able to do so.

Q You have already started testing the Yaris WRC with two years to go until your WRC return. Are you looking for immediate success in 2017?

A We are realistic and modest, so I'm not going to make any promises for our performance in 2017. Ultimately our target is to win rallies and championships during our new WRC era, but it would be unreasonable to say we will do that in 2017. We are facing some experienced and talented competitors who will be very challenging to beat. Our approach is to make consistent positive progress to build for lasting success; that is our target.

Q Why did you choose Stéphane Sarrazin, Sebastian Lindholm and Eric Camilli as your development drivers?

A It was an easy decision to continue with Stéphane and Sebastian as they were both part of the testing programme in 2014. Both are experienced drivers who know what a fast rally car should feel like, so their input has been invaluable so far. But looking to the future, we want to develop the next generation of rally star, so we have started a junior driver development programme of which Eric is the first member. He showed great speed, consistency and intelligence during his evaluation test and greatly impressed our engineers.

Q Can you give some more details about your young driver development programme?

A The main purpose of this programme is to provide experience of rallying at the top level to our junior drivers, to help them prepare for WRC competition, hopefully in a Toyota. Toyota Motorsport GmbH will support Eric to gain experience on various rallies, not necessarily in Toyota cars, and he will also be a key player as we develop our Yaris WRC. As well as the driving aspect of the programme,

we will also help develop our junior drivers in terms of engineering feedback, media relations and all the other requirements a top driver has to manage.

Q Given Toyota's history in the WRC (43 wins, four drivers' titles and three manufacturers' titles), how much pressure is there on the Yaris WRC to succeed?

A There is always pressure on Toyota to succeed in motor sport. We are the biggest car company in the world so we are expected to be competitive in motor sport; that is natural. Right now, we are at the beginning of the Yaris WRC project, but certainly our team sets high standards and we have high expectations for our new era.

Q Why do you think manufacturers are becoming interested in the WRC again?

A I can only speak for Toyota, but I hope we do see other new manufacturers showing an interest in the WRC. For Toyota, the time was right to come back to WRC; it fits well with the company's philosophy and current situation. We all know the potential the WRC has and the passion that it creates. Any sport that can generate that level of passion is interesting to a manufacturer.



FIA SPORT CONFERENCE MEXICO CITY 8-10 JULY 2015

The third annual FIA Sport Conference will take place in Mexico City on 8-10 July. The event will bring together leaders from across motor sport, including FIA sporting clubs and industry representatives. This first Conference outside Europe will explore business and development in motor sport, looking at models in the Americas and across the world.

FIA SPORT CONFERENCE
PRESENTS



MEXICO CITY
9-12 JULY

COMPETITION EXPERTISE BUSINESS NETWORK

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