INTERNATIONAL
JOURNAL OF THE FIA:
Q4 2014 ISSUE #9

AUTO

P42

THE DRIVING FORCE OF CHAMPIONS

CELEBRATING 110 YEARS OF THE FIA
THROUGH ITS GRAND PRIX HERITAGE

OFFICIAL TIMEPIECE

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ISSUE #9

AUTO

INTERNATIONAL JOURNAL OF THE FIA

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

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

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

THE GLORY YEARS

As the FIA reaches its 110-year anniversary, AUTO looks back at the federation's motor racing origins and some of the legendary champions that have graced the sport since then.

Our cover image celebrates this by bringing together the nine Formula One champions who have won three titles or more. Between them they have 35 championships and represent some glorious eras of racing.

One of those champions, Niki Lauda, is our feature interview. The Austrian recalls pivotal moments from his motor racing career and how they have influenced the management of his drivers at 2014 Formula One champions, Mercedes.

But AUTO is not just looking back. This issue also focuses on the future, through the eyes of some of motor sport's youngest champions. AUTO speaks to three title winners to ask how they have achieved so much at such a young age.

Of course, the cars are also the stars of the show. AUTO examines how Williams, Ferrari and McLaren are exploiting their rich history to get classic racing cars back on the track.

Meanwhile, on the roads, the FIA Foundation is very much facing the future by working with manufacturers to make cars more economical and less reliant on fossil fuels.

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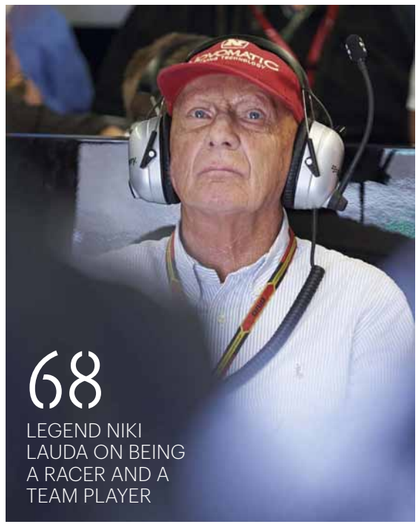

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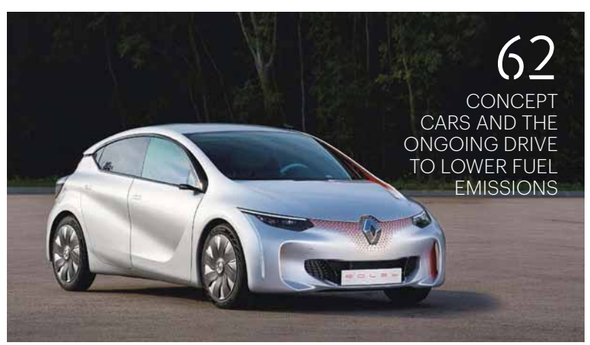

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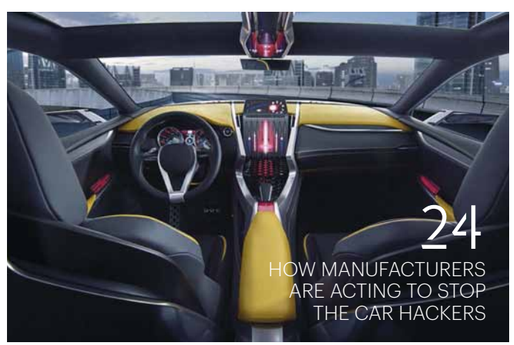

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Solberg's title success

DOUBLE FIRST

Norway's Petter Solberg entered the record books after becoming the first FIA world champion in two different disciplines.

The former World Rally Champion won the inaugural FIA World Rallycross Championship this year after scoring enough points in round 10 in Italy in September to secure the title.

His podium position at the Franciacorta International Circuit saw the Peugeot Sport driver stretch his lead at the top of the standings to 60 points with two events remaining. And having already won four events in the season, he couldn't be caught by his closest challenger, 'Topi' Heikkinen, with just one event victory to his name.

"It is a dream come true," said 39-year-old Solberg. "When I stopped rallying, I didn't know what to do, and then IMG took on rallycross and brought it to an amazing level so it seemed like the right choice. I broke the right-rear suspension in the final and my spotter was shouting on the radio to calm down because all I had to do was get to the podium and I would win the title."

FIA President Jean Todt said: "I am delighted to see a champion already having won a world title in WRC in 2003 taking on

a new challenge. Petter's commitment during this first year of World RX has certainly contributed to its success and media coverage, and I am very grateful to him for this."

Solberg won the 2003 WRC competing for the works Subaru team. He was the first Norwegian to win the drivers' title before switching to rallycross after the 2012 season.

HIGH FLYER

Petter Solberg, running second behind the similar Peugeot of Timmy Hansen, finished third in the final at Franciacorta to secure the inaugural FIA World Rallycross Championship, following on from his WRC title win of 2003.

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FLYING HIGH

Lewis Hamilton, draped in the British flag, takes the adulation of the Abu Dhabi crowd as the world's media looks on

2014 F1 World Champion

FIRST DOUBLE

Lewis Hamilton became a double Formula One World Champion following victory in the season finale in Abu Dhabi.

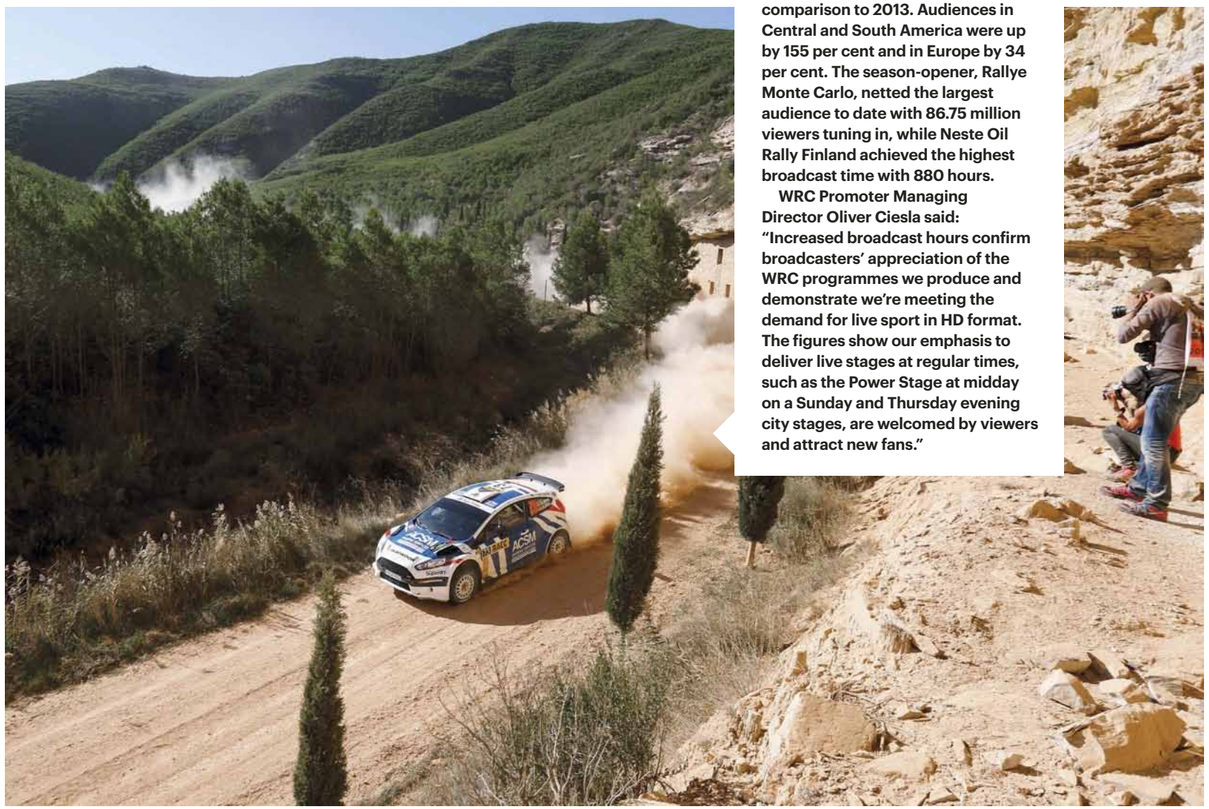
The Brit made a perfect getaway from second to take the lead into turn one and never looked back as his team mate and title rival Nico Rosberg suffered a series of technical glitches that ended his bid for glory.

The 29-year old took 11 victories to Rosberg's five and finished 67 points clear in a year where the title momentum swung back and forth. Speaking after the race, Hamilton said: "This is the greatest day of my life."

This is Hamilton's second drivers' title following his maiden success with McLaren in 2008. On that occasion, he had to rely on a last corner pass to secure the title but this time it was much more straightforward. He added: "2008 was a great year but the feeling I have now is way, way past that. The greatest feeling ever."

AUTO NEWS

In this issue, WRC promoter welcomes TV audience boost, six regional winners announced for 2015 Young Driver Excellence Academy, Dutch designer unveils luminous paint that could replace street lighting, New York lowers city speed limit to 25mph, and ESP anti-skid system is made mandatory on most new vehicles in the European Union



WRC TV AUDIENCE UP BY 35 PER CENT

TV audiences for the World Rally Championship have grown 35 per cent this year, according to data gathered by sports marketing research company Repucom.

Figures for the first 10 rounds of the season show that total audiences rose by 35 per cent to 581.81 million viewers, with most regions seeing notable audience increases in comparison to 2013. Audiences in Central and South America were up by 155 per cent and in Europe by 34 per cent. The season-opener, Rallye Monte Carlo, netted the largest audience to date with 86.75 million viewers tuning in, while Neste Oil Rally Finland achieved the highest broadcast time with 880 hours.

WRC Promoter Managing Director Oliver Ciesla said: "Increased broadcast hours confirm broadcasters' appreciation of the WRC programmes we produce and demonstrate we're meeting the demand for live sport in HD format. The figures show our emphasis to deliver live stages at regular times, such as the Power Stage at midday on a Sunday and Thursday evening city stages, are welcomed by viewers and attract new fans."

Hyundai's new in-vehicle App shows alerts to teenage drivers that will also be seen by parents.

NEW HYUNDAI APP ALLOWS PARENTS TO MONITOR YOUNG DRIVERS

Hyundai Motor America has launched a new App aimed at reducing the number of deaths among teenage drivers.

The Hyundai Blue Link Vehicle Safeguards Alerts In-Vehicle App is available for download into the multimedia systems of the 2015 Azera, and will soon be introduced to the Genesis and Sonata models with navigation.

The App allows parents to monitor and set limits on their Hyundai's speed, hours of operation and movements via text message, email or both. The aim is to help parents reinforce safe driving habits for their children.

Teenagers in vehicles with monitoring devices took fewer risks while driving than unsupervised teens, according to a 2009 Insurance Institute for Highway Safety study of 16 and 17-year-old drivers.

The in-vehicle App allows alerts to be seen from inside the vehicle. For example, a teenage driver will see a notification on the vehicle's multimedia screen, while the parent will get a text message alerting them of a violation. The alerts can then be used by parents to coach and remind teenage drivers that their driving habits are being monitored. The in-vehicle alerts are designed to get the attention of the teenage driver and focus them on driving safely.

"We've listened to our Blue Link subscribers and given them exactly what they want," said Michael Deitz, Senior Group Manager of Connected Care, Hyundai Motor America. "If being able to set these alerts on multiple devices makes parents' lives easier, then we have furthered our goal of making the ownership experience as easy as possible."

CHAMPIONS TO RACE AT FIA GALA

This year's FIA Prize-Giving ceremony, which honours the achievements of all FIA title-winners over the past season, will begin with a Race of Champions style karting event for the first time.

On 4 December, the night before the ceremony, FIA championship drivers will take part in a race at a karting track designed by Herman Tilke in the Prize-Giving Village in Doha, under the watch of F1 race director Charlie Whiting. Over 30 drivers have confirmed participation, including F1's Daniel Ricciardo, WRC's Sebastian Loeb and WRX's Petter Solberg.

The ceremony itself will welcome a new award for Rookie of the Year, voted for by the FIA Drivers' Commission. In addition, the winners of FIA Personality of the Year and FIA Action of the Year awards will be unveiled that same evening.

The Personality of the Year award sees permanently accredited media from the FIA's World Championships honour the competitor or figure affiliated to an FIA Championship or Event, who they believe achieved an exceptional individual or collective performance this season.

The FIA Action of the Year award allows motor sport fans to choose their defining event of the sporting year, via a vote on fia.com.

The Formula One driver's trophy will be presented at the FIA Gala

Young Academy hopefuls are put through their paces at the Yas Marina Circuit in September.

GLOBAL ACADEMY SELECTION PRODUCES SIX WINNERS

Drivers from 76 countries competed for a place on the 2015 Young Driver Excellence Academy, with six regional qualifying events held worldwide.

The winners of these events received automatic entry to the Academy, a fully-funded training programme that actively promotes the principles of safety, fairness and responsibility on and off the track while helping drivers develop their motor sport careers.

The first qualifier was for the Sub-Saharan Africa region and took place at the Gerotek vehicle testing centre near Pretoria, South Africa, in September. It was won by 18-year-old Jordan Pepper, representing Motorsport South Africa, after three days of intensive testing and evaluation on fitness, driving technique and off-track skills. Competing against drivers from countries including Zimbabwe, Namibia and Kenya, Pepper impressed the judges the most. He follows in the footsteps of fellow South African Kelvin van der Linde, who was named Academy driver of the year in 2014.

Selection then moved to South-Western Europe for the first of two qualifiers on the continent. Rally driver Tim Novak, representing Auto Sport Federation of Slovenia, won the event held at the ORYX Centre for Safe Driving in Croatia. The 20-year-old performed consistently and to a high level, both on and off the track, during the three days of assessment. His success followed the final-day track shoot-out that featured in each regional qualifier.

Speaking after being announced as the winner, Novak said: "I'm really pleased to be given this opportunity and it was an amazing experience. The Academy is a great opportunity to learn new things and get some new connections, and I'm excited to be a part of it."

Panikos Polykarpou, representing Cyprus Automobile Association, won the Middle East, North Africa and Central Asia selection event at the Yas Marina Circuit in Abu Dhabi. He took his place on the fully-funded Academy programme after proving himself ahead of 12 other competitors. The 23-year-old, who is currently competing in the Junior World Rally Championship, impressed throughout the event. Each participant gained invaluable knowledge and experience through structured seminar and practical lessons.

Held in Mexico in October, the Americas selection event saw Kenton Koch, representing Automobile Competition Committee of the US, chosen as the winner to take a place on the 2015 Academy. The 20-year-old saw off drivers from 11 other countries for his victory.

José Abed, President of Mexican ASN OMDAI, which hosted the event, said: "I have to recognise that the candidates were extraordinary, showing a world-class competition level. I want to congratulate Kenton for his outstanding performance and tenacity, which led to him landing the coveted spot in the Academy."

The penultimate qualifier saw a return to Europe where Jordan King, representing UK Motor Sport Association, won the North Eastern Europe event. In a highly competitive field, the 20-year-old rose above 15 other rivals to represent the region in 2015. Held at the ANWB Test and Training Centre in Lelystad, Holland drivers were put through their paces by expert instructors before King was named the winner after the final day shoot-out.

The final selection event took place in Beijing, China where Macauley Jones, representing the Confederation of Australian Motor Sport, became the sixth driver to join the 2015 Academy. The 20-year-old beat competitors from nine other countries in the region. Jones, who competed in the Dunlop Development Series in Australia this year, said: "I'm really excited to come out on top and go to the Academy. I'm going to take every opportunity that I can and learn as much as possible from the experience."

All six selection event winners will now take part in the 2015 Academy and will be joined by a number of wildcard selections.

DUTCH ROAD LIT BY PAINT RATHER THAN LIGHTS

A stretch of road in the Netherlands lit by luminous paint rather than traditional street lighting has been hailed the "highway of the future" by its designer.

Some 15,000 feet of Highway N329, 60 miles southwest of Amsterdam, has been lined with glowing green paint following several years of work by Dutch designer Daan Roosegaarde and his team.

Roosegaarde's pilot project is based on an ambitious vision of replacing passive infrastructure with smart roads that communicate with drivers. In the future he envisages roads that will charge electric cars and colour-change paints that alert drivers to poor conditions. He argues that as cars get smarter so too should the infrastructure that supports them.

"The road industry is one of the most conservative out there," says Roosegaarde, who first unveiled the glowing paint concept in 2012.

Since then he has worked with Dutch company Heijmans to develop a luminous paint that uses luminescent powder to absorb solar energy.

Roosegaarde will not reveal how the paint is made, but says the luminescence will last up to eight hours after being charged by the sun. In case of extreme clouds and rain the roadways can be charged artificially using solar panels.

The strip of road on Highway N329 will be a test ground for durability and usability before Roosegaarde and Heijmans expand their project to other countries. They say Tokyo has expressed interest in the project ahead of the 2020 Olympics, and there is interest in the UK.

Designer Daan Roosegaarde's luminous road project in Holland could signal the end of street lights.

NISSAN EXTENDS COLLISION AVOIDANCE TECHNOLOGY

Nissan has developed new collision avoidance technology to work for not only the car you are following, but the one ahead of that too.

The Predictive Forward Collision Warning system, due to appear on the 2015 Nissan Murano (right), can monitor movement over a distance of around 390 feet using a bumper-mounted radar that tracks the car in front but also shoots beams underneath it to scan the road ahead.

The system will beep and flash dashboard alerts if it detects a problem, such as a slow-moving or stationary car. The device is part of Nissan's bigger Safety Shield system, which incorporates four cameras and three radars on a car to provide a 360-degreee view of the road.

The collision warning system is appearing on the Murano initially, although Nissan says it could become standard equipment in other models.

RADAR GUN TO STOP DRIVER TEXTING

An American company is developing a radar gun designed to detect drivers texting at the wheel.

ComSonics, a company specialising in cable leakage detection, is working on a device that could pick up the radio wavelengths that phones use to send and receive SMS messages, according to regional newspaper The Virginian-Pilot.

It is thought that the final product, designed for police use, might resemble the radar guns used to detect drivers who are speeding. ComSonics manager Malcolm McIntyre said the device would be able to distinguish between the radio waves used by texts with those used by calls, which are of a different frequency.

In many US states it is legal for adults to talk on a phone while driving, but not text.

NEW YORK LOWERS SPEED LIMIT TO 25MPH

New York City officials have lowered its road speed limit from 30 to 25mph in an effort to save lives.

City officials hope to not only reduce the number of accidents that occur, but gain results through evidence that shows a huge jump in pedestrian survival rates when road speeds are reduced by just 5mph to 25.

"I'd estimate that a person is about 74 per cent more likely to be killed if they're struck by a vehicle travelling at 30mph than at 25," said Brian Tefft, a researcher with the AAA Foundation for Traffic Safety, who wrote a 2011 report on the subject.

Tefft examined 549 vehicle-pedestrian accidents that occurred across the US between 1994 and '98, accounting for factors like vehicle size and pedestrian BMI. The risk of serious injury (defined as likely to result in long-term disability) for a pedestrian hit at 23mph was about 25 per cent. At 39mph, Tefft found, it jumped to 75 per cent. He concluded that 35mph was the median impact speed for fatal pedestrian crashes.

"If the actual [car] speeds are reduced in response to the change in the speed limit [in New York], it should have a safety benefit," added Tefft. "But in general the research shows that it takes more than the number on the sign to change the speed of traffic."

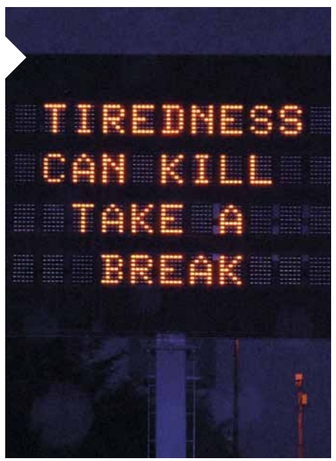
SMART SEATBELT TO STOP SLEEPY DRIVERS

Testing is continuing on a smart seatbelt system that uses sensors to be able to tell when a driver is falling asleep.

The system, developed by European private-public consortium Harken, relies on smart textiles worked into the fabric of the seatbelt and the driver's seat to monitor heartbeat and respiratory rates from various contact points placed along the driver's body.

Harken says changes in these rates can provide a good indicator of when a driver may be falling asleep. What is not clear, however, is what action would then be taken to alert the driver to any possible danger.

Harken has already conducted closed track testing of the system and is now monitoring it in 'real traffic scenarios'.



ESP MADE MANDATORY ON VEHICLES IN EU

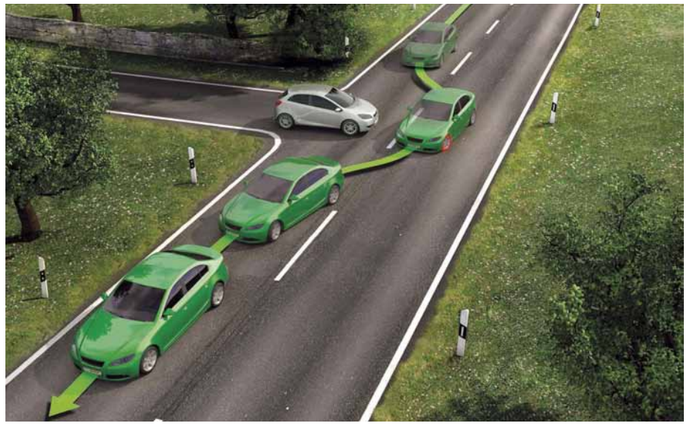
Bosch's ESP electronic stability program has become mandatory on all newly-registered passenger cars and light commercial vehicles in the European Union.

From November 1, all new passenger cars and light commercial vehicles with a gross weight of up to 3.5 tonnes must be equipped with the anti-skid system. The regulation will take effect for all other vehicles one year later.

"ESP saves lives," said Gerhard Steiger, President of the Bosch Chassis Systems Control division. "It is an unparalleled success story that we hope to replicate outside Europe as well."

Since its introduction, Bosch estimates that ESP has prevented 190,000 accidents and saved more than 6,000 lives across Europe. The German multinational engineering and electronics company has manufactured 100 million ESP systems since production began in 1995. While 84 per cent of all new vehicles in Europe were fitted with ESP in 2014, the figure for new vehicles worldwide was only 59 per cent.

Since September 2011, ESP has been mandated for vehicles in the US and Canada with a gross weight up to 4.5 metric tonnes. Australia and Israel have also made ESP mandatory. Bosch says similar regulations will take effect in Japan, Korea, Russia and Turkey in the coming years.



GLOBAL NCAP CALL FOR SAFER CARS IN INDIA

New vehicle crash tests in India have revealed the need for better safety standards after two models scored poor results.

The Datsun Go and Suzuki Maruti Swift both scored zero stars in the Global New Car Assessment Programme's (NCAP) independent crash tests, which are co-funded by the FIA Foundation. Neither car offers airbags as standard.

Both models scored zero stars for adult occupant protection, with the Go scoring just two stars for child occupant protection and the Swift only one. The Go's vehicle structure collapsed in the test, while the Swift's structure showed signs of collapsing.

The Indian Government has announced plans to launch an official India NCAP to test cars. But Global NCAP is calling for India to go further by requiring new regulations based on the UN's minimum standards for crash safety.

AUDI PIONEERS NEW E-FUEL

Audi has announced details of a new project to produce e-diesel from air, water and 'green' electricity.

A new pilot plant for the production of CO2-neutral synthetic fuels has opened in Dresden, Germany (below), with Audi working in partnership with Swiss firm Climeworks and sunfire on the project.

The German manufacturer and its partners hope the plant will prove that the industrialisation of e-fuels is possible. It was opened in the presence of Prof Dr Johanna Wanka, German Federal Minister for Education and Research, and Dr Hagen Seifert, Head of Environmental Assessments, Renewable Energies and New Materials at AUDI AG.

The sunfire plant requires carbon dioxide, water and electricity as raw materials. Carbon dioxide is extracted from the ambient air using direct air capturing – a technology developed by Climeworks.

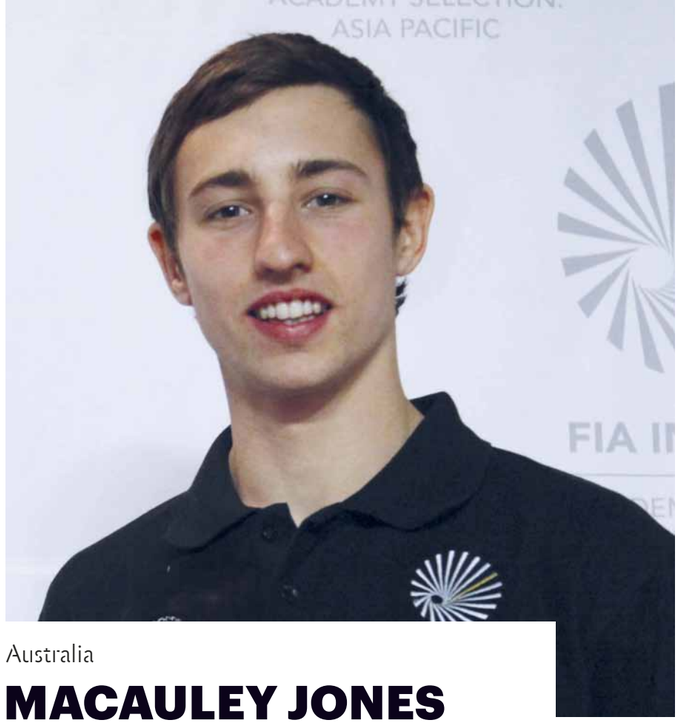
In a separate process an electrolysis unit powered by green electricity splits water into hydrogen and oxygen. The hydrogen is mixed with carbon dioxide in two chemical processes conducted at 220-degrees Celsius and a pressure of 25 bar to produce an energetic liquid, made up of hydrocarbon compounds, called Blue Crude.

The pilot plant can currently produce around 160 litres of Blue Crude a day, nearly 80 per cent of which can be converted into synthetic diesel. This fuel – Audi e-diesel – is free of sulfur and aromatics. It has a high cetane number, so it ignites easily. Its chemical properties allow it to be blended in any ratio with fossil diesel, which means that it can be used as a drop-in fuel.

AUTO ASKS

HOW HARD IS IT TO BECOME A RACING DRIVER IN YOUR REGION?

The selection events for the 2015 FIA Institute Young Driver Excellence Academy took place in six regions across the world, with drivers from 76 countries competing for a guaranteed place on the programme. As with all motor sport, competition was fierce. We asked three of the selection event winners how difficult it is to become a professional driver in their region.



Australia

MACAULEY JONES

WINNER, ASIA-PACIFIC SELECTION EVENT

Australia has a population of around 23 million people spread out over a large area, so finding the financial support as an aspiring racing driver to compete at an elite level is difficult, especially if your goal is Formula One. Teamed with the geographical disadvantage that Australia has to Europe and America, and coupled with the fact that touring car racing is our premier motor sport, chasing your dream of racing in Europe becomes a far more difficult challenge.

My career started in Go Karts, where drivers can compete with the help of friends and family, and it's a great opportunity to measure yourself against the best competitors of your age in the country.

In Australia, the natural progression from Go Karting is Formula Ford, which is being replaced by Formula 4 in 2015 as a national championship. I believe this change is a great step forward as it's a worldwide formula run in a number of countries. I also believe that being able to compete in Australia then to go to Europe to race a similar car would help any driver trying to break into that market.

If you stay in Australia, the next step is touring cars. There are a couple of options here, but the right step for me was the Dunlop Series, which is the second-tier category that acts as a support event at seven rounds of the Australian Touring Car Championship. One difficulty is there are only six test days per year at a nominated circuit in the state your team is based, so testing is very limited.

The Dunlop Series is extremely competitive with a great depth of talent – a mix of young drivers fighting to make a name against more established competitors. The fastest drivers are usually recruited by the main teams as co-drivers for our high-profile two-driver events at Sandown, Bathurst and the Gold Coast. These three events make up a series within a championship, called the Pirtek Enduro Cup.

A young driver must be competitive enough to land a co-drive in these events, and then impress a team to secure a drive in the main championship. This takes years as there is little driver movement, with usually only a couple of seats offered each season.

Being able to drive fast, supply useful feedback and represent team sponsors are all critical success factors for a driver, but the major challenge, no matter where you live, is finding the right team that best understands you plus the equipment to help you to the front. It's the crucial ingredient that usually only comes with the right amount of money and with clever people helping you.

United Kingdom

JORDAN KING

WINNER, NORTH EASTERN EUROPE SELECTION EVENT

In general, it is difficult to succeed as a racing driver in Europe. It is well-established in the motor sport world, so there are lots of other drivers, and we also have a lot of people coming to race here from all over the world because it is recognised as a strong region. In the UK, national series from karting through to cars are very competitive.

What you soon realise is that modern racing drivers need to be about so much more than just posting the fastest lap time. Fundamentally, that is still the most important factor, but becoming a complete racing driver is vital. Being good with the media, talking with sponsors and understanding other aspects of the sport are crucial for a young driver.

But there are lots of different types of championships from rallying through to touring cars and GT racing. We have a well-established motor sport market and a lot of different categories where people can start from a very young age.

I have always made my decision to choose between these with the end goal in mind. My goal is to reach Formula One and that is what I am aiming for at the moment. Obviously that can change, but that is my ultimate goal. You just have to work backwards from there and look at drivers who have made it to that level and see what they did. I did Formula 3 this year and I will look to do GP2 next year.

I'm also hoping that the Academy can provide the extra tuition I need to make me a complete driver. Hopefully I can gain all the skills necessary to be a modern racing driver.

South Africa

JORDAN PEPPER

WINNER, SUB-SAHARAN AFRICA SELECTION EVENT

As we all know, motor racing is a really expensive sport to get involved in, and as a driver trying to make it a career can be really tough, because to become a professional requires talent as well as financial backing.

Living in South Africa makes it even harder as our country is struggling financially and our currency is very weak. However, it is not impossible, and you just have to keep a positive attitude and make it happen.

Motor sport has had a long history in South Africa and it is a really well-recognised sport. We are lucky to have really awesome circuits and infrastructure, which provide us with the opportunity to become racing drivers. In the past South Africa has shown that we can produce really talented drivers who are just as good as the best in the world. However, it's much harder for us drivers to make an impact overseas.

Of course, to become a successful racing driver you have to learn the trade from a very young age in karting. This teaches you the basics and provides the building blocks to become a professional driver. In South Africa we have proven over the years that the talent coming through karting is really strong, and we have been one of the best nations in the karting classes we compete in.

However, it is a struggle for us to take this talent from karting into circuit racing and be able to compete against the best from Europe and other countries due to the financial difficulties in our region.

But South African motor sport is starting to pick up once again from the ground up and hopefully our racing drivers will be able to show their abilities around the world.

Everyone involved in motor sport in South Africa is working really hard to get us back on the map, and hopefully this will lead to more South African racing drivers making it in this tough sport and maximising every opportunity they are given.

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Manufacturers have embraced computer technology in cars, but left themselves open to cyber attacks.

Virtual car crime

THE CAR HACKERS

Car crime has become much more sophisticated in this computer age, leaving manufacturers working to play catch-up with the cyberspace criminals

TEXT: ERIC SILBERMANN

The key fob has reassuring heft in your hand, as befits the prestige vehicle you proudly purchased a few days ago, and you're looking forward to the drive home. You were able to park the car near the office thanks to the new App on your phone that lets you find spaces in the busy city streets. But when you get to where you left your new car... it's not there. You go through the usual panic processes, checking the street name, looking across the road to an identical car, but finally the truth dawns that your pride and joy has been stolen.

Nobody would have noticed the robbery, because the modern car thief doesn't have to resort to sticking a coat hanger down the window frame before breaking the steering lock and joining a few wires together under the dashboard. Instead, the theft is altogether cleaner, more hi-tech. All that was required was to hack into your phone, 'read' your parking App and then unlock the codes for the door and steering lock.

Far fetched? Not at all, and it's happening right now, with thieves stealing cars to order and exploiting the sophisticated technology built into every modern car to do so. This is nothing new, it happened at the end of the last century, when it was found that a Palm Pilot – remember those strange devices – could read the infrared signal from ▶

the remote key lock, block it and thus the car would not lock. The thief still had to start the car but at least all the doors were left open as the owner walked away. That particular problem was easy to overcome and today's car remotes change their code each time they are used.

However, a modern car can have more than a dozen electronic control units, managing not only its security but also its engine functions, steering and brakes, even its suspension. And just as any computer is hackable, so too are these units, meaning that a thief could theoretically take control of your car while you sit behind the wheel.

Theoretical car-jacking has been turned into reality, but only in a 'laboratory' environment with scientists 'driving' the car with a PlayStation-style controller. It's a scary scenario, but thankfully still belongs in a James Bond film rather than the real world. It also involves breaking into the vehicle first to fit a receiver and is therefore a far more complex process. The truth is that in reality thieves are after two things: an easy way of breaking into your car to steal it while you are absent, or to steal the data contained within the vehicle's systems.

HANDLING THE DATA

Kaspersky Lab is the world's largest privately owned software security company and its European Managing Director, Alexander Moiseev, offers a chilling assessment of the hidden threat of car hacking.

"You can steal all the private information without the driver inside the car being aware of it," says Moiseev. "Nowadays, it has become convenient for all car manufacturers to integrate remote telemetry into cars. For example, you will get a call from your car dealer because they already know your car is due a service.

"There are more complex scenarios, for example if you have an accident, modern cars can ask for remote assistance, using all the data including the geographical position of your car," he adds, referencing the eCall technology that has been mandated for inclusion on all cars sold in Europe from 2015. "Therefore if you can access the data, in other words hack the car, you can get its geo-coordinates, track it, listen to the microphone used for your mobile, watch the cameras and see actual data from the car, and the remote assistance will have ensured all the doors are unlocked. So actually, it's about privacy and that has become a sensitive topic today."

One area of hacking into a car that is often regarded as a legitimate activity is when the engine management system is altered in order to tune or 'chip' the car. With most engines never run at 100 per cent performance capacity in the interests of longevity, reliability and reduced maintenance costs, being able to prevent the ECU being re-mapped is a key consideration.

"It's one of the really sensitive topics today for car manufacturers," says Moiseev. "They all try and protect their cars from being tuned because if the car is tuned it gets complicated to guarantee the life of the engine."

It seems that, in their haste to embrace computer technology, car manufacturers have left themselves exposed to the consequences.

"In the past, manufacturers were keen on software security in terms of protecting their intellectual property, but they had not considered the real threat coming from software security," reckons Moiseev.

As such, they've had to play catch-up and are sensitive to the notion that their products are vulnerable to attack.

"We have a cyber-security team to respond to reports of malicious hacking of our vehicles," says a spokesman for Ford. "The team will investigate, resolve concerns and work with our engineers to mitigate future threats. We are unaware of any instance in which a Ford vehicle was infiltrated or compromised in the field.

"In developing electronic systems, Ford uses rigorous testing processes, which include assessments of the security architecture and controls. This includes testing of radio frequency (RF) systems such as the tyre pressure monitoring system (TPMS), Bluetooth systems such as SYNC, and hard-wired systems such as any electronic control unit (ECU). We conduct additional assessments of systems based on risk, considering the function of each system and its vulnerability to external interfaces."

There's no doubt that vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication is the future, and manufacturers insist they are taking steps to minimise the danger presented by the opening up of further channels of communication to cars.

Car manufacturers are not immune to concerns about hacking. Ford's Synch wi-fi hotspot offers a secure connection to car occupants.

"The automobile is undergoing a technological transformation that is reducing crashes, improving fuel efficiency, and bringing greater convenience and better quality of life to drivers and passengers," says Kristen Tabar, Vice-President of the Technical Administration Planning Office at Toyota USA Technical Center.

"We have no doubt that the technology will save lives, improve the environment and create jobs," she adds. "Its success is in large part dependent on public acceptance, and that requires the network to be adequately secure and for the privacy of drivers and passengers to be preserved. The good news is that the connected vehicle system is being developed to support the security required and to minimize the potential for hacking."

IMPROVING SECURITY

Manufacturers have responded with alacrity to the security issues surrounding increased connectivity and, given that there will always be hackers, the most obvious form of protection has been to ring-fence a car's critical systems, so that the infotainment software – once hooked up to phones and laptops the most easily accessible vehicle system – now runs independently of those systems that control the car's main components.

"Cars are just one part of a global problem," believes Eugene Kaspersky, Chairman and CEO of the tech security firm. "There's a general problem with security as transportation gets more automated, with automatic railway track, traffic controls and parking systems. It's become a reality because the computer systems are more reliable than Homo sapiens. They make fewer mistakes, work 24 hours a day, don't need vacations and salaries, consume only power, and they are not members of trade unions, etc! While we are the first generation to enjoy having computer systems everywhere, sometimes they are not secure enough. They have vulnerabilities and technical security issues. So while we enjoy the benefits of the cyber-world, we are also victims of design, and the future of cyber-technologies is to build in immune systems to ensure safer and more secure systems." ■

> "YOU CAN STEAL ALL THE PRIVATE INFORMATION WITHOUT THE DRIVER INSIDE THE CAR BEING AWARE OF IT"
>
> ALEXANDER MOISEEV
> KASPERSKY LAB

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F1'S SYSTEMS IN CHECK

A Formula One car doesn't have doors with locks to hack open, but even here in the most sophisticated form of motor sport, data protection is an important consideration. With every F1 team having a 'War Room' back at their factory to study data, run simulations and get back to the race team with suggestions relating to car set-up, there's plenty of traffic between the race track and team HQ.

"During a race, each car is sending back to the pit garage about one-and-a-half gigabytes of data, which is about 750 million numbers," explains Peter van Manen, Vice-President of McLaren Applied Technologies. "Within the garage the data is processed by various models of elements such as the tyres and engines. This generates a further three to four gigabytes of virtual data, so a total of about five gigabytes of data per car is being looked at.

"The same live data is being sent from the garage to the factory via a Digital Subscriber Line connection, so it's essentially being sent over the internet," adds Van Manen. "The guys in the garage and those in the factory will be seeing the data on the same tools, at about the same time. Sending the data is largely about being efficient in your footprint. The way we pack data from the car into the telemetry link is efficient and we also have a high level of compression when we go from the garage back to the factory, therefore the amount of bandwidth you need is reasonably modest for the amount of data you send."

Although Van Manen does not see a high threat of data hacking, there is a security aspect, the essence of which is how data is packed before it is sent via telemetry. "An F1 car has complex logging systems, with many parameters being logged at different rates, and some of those rates will change depending on the situation," he says. "For example, you log the gear position quite slowly and then during a gear change you measure it very quickly.

"So the configuration of how that data is logged and then packed into the data stream is only known by each team. Without that information it would be very difficult to decipher what all these numbers mean. In that respect, it provides you with quite a high level of encryption without the need to have an actual encryption key to protect the data. That doesn't mean it would be impossible to unpack the data, but it would be very difficult. However, in over 20 years, I've not seen any signs of anyone trying to interfere with the data transmissions."

Kaspersky Lab's involvement with car security has extended into F1, where it has sponsored Scuderia Ferrari since 2010. The Italian team relies on Kaspersky to safeguard its telemetry data as it travels from the track to the team's base in Maranello and, in fact, Ferrari's entire factory IT system is kept safe under the Kaspersky wing.

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At first glance the correlation between the exotic world of racing tyres and the plain, round, black rubber fitted to your road car might seem slight, but as Michelin's Director of Motorsport Pascal Couasnon explains, for the French firm the two are inexorably linked

TEXT: JUSTIN HYNES

Tyre technology transfer

SPREADING THE LOAD

Michelin's participation in endurance racing has helped it to further develop the durability and consistency of its tyres.

If you key the words Sébastien Ogier, Argentina and highlights into the search window of any video-hosting website and click, the return will be numerous videos showing the two-time World Rally Champion pounding down roads more suited to farm vehicles and cattle rather than a 250bhp World Rally Car.

In many of the clips there are moments of extreme violence as Ogier, his co-driver Julien Ingrassia and their VW Polo WRC smash into hummocks, pound through ruts and potholes, and crash back to earth with bone-crunching force after a brief airborne moment while taking a crest at full tilt. In all of these situations the element of the car bearing the brunt of impact are the tyres.

So great are the forces they endure that it's easy to imagine these tyres are made of some sort of esoteric rubber compound forged from titanium and kryptonite, that they feature the sort of extreme – and punishingly expensive – engineering that sets motor sport on another plane entirely from the humble tyres you popped down to your local dealer to fit to your 1.0-litre runabout.

In fact, the opposite is true, and in 2014 the tyres the average road user has bear more relation to race tyres and feature more technology derived from motor sport than ever before.

In motor sport circles much debate over the past few years has surrounded the FIA's modification of technical regulations across its championships to promote efficiency and, through research into new technologies, more closely align top-level motor sport with road car research and development. The most high-profile expression of this has, of course, been Formula One's shift to a new 1.6-litre, turbocharged, hybrid power unit.

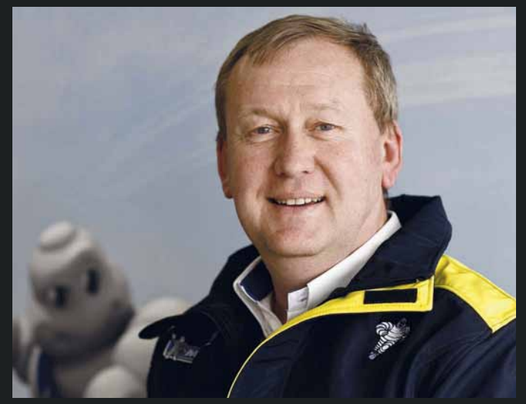
RALLYING'S TOUGH TEST

But it isn't just the big-ticket items such as powertrains that the FIA has targeted. They may not grab as much limelight but motor sport's tyres have also felt the winds of change. For the 2011 season, the FIA took the decision to radically rework rallying's tyre regulations, which were resulting in a mind-boggling variety of specialist tyres designed to cope with very specific conditions. The resultant cut to just two specifications – a hard and soft compound – presented manufacturers with a tough engineering challenge, and one significant enough to tempt Michelin back to the sport as its Director of Motorsport Pascal Couasnon explains.

"The philosophy of Michelin in terms of our participation in motor sport is really linked to technology transfer," he says. "You will not find a series where we participate just to put stickers on the car and banners around the track for visibility, and that's it. That's really important for us. Every time we participate, for my boss to give me the budget he is asking me first, 'how is it going to help the tyre of tomorrow?'. Rallying gives us that.

"In the past what happened was that, depending on the road, you could choose a tyre within a five-degree window, which after a while was almost confusing. Now the challenge is that you need to find rubbers that function and are efficient across a much wider temperature window. You have two choices – below 10 degrees or wet, and above 10 degrees or wet. It was a big change and reduced the number of tyres in the series by about 40 per cent, but that's pretty much how you choose your tyre.

"You could now argue that rallying is the motor sport that is the closest to what you and I live with on the road every day," he adds. "Obviously the cars go faster, but in terms of the rules you have the minimum choice of tyres, just two, there is no slick any more, so you have to find something that is versatile. We need to have a solution where they can handle wet and dry, different temperatures when they drive at different altitudes, etc. The difficulty and the challenge for us is to find a tyre that is fast, has good grip, is safe and lasts a long time. What we have developed is a tyre that is as efficient with one solution as maybe two or three types of tyre were in the past."



Above: Michelin's Director of Motorsport, Pascal Couasnon. Top: rallying has proved ideal for testing a tyre's strength and versatility, with the results incorporated into Michelin's road car tyres.

"The mapping of the pressure on the contact patch and the temperature is crucial. Today, we have a good understanding and can simulate the temperature and pressure accurately. Mastering what's going on in the contact patch is the secret to going fast and going fast for a long time. We think we have done that but that's out secret!"

One area that Couasnon says currently does not fit with Michelin's R&D philosophy is the top level of single-seater racing, Formula One. The company last began an F1 programme in 2001, racking up 43 wins over the following six seasons, but when the option of a control tyre was again pursued for the 2008 campaign, Michelin announced that it would withdraw from the sport at the end of 2006. It hasn't returned since.

"The problem we have with F1 – and it's no secret, we have said this many times – is that it is pushing the cursor too much towards the show and not enough towards technology," says Couasnon.

"When it's seen as a good thing that the tyre degrades because it will give a little bit of suspense, it's not what we want to do, because on your car you don't want a tyre that degrades.

"Finally, we have asked to change the sizes, because it's a small tyre with a very high sidewall. This tyre does not exist in real life anymore. So, even if you learned something, you cannot really use it because it's not relevant to a street tyre. Unfortunately, with F1, for us, it has the wrong size and the wrong strategy in terms of technology. We love the sport, we love the visibility, but in terms of strategy it doesn't make sense for what we want to do with motor sport. If there is a change in the rules and it goes towards what we have in mind we'd be very glad to come back."

FORMULA E FOR EFFICIENCY

Instead the company has embraced the possibilities afforded by the FIA's new electric racing championship, Formula E.

"This is interesting for us as it opens up a new area we want to study, which is the energy efficiency of the tyre. To be honest this isn't an element we had ever looked at in rallying or endurance racing, but through Formula E we have started a basic, fundamental study of the energy efficiency of the tyre. It's a new area for us, this is the best place to study, it's an area we want to focus on and one of the fundamental reasons why we wanted to be present in Formula E."

Couasnon says the tyre specification in Formula E also suits the company. "We asked for a change, and it is now an 18-inch tyre with a small sidewall, which is something close to your tyre and mine."

The company's Formula E activities complete what Couasnon believes is a virtuous circle of road-relevant R&D possibilities.

"Rallying is about resistance to shock and versatility," he says. "Endurance racing for longevity and consistency of performance, and again being able to function with different temperatures, and Formula E for energy efficiency of the tyre. So all three together give you all the elements of the tyres.

"You cannot be everywhere in motor sport. DTM is interesting. WTCC is interesting. But at some point you need to choose. We have, I would say, a fairly impressive presence in different series and if we want to do well at what we do we have to make choices."

And he is certain that motor sport delivers crucial value to the company's road car programme.

"Because of our presence in motor sport we can really accelerate our innovation and we can prove much faster – three times faster – the validity of an idea compared to the normal R&D cycle, which is normally from nine months to a year for a big idea.

"I'm not talking about just making a new tyre and checking but something different, something that you have to design, build, test and validate. Divide that by three in motor sport. If we have a strategy to use motor sport to develop innovations and translate them to the real world, that's a pretty interesting statement to make to someone who might be considering buying tyres." ■

The result of this R&D into strong, versatile and durable tyres is technology that can be incorporated directly into road car tyres.

"All the technology we develop, both on Tarmac and gravel, helps us and we can transfer that quickly to the road," says Couasnon. "When you think about the materials – the construction, the textiles used within the tyre – all this experience has been useful in creating tyres for new and emerging markets where the roads are not so good.

"Some of the technologies we are developing in rallying are useful for agricultural applications or even in mining, specifically in terms of durability and ability to withstand aggressive ground."

The motor sport chief adds that the shift in the WRC regulations has been crucial in promoting this kind of research.

"The role of the FIA is extremely important in this transfer of technology," he says. "The rules mean that the more efficient you become, the more rapid the transfer of technology will be between the track and the road. Decreasing the number of tyres was a very tough challenge but a very clever rule, as it forced us to go towards solutions that are more relevant for the street."

TYRES THAT ENDURE

It isn't only rallying that facilitates technology transfer. The World Endurance Championship, too, is a series rich with possibilities for the tyre manufacturer.

"Endurance racing has been extremely interesting for us, because with GT, with Ferrari or Porsche or whoever, we have 18-inch tyres that are relevant to what you see in the street," says Couasnon. "At somewhere like Le Mans if you change tyres it's equivalent to a penalty of about 25 seconds. We have to develop tyres that are fast, stable in performance and which last a long time.

At the Le Mans 24 Hours, a set of tyres can last for 750km – that's 2.5 F1 GPs – and lose under a second per lap, and the lap is 13km."

Consistency is achieved, he says, through analysis of every aspect of the tyre's performance, but in particular how the contact patch – the section of tyre in contact with the road surface – is behaving.

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Classic car collections

F1'S WORKING MASTERPIECES

A growing number of Grand Prix teams are benefitting from taking their museum pieces out onto the track

TEXT: MATT YOUSON PHOTOGRAPHY: THOMAS BUTLER

Williams Heritage has been formed to maintain the team's fleet of old racing cars, with Nigel Mansell's 1992 FW14B being the most recent to undergo a full check before heading back out onto the race track.

Former Williams Team Manager Dickie Stanford heads the Heritage division, which is responsible for the upkeep of some 125 cars.

Today there is a small gap in the Williams Collection. A 1992 FW14B in the livery of Riccardo Patrese sits on a plinth in the museum at the eponymous team's Grove HQ in Oxfordshire, but its companion, bearing the red number five of Nigel Mansell, isn't on display.

A clockwise walk around the spiral museum, back through the eras of Boutsen, Piquet, Rosberg, Laffite, Reutemann and Jones, brings you eventually to a discrete set of double doors, leading to a pristine workshop. There, denuded of bodywork, sits Mansell's car. It is coming to the end of a complete strip down and rebuild, ready to fire up and head out onto a race track with the same power and performance it possessed when ruling the world 22 years ago.

This week it's Mansell's car, before this an equally hegemonic FW18 of Damon Hill was in the workshop, before that Keke Rosberg's less dominant but ultimately victorious FW08. All of Williams' museum pieces will cycle through the workshop – because they are not museum pieces. Every one is maintained in full running order, as the occasional drip tray below a display attests. And these are not replicas. A quick look inside the cockpit of the Mansell car reveals the chassis plate: FW14/11 – the 11th FW14 chassis produced, a B-spec model fitted with the revolutionary active suspension system. A more evocative indicator of the car's provenance is the constellation of fading red and gold stars stencilled onto the cockpit interior. Those point to a rich history.

There's an explanation on hand from Dickie Stanford, former Williams Chief Mechanic and Team Manager, now General Manager of Williams Heritage, the new division tasked with preparing, demonstrating and occasionally trading in Williams' vast collection of classics. "The mechanics used to put a gold star in for a win, a silver for second and red for pole – you didn't get anything for third," he explains with a wide smile. "You'll find stars like that on most of the cars in the museum."

Running a fleet of classic cars has become a complex endeavour for Formula One's biggest teams. These were cars built to last a matter of months, now running decades after they last competed. Keeping them in peak condition is a task requiring experience, good contacts and a fine touch – though it does not necessarily follow that the older the car is, the harder it is to prepare.

"Every restoration process has different specific challenges to overcome, depending on the year and model," says Ferrari's Michele Cecchini, responsible for the Corse Clienti division, which includes the F1 Clienti department, tasked with looking after the Scuderia's vintage F1 collection. "Older cars might be more difficult from a mechanical point of view, while new ones are more delicate in terms of complex electronic systems and carbon components."

"It's easier the older the car is," reckons Emmanuel Esnault, McLaren's Support Operations Manager, who has the 200-plus cars of the McLaren fleet in his care. "It becomes particularly difficult from 1993, starting with our MP4-8, which had active suspension and the complex electronics that characterised the period. Preparing one of those cars for a proper run can be quite tricky. You need to have the right computer and hardware, compatible with the embedded electronics. It's not simply a case of having the parts for the car – we need to have the right vintage computer running Windows 3.1 as well!"

There is a huge amount of pride in maintaining these machines in immaculate condition, but it's an expensive undertaking, not one driven by philanthropic motives. The classic fleets have become a valuable marketing tool, but also a useful revenue-generating sideline.

Williams Heritage began operations in March. The team has long had a museum at Grove, co-located with the Williams Conference Centre and housing the complete range of Williams models from the late 1970s to the final generation of V8s. The new business aims to substantially expand that operation. ▶

Riccardo Patrese leads the sister Williams-Renault of new world champion Nigel Mansell in the 1992 Japanese Grand Prix at Suzuka. It was the Italian's last win in Formula One.

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“IT’S FINE HAVING CARS IN THE MUSEUM, BUT WHY NOT GET THEM OUT ON TRACK?”

DICKIE STANFORD, WILLIAMS HERITAGE

McLaren's sole M7C on display at the team's HQ in Woking, Surrey. Right: F1 Cienti has long run a fleet of Ferraris, like this early Noughties Barrichello example, for the Scuderia.

"Whether it's for our sponsors, private events or public displays, we want to get more cars out where people can see them," says Stanford. "It's fine having them in the museum, but we're spending a huge amount of money and resources keeping them in excellent condition, so why not get them out on track?"

Stanford estimates that Williams has around 125 cars at Grove, split between models on display in the museum and those crammed into storage above the race bays. Alongside prepping Williams' own running collection, the Heritage division is also tasked with operating a customer business, ranging from the sale of surplus chassis for static display to package deals supplying a running car and a maintenance support programme to accompany it.

In this, Williams is creating a business similar to that long run by Ferrari, where many of the classis cars are privately owned but maintained by the team. "Some are still owned by Ferrari – being used for road shows, exhibitions and special events or simply put on display at our official museum – but most belong to private owners," says Cecchini. "The programme is a huge benefit to Ferrari, promoting its image and racing heritage around the world, but also working as a marketing and advertising medium. F1 Clienti helps keep Ferrari history alive: it is a landmark for our brand name and a precious container of important information to be safely kept and preserved in time."

It's a very different story at McLaren, which retains ownership of almost all its retired racing cars. "We have a team of between five and seven people working on heritage cars, and we have approximately 200 cars in our care," says Esnault. "That number includes McLaren F1 GTRs from 1995-98, Can-Am and Indy cars. There are some owned privately, but those are people very close to the team. In general, the philosophy is different to that of other teams. We restrict the number of cars outside the company."

Despite a different attitude to ownership, both McLaren and Williams agree on the showing of cars with the greatest provenance. Having constructed multiple chassis, there are choices to be made.

"Until 2008 the number of chassis that were manufactured was far higher," says Esnault. "If we take [1991 championship winner] MP4-6, we've got 10 chassis – maybe not 10 complete cars, but 10 chassis. We've got such a limited number of engines that we tend to put those in the most famous cars. The running cars will always be among the most successful of the year."

"We've mostly got the best cars," agrees Stanford. "We're missing a few from the early years as they were sold, but from the Honda days onwards we've retained the plums. Lots of championship-winning cars from the 1980s and '90s, many of the race winners from the BMW era. Look closely at Jacques Villeneuve's FW19 and you can still see some of the accident damage from his collision with Michael Schumacher in the title-decider at Jerez in 1997. When that came back to the factory it automatically went for repair, but thankfully we got to it before the technicians could return it to completely pristine condition: far better to preserve an authentic piece of history."

Authenticity is a word that crops up again and again, and it is taken to extremes as a matter of course. Williams, for example, ensures its cars run with a geographically accurate livery wherever they go. Were Damon Hill's FW18 to run in France, it would be in the unique French GP livery of the day, rather than the standard 1996 livery used elsewhere. That task gets harder under the skin. The teams steadfastly refuse all manner of labour-saving compromises.

"Total authenticity is our main and crucial rule," says Cecchini. "All cars being restored in our workshop follow the specs of that time: parts, livery, painting. Every detail must be original.

"Our collection has many highlights. There's a 312 B2 car from 1972 – amazingly still running – to the F2004 that collected the highest number of victories during a racing season. Every restoration is one of a kind, taking into account the specific needs of that chassis in particular. Every case has its interesting story to tell – just to mention one, we once rebuilt a boxer engine from the 1970s, completely from scratch, including making the moulds."

In this regard the teams have certain advantages over other collections. They can often call on the expertise of the original designers and mechanics but they also have access to some of the world's best facilities for making bespoke racing car components.

"Some of the Renault cars that have been sold to private collections may have been reverse-engineered for steel suspension. We could do that but I try to keep ours as original as possible," says Stanford. "It's one of the reasons why we do a ground-up rebuild every time we want to run one of the cars, just as we would with a current car. They're stored in running condition, but safety always comes first. We prepare the cars to be driven as hard as they were when they raced. When Valtteri [Bottas] recently drove the FW18 at Silverstone, he had the brake discs glowing red-hot. These cars were built for that – the harder they're driven, the better they are.

"Luckily I've got a whole factory to play with. When we ran the FW18, the gearbox shop took in the gearbox, stripped it and rebuilt it. The parts went into our crack-testing facility for a thorough examination, the same as would be done for a [current] FW36.

"Obviously the priority for the factory is getting the two race cars ready to go on time, but there is downtime and we build our schedule to take advantage of that spare capacity. So when the team were off racing in Austin and Brazil, we had heritage parts fabricated and inspected by some of the most skilled people in the business."

Authenticity extends beyond the factory, with teams frequently relying on the support of [ex]suppliers. "Obviously things do break," continues Stanford. "Fortunately all of our ex-partners want to see these cars running so we have good relationships with the likes of Honda, Renault, Toyota, BMW and Cosworth. We recently ran an FW18 at Goodwood and it developed an air pressure problem, but it required an air sensor that was specific to Renault. Renault, as usual, were more than willing to help and they found us a replacement. It's the same with many of our other suppliers – though for something like the Psion Organiser, required to run an FW14B, we keep several tucked away in a drawer. And if we run low, there's eBay."

The universal mantra across the fleets is that everything that can be made to run, should be made to run. But because everything can run doesn't necessarily mean it gets the opportunity. The manufacturers are confronted with an audience that wants them to play the greatest hits.

"We've got certain cars that are iconic, and those ones are requested quite often," says Esnault. "M23 [the first championship-winning McLaren] is popular, as is the [record-breaking 1988] MP4-4. The MP4-13 [the first championship-winning McLaren-Mercedes] and Lewis' MP4-23 from 2008 run quite often, as does the 1995 F1 GTR Le Mans-winning car.

"The more often the car runs, the less time it takes to prepare. For something often on track the preparation time might be 20 man-hours. For something rare it could be anything up to 500 man-hours. MP4-4 and M23, for example, are cars where you just press the button: there's a minimum of preparation to do. It's much less complex than if we are asked to run a 2002 MP4-17, for example. It doesn't go out often, so with something like that there's a lot of work involved. We'll x-ray all the suspension components, check the fuel cell, the fuel lines. After safety, it's a case of getting the car prepared, ensuring it's spotlessly clean and as shiny as when it raced.

"Of course, it's enjoyable when we're asked to prepare a rarely-run car, and also very useful. It's a way for us to make sure our collection is in good condition and in good running order. We try to do that for all the cars anyway by rotating those on display, conducting health checks and firing them up at least once a year. Unfortunately it's not always possible due to the number of cars and the additional activities we have, but we try."

Formula One is defined by its history. It stays at the pinnacle of motor sport with an unrelenting devotion to technological development, but alongside change it basks in the reflected glow of continuity. At its core are events, teams and a championship with a lineage that can be traced back half a century and more. Ferrari, Williams and McLaren, like Monaco, Monza, Silverstone and Spa, legitimate the achievements of the modern champions. The ability – and the desire – to bolster that link to the past with an expanding fleet of functional, perfectly authentic, classic cars from F1's past can only be good for F1's future. ■

"TOTAL AUTHENTICITY IS OUR MAIN AND CRUCIAL ROLE. EVERY DETAIL MUST BE ORIGINAL"

MICHELE CECCHINI, CORSE CLIENTI

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SPORTING LIVES

From its earliest days, 110 years ago, motor sport and particularly grand prix racing have played a definitive role in the development and success of the FIA

TEXT: JUSTIN HYNES

Go to any of the world's big motor shows – Geneva, Tokyo, Los Angeles – and there, bathed in laser light and sound-tracked by thumping techno or driving rock music, the world's major car manufacturers will be showcasing their vision of the future of the automobile.

Amid all the razor-sharp angles, flowing lines and pulsing electric blue infotainment displays of this year's Paris Motor Show, however, one gleaming silver vehicle stood out, a car so far ahead of its time that it is hard to imagine the impact it would have made when it was first driven.

The vehicle in question, dating back to 1899, is one of just two *'Jamais Contente'* Land Speed Record cars in existence today. Built in a year when communications technology extended to sending a radio signal across the English Channel, in which Claude Monet was painting London's Charing Cross Bridge, and in which the fastest street traffic reached 20km/h, the torpedo-shaped electric car was taken past the 100km/h mark near Paris by Belgian daredevil Camille Jenatzy.

That the ancient car was paired on the stand with a 2014 Formula E racer, an electric car capable of reaching Jenatzy's benchmark in under three seconds and which utilizes – by weight – the most powerful electric motor in existence, was neatly symbolic of the FIA itself with the federation using the cars to celebrate more than a century of activity under the banner of '110 years of Accelerating Progress'.

"Since its foundation the FIA has had a proud history of driving innovation through motor sport and is today a leading ▶

Gordon Bennett Trophy winner Camille Jenatzy aboard a Mercedes 120 in the 1906 French Grand Prix at Le Mans.

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promoter of clean, safe and accessible mobility for all," said FIA President Jean Todt. "The 2014 Paris Motor Show is a fantastic opportunity to highlight our commitment to ensuring that motor sport continues to play its role as an accelerator of progress in the automotive sector in the years to come."

It was through the feats of adventurers such as Jenatzy that the FIA was born. Inspired by the motor technologies emerging in the mid-1890s, the new activity of motoring saw the foundation, in November 1895, of the Automobile Club de France (ACF) at 4, Place de l'Opera in Paris. By 1898 a small group of its members – including founders Baron Étienna de Zuylen, pioneering car builder Count Albert de Dion, and journalist and publisher Paul Meyan – had raised 1.5 million Francs to purchase two fine classical-style mansions in the Place de la Concorde, numbers six and eight, which still house the club and the FIA.

With motoring gaining popularity similar organisations were soon established in other parts of Europe: the Royal Automobile Club of Belgium and the OAMTC in Austria in 1896; the Automobile Club of Great Britain in 1897; the Turin Automobile Club, KNAC in Holland, and the Automobile Club of Switzerland in 1898.

The purpose of these gentleman's clubs was clear – much as they raced horses, they intended for these new machines to compete against each other. And in much the same way horse racing led to the pursuit of superiority through training, diet and breeding, so too would the putative racers develop vehicles – through engineering, testing and bravery.

The first major event organised was a race from Paris-Bordeaux-Paris in 1895. At 1178 kilometres (732 miles) it was an exceptional test of the machinery available at the time, designed it seemed to push the fragile technology beyond endurance. And so it proved. Twenty-two starters began the race with just nine finishing, eight of them petrol-driven. Émile Levassor led throughout, but his two-seater Panhard, which had averaged 24km/h (15mph), was technically outside the rules which stated that the winning car must have at least four seats. It is nonetheless regarded as the first real motor race, with its city-to-city format setting the template for more than a decade of competition.

By 1903 one of Europe's most important motor sport events was for the Gordon Bennett Trophy, which had been established three years earlier by American businessman James Gordon-Bennett. Contested by national teams, the event was hugely popular in France where it was held. For 1903 the decision was taken to stage an event on the other side of *La Manche*, but with racing banned on public roads in England the race was run in Athy, County Kildare in Ireland (where the Irish Veteran and Vintage Car Club still hosts an annual Gordon Bennett rally).

> "THE FIRST MAJOR EVENT WAS A RACE FROM PARIS-BORDEAUX-PARIS, AN EXCEPTIONAL TEST OF MACHINERY"

And it was that man Jenatzy who won, the Belgian piloting a Mercedes. The following year's event was held in Bad Homburg, near Frankfurt, Germany in June 1904, where motoring organisation members representing the competing nations came together to form an international federation of motoring clubs, to be known as the Association Internationale des Automobiles Clubs Reconnus (AIACR). With France the centre of the motoring world at the time, the decision was taken to headquarter the new body in Paris, with the ACF offering space at its Place de la Concorde home. Its president, Baron de Zuylen, was elected AIACR president and the forerunner of the FIA was born.

GRAND PRIX GENESIS

While the earliest agendas of the AIACR were envisaged to encompass representation of all motor vehicle users, the foundations of the organisation lay in racing, and it was sport that dominated the body's plans. With the Gordon Bennett Trophy races running out of steam the ACF proposed to run a new race – a grand prix, open to all car manufacturers to run on a fast, triangular course near the rural town of Le Mans.

Run over two days, the 103.18-kilometre (64.1-mile) circuit had to be lapped six times each day. The total distance was a whopping 1238 kilometres (769 miles). And as has been the case since, technological development conferred superiority. The detachable wheel rim was introduced by tyre maker Michelin to cope with the large amount of punctures due to bad road surfaces and was run by three teams: Fiat, Renault and Bayard-Clément.

The success of the event, won by Hungarian Ferenc Szisz driving a Renault, prompted other nations to stage grands prix. Italy had the Coppa Florio, run near Brescia, which gave rise to the Targa Florio in Sicily from 1906. The German national club promoted the Kaiserpreis, held in the Taunus hills near Frankfurt, while the AC of Bavaria organised the Herkommer Trophy, a popular week-long event with set average speeds, which can be seen as the forerunner of the modern rally.

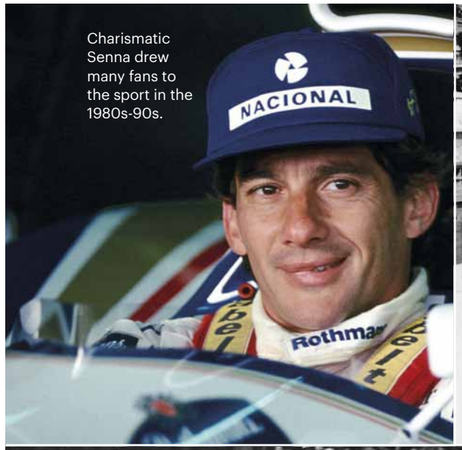
Co-ordinating all these events was seen as crucial and the AIACR became involved, setting up a Calendar Commission to allocate (or negotiate) dates for international races. The longest established events would be designated *grandes épreuves* and have priority over newcomers and one-off promotions.

Unfortunately the setting up of the Commission and the AIACR's own statutes coincided with a downturn in interest in motor racing. By the time it returned to popularity in Europe and the Calendar Commission and AIACR began to flex their muscles – particularly with the Grand Prix de l'ACF of July 1914, for which the AIACR drew up the first grand prix formula –war broke out. The AIACR would not meet again until June 1920.

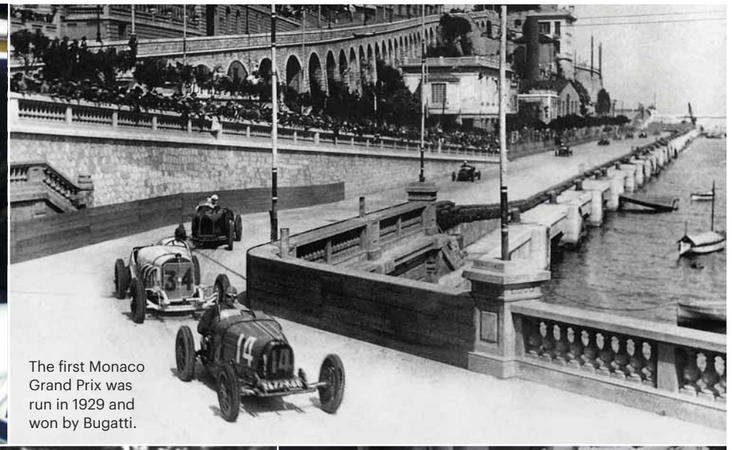
BETWEEN THE WARS

The most significant major sporting decision taken by the reconvened body was the foundation of a group dedicated to sport – the Commission Sportive Internationale, the CSI. Featuring representatives from Austria, Belgium, France, Great Britain, Italy, Spain and the United States of America, it would become the major sporting force of the proto-FIA in the two decades before the outbreak of the Second World War.

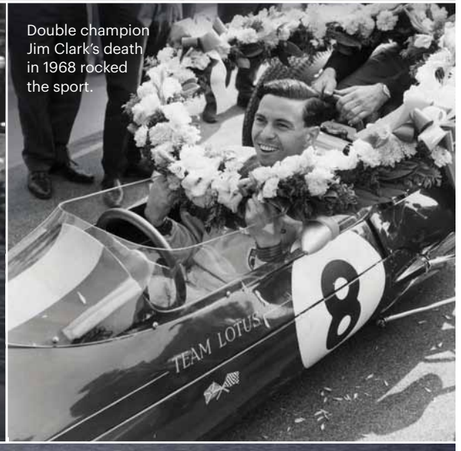
The first challenge was to draw up a comprehensive set of general regulations and principles governing motor sport in all its varieties. No easy task, it took the group three years, but when published the Code Sportif International (International Sporting Code) gave the first universal shape to regulations for cars, driver licensing and circuit requirements. ▶



Charismatic Senna drew many fans to the sport in the 1980s-90s.


The first Monaco Grand Prix was run in 1929 and won by Bugatti.


Rudolf Caracciola and Auto Union were a force to be reckoned with pre-WWII.



Double champion Jim Clark's death in 1968 rocked the sport.


Giuseppe Farina: Formula One's first World Champion in 1950.

Nelson Piquet in the Brabham-BMW at Monaco. He won the title in '83.

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The first race of the FIA Formula E Championship took place in Beijing in September 2014

It also contained a statement that was to feed directly into the later mission of the FIA: "The AIACR shall be the sole international sporting authority entitled to make and enforce regulations for the encouragement and control of automobile competitions and records."

In a further landmark move, still embraced by the FIA, the code established that the AIACR would grant motor sport authority to one club per country, and that the Association and its CSI would neither organise nor control individual events directly.

Then as now stabilising a coherent formula for grand prix racing was a complex operation, but by 1926 rules were in place. An Automobile World Championship would take in the Grand Prix of Europe (in 1926 at Pain's Circuito Lasarte) and two other races from a list comprising the Grand Prix d'ACF, Grand Prix of Italy, Grand Prix of Great Britain and the Indianapolis 500.

Bizarrely, it had a reverse points system with one point for the winner, two for second and three for third. All other finishers scored four points and non-finishers five. The championship winner was the manufacturer with the fewest points – Bugatti.

The new championship covered just five events in a CSI calendar of 30 in 1926, and by the following season the calendar had expanded to 65 events. Its tenure was brief, however. In 1928 the global economy began to fracture and within a year grand prix racing on such an organised scale became impossible as manufacturers reeled in the financially straitened times.

Curiously it was during this time that a race, which along with the Italian and British grands prix would come to define Formula One, came into being. Organised under the auspices of Prince Louis II, the first Monaco Grand Prix was run in order that the principality's motoring club, the ACM, could gain full national status from the AIACR. The first race was won by Britain's William Grover-Williams ahead of one of the inter-war period's most famous racers, the German Rudolf Caracciola.

Monaco GP founder Antony Noghes can also in some ways be regarded as the father of modern rallying. With the ACM accepted in the AIACR fold and Noghes installed as a delegate, he took up the cause of rallying with the Monte Carlo Rally. In 1933 the CSI defined the term rally as 'an event which is ruled by average speed, has multiple itineraries, and fastest speed on the road is not a factor in the final classification'. That, of course, would change but the recognition of the category was nonetheless important.

This was, however, a period of increasing shadow in motor racing. Germany under the Nazis undoubtedly used the technical challenge of motor racing as a showcase, and from the mid-1930s until the outbreak of war in 1939, the country established unnerving dominance with its sequence of incredible Mercedes-Benz and Auto Union machines in the hands of the unbeatable Carraciola. Indeed, the Yugoslav Grand Prix in Belgrade took place on September 3, the very day that Britain and France declared war on Germany. It was won by an Auto Union and driven by an Italian, the great Tazio Nuvolari.

FEDERATION WITH A FORMULA

When peace returned, so too did the CSI, though in a different guise. On 20 June 1946 – 42 years to the day after the formation of the AIACR – at the first post-war General Assembly of the AIACR held at the ACF in the Place de la Concorde, Paris, the Fédération Internationale de l'Automobile was born. A new title had been discussed several times in the past, but the forces of conservatism had always resisted change. Now, as a symbol of a new era, the proposal to form the FIA went through unopposed.

The new title was more appropriate for the composition of the organisation, the breadth of its activities and its future ambitions. One of those was consultative status at the United Nations, granted in 1949. In 1954, on the 50th anniversary of the organisation's formation, the FIA encompassed 52 member clubs from five continents. Some national motor clubs began to devolve responsibility for motor sport to specialist bodies and, after the 1955 Le Mans 24 Hours disaster, the American Automobile Association ceased involvement with the sport, necessitating the creation of ACCUS, a special motor sport control organisation for the United States.

In 1946, however, the new organisation – still acting through the CSI – was keen to re-establish motor racing and set about drawing up a new set of rules to deal with the post-war world. The regulations were branded Formula One, chiefly because the CSI had adopted an ACF proposal for a second formula for smaller cars, with the maximum engine displacement of two litres unsupercharged, or 500cc supercharged.

The first grand prix to be run to this new formula was the Gran Premio del Valentino held in Turin, Italy in September 1946, which featured such exceptional racers as winner Achille Varzi from Italy, Monegasque Louis Chiron, Briton Reg Parnell, Nuvolari and fellow Italian Giuseppe 'Nino' Farina.

By the following year the *Grands Épreuves* races were joined by more than 20 other competing grands prix in a season that was becoming increasingly crowded. The answer was simple – a World Championship, focused on drivers rather than manufacturers and featuring the best in the business.

The championship that has come to define top-level motor racing and to a large extent the FIA itself began at Silverstone in 1950, where such luminaries as Farina, fellow Italian Luigi Fagioli, local hero Parnell and a 38-year-old Argentinian called Juan Manuel Fangio lined up on the grid of a former WWII airfield in central England.

Regulating the series was a complex process, with technological advances forcing changes to control the speed of the cars. Indeed, it is somewhat amusing to read the reasoning behind changes to the formula in light of F1's recent wrangling over the current 1.6-litre, turbocharged hybrid power unit.

With a switch to a new engine regulation of 2.5 litres and 750cc in the case of supercharged engines, the federation ruled that, "The 1.5 and 4.5-litre Formula One was doomed to disappear, as it was technically too successful; in fact, the speed that it enabled the drivers to reach skirted too closely the limits of safety. It has become very difficult to find either drivers capable of using such machines to the maximum of their possibilities or ▶

constructors with the financial and material means of building them. With the lowering of the speed, the public will lose nothing. On the contrary, the quality of the entertainment will be enhanced by a greater number of competitors."

In another parallel, measures were being put in place to bring better safety to the sport. It would be another 25 years before a concerted series of safety improvements began to figure in the sport's regulations, but as early as 1952 drivers were required to wear hard helmets. The CSI also ruled that a race could be abandoned for safety reasons – for example, in torrential rain – and certain circuits had been identified as 'unreasonably dangerous', with a sub-commission set up to investigate and suggest modifications. The working party included experienced racing drivers Albert Divo and Piero Taruffi.

The tragic accident at Le Mans in which 83 spectators were killed when Mercedes driver Pierre Levegh crashed caused more resources to be put into safety, including medical checks on all drivers prior to the start of a race.

On track the technological battle was hotting up as manufacturers sought to gain an advantage. It was the British Cooper marque that made the biggest breakthrough in the championship's first decade, winning races in 1958 with Stirling Moss and two titles in 1959 and 1960 with a mid-engined car in the hands of eventual three-time champion Jack Brabham.

Again, as an echo of F1's current woes, the cost of Formula One racing was on the agenda as the decade turned and for 1961 the FIA introduced a new 1.5-litre formula. The championship was won by Ferrari's American driver Phil Hill, though the campaign was marred by the death of his German team-mate Wolfgang von Trips, as well as 15 fans, at Monza.

Von Trips' death was emblematic of F1 in the so-called golden age. This was a sport of incredible glamour and heroism but ever-present danger. It was an age of full-throttle living for the moment in the knowledge that the next race might be a driver's last. Indeed, in reporting the race for Britain's venerable *Motor Sport* magazine, its correspondent did not mention the tragedy until two-thirds of the way through his article. "For those in the grandstands and pits and around the rest of the circuit the race went on," the report read, "details of the accident being unknown and unannounced by the organisers."

It was a disregard repeated throughout the decade, from the death of young Mexican racer Ricardo Rodríguez the following year, to the fatal accident in a Formula 2 race at Hockenheim that robbed racing of triple champion Jim Clark, right through to the death in 1970 of champion-elect Jochen Rindt. The Austrian would become the sport's only posthumous title winner.

It was only as the toll mounted in the early '70s with the deaths of Jo Siffert, Roger Williamson and François Cevert that safety matters began to weigh on the sport's mind, thanks in large part to the efforts of three-time champion Jackie Stewart, who worked tirelessly to advance safety through the sport.

His work and that of the FIA, through the introduction of mandatory medical facilities at circuits, crash structures around fuel tanks, the introduction of the safety car, improved survival cells, FIA standard for equipment and a whole host of other advances – many introduced after the tragic death of three-time champion Aytron Senna in 1994 – have made the sport incredibly safe. Risk remains of course, as evidenced by the terrible accident that befell Jules Bianchi at this year's Japanese GP.

On track F1's popularity steamrollered, with the sport becoming a commercial juggernaut. It wasn't without roadblocks, however. When visionary Lotus boss Colin Chapman introduced large-scale sponsorship to the sport in 1968 the FIA choked, with then-president Wilfrid Andrews thoroughly disapproving of the idea.

The sport and its teams, though, needed the money. Racing was becoming prohibitively expensive and new revenue streams had to be opened up. ASNs around the world began to relax their rules and gradually modern Formula One began to take shape.

The 1970s would provide some of the sports greatest moments and arguably the height of its cultural importance, with the efforts of Jackie Stewart in 1973, the duels between Niki Lauda and James Hunt, and the exploits of American Mario Andretti in 1978 gripping the public imagination.

Arguably, it wouldn't be until the late 1980s and early '90s with the inexorable rise of Senna and the poignancy of his demise that F1 would form so great a part of the mass cultural zeitgeist. Following the Brazilian's death it would take the rise of another impossibly gifted driver, Germany's seven-time world champion Michael Schumacher, for F1 to cement its place in the top echelon of world sport, a space it occupies to this day.

At the heart of that ever-growing phenomenon is the FIA. Formula One and the federation have changed immeasurably since the championship that defines public perception of the organisation began. But while grand prix racing is unrecognisable from those days – and even more so from the first grand prix held over a century ago – the impetus behind the FIA's regulation of F1 and all motor racing is the same. While its quest is for safe, fair and accessible competition, ultimately it is about the possibilities of this incredible machine called the automobile and a passion for racing them. ■

THE FIA ON THE ROAD

The FIA is of course more than just a sporting organisation, and its mobility heritage is almost as rich as its sporting history.

As early as 1908 the FIA's forerunner, the AIACR, established a commission to examine the harmonisation of vehicle requirements, licensing and signage – work the FIA still has an involvement with through its association with the Transport division of the United Nations Economic Commission of Europe (UNECE).

The FIA mission to protect the rights of motorists and ensure safe mobility also goes right back to the federation's origins. For example, in the post-war period the body lobbied the United Nations to provide aid to struggling nations in order that they build safe roads.

In the decades since, the FIA has continued to campaign for better roads, safer vehicles and for more affordable motoring.

In this time the membership of the FIA has expanded greatly. In 1954, the year of its 50th anniversary, membership figures stood at 52 clubs on five continents. As the federation marks its 110th anniversary the FIA comprises 236 clubs in 141 countries around the world.

The federation's reach is phenomenal, with 80 million motorists now represented. Its largest club, Germany's ADAC (Allgemeiner Deutscher Automobil-Club), can even boast of publishing Europe's most widely read magazine, with *Motorwelt* reaching 13 million readers each month.

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GIUSEPPE FARINA
1950


JUAN MANUEL FANGIO
1951, '54-57


ALBERTO ASCARI
1952-53


MIKE HAWTHORN
1958

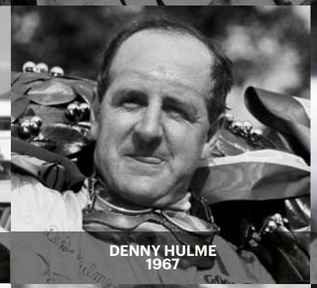

JACK BRABHAM
1959-60, '66


PHIL HILL
1961


GRAHAM HILL
1962, '68


JIM CLARK
1963, '65

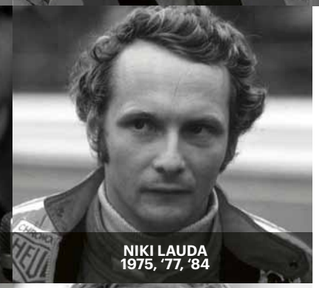

JOHN SURTEES
1964


DENNY HULME
1967


JACKIE STEWART
1969, '71, '73


JOCHEN RINDT
1970

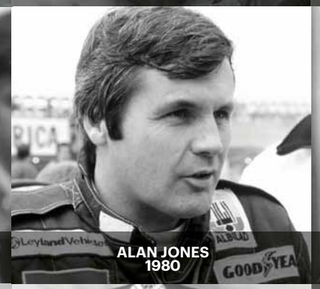

EMERSON FITTIPALDI
1972, '74

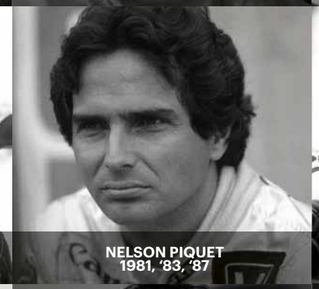

NIKI LAUDA
1975, '77, '84


JAMES HUNT
1976

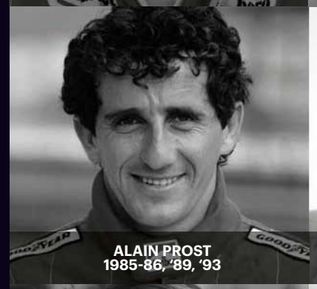

MARIO ANDRETTI
1978


JODY SCHECKTER
1979

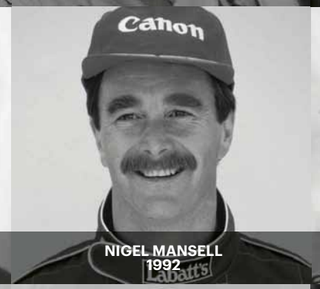

ALAN JONES
1980


NELSON PIQUET
1981, '83, '87


KEKE ROSBERG
1982


ALAIN PROST
1985-86, '89, '93


AYRTON SENNA
1988, '90-91


NIGEL MANSELL
1992


MICHAEL SCHUMACHER
1994-95, 2000-04

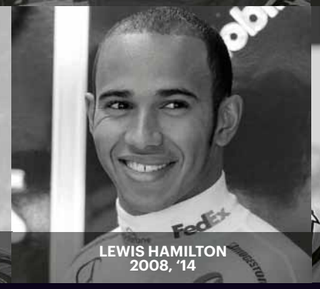

DAMON HILL
1996


JACQUES VILLENEUVE
1997


MIKA HÄKKINEN
1998-99


FERNANDO ALONSO
2005-06


KIMI RAIKKONEN
2007


LEWIS HAMILTON
2008, '14


JENSON BUTTON
2009


SEBASTIAN VETTEL
2010-13

FINDING THE FORMULA

Across 64 years of competition Formula One, the FIA's flagship category, has made champions – and legends – of 32 incredible racers...

If any two sentences sum up the strange alchemy at play in the creation of a Formula One World Champion then these, spoken by legendary five-time title winner Juan Manuel Fangio, might encapsulate it.

"There are those who stay out of mischief and then there are the adventurers," he said. "We racing drivers are adventurers; the more difficult something is, the greater the attraction that comes from it."

And there is no greater racing challenge than winning the FIA Formula One World Championship. First claimed by Giuseppe 'Nino' Farina in 1950, F1 has produced 32 champions, with 16 drivers winning the title more than once.

Michael Schumacher leads the field with a staggering seven titles, the first two taken with the Benetton team in 1994 and '95. The German then joined Ferrari and made history with a record five championship wins in succession between 2000 and '04. Fangio's five crowns put him next on the list, ahead of four-time winners Alain Prost and Sebastian Vettel. The latter recorded his current total in a four-year burst between 2010-13.

But no matter how many each driver has, one thing is true – every single one proved the words of another great champion, Ayrton Senna. Asked to define what made him the racer he was, the three-time Brazilian champion simply replied: "I am not designed to come second or third, I am designed to win." ■

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RACING FORWARD

FIA Secretary General for Sport, Jean-Louis Valentin, has been working hard to rebuild the federation's sporting ladder to attract a new generation of drivers and fans alike

For most people, when motor sport is mentioned, the first image that springs to mind is of high-tech, high-finance Formula One, that globe-trotting, heroic melodrama that represents racing at its most gilded and glamorous.

It is for these very reasons – its global reach, intense crowd-pleasing action and extraordinary technical prowess – that F1 sits at the apex of the FIA's motor sport activities. It is, however, just that – a peak atop a mountain of worldwide motor sport.

It is the FIA's job to regulate this panoply of motor racing events, with the federation overseeing codification and the maintenance of standards across an array of categories – from the most advanced prototype and single-seat racing series such as the World Endurance Championship and Formula E, through to regional rallies, hillclimbs, cross country events and historic races.

Charged with keeping a watchful eye over all this is the FIA's Sport department. Based in Geneva, it is led by Secretary General Jean-Louis Valentin (above), the former French National Football Federation Deputy Secretary General who took up the role at the start of this year.

2014: A YEAR OF FIRSTS

In Formula One it has been an exciting if turbulent and difficult year, and one in which much has changed, not least with the introduction of the technically innovative V6 Turbocharged Hybrid power units. Valentin believes this has had a hugely positive impact on the sport.

"On the one hand, we have had one of the closest, most exciting championships for many years," he says. "We also introduced new, greener V6 turbo hybrid engines. Today cars are completing lap times as quick as last year but using 35 per cent less fuel. It's a fantastic achievement which is testament to the skill of the teams and their engineers, and has also helped attract manufacturers to the sport.

"On the other hand, the tragic accident of Jules Bianchi has been a reminder that we can never let up in our efforts to improve safety, while the financial troubles of Marussia and Caterham have been a wake-up call on the necessity of introducing effective cost limitations, something the FIA has sought for many years now."

Beyond the flagship series Valentin says it has been a successful year for the FIA across its championships.

"It's been a year of firsts for the FIA," he says. "In May we saw the launch of the World Rallycross Championship, which grew out of the European championship and the successful partnership we have with promoter IMG. It has provided exciting competition, with the closest finish in rallycross' long history and the first competitor to be a world champion in two FIA series, with champion Petter Solberg having won the World Rally Championship back in 2003."

Valentin also points to the launch of the Formula E electric racing series in September as another landmark.

"Formula E has so far been a great success," he says. "It was an ambitious idea when first conceived by the FIA in 2010 and, again, thanks to an excellent partnership with the promoter we had an outstanding first event in Beijing."

When asked to assess the current health or otherwise of FIA sport heading towards 2015, it is the partnership aspect that Valentin stresses, adding that ultimately the federation's role is to work alongside its member clubs and promoters to deliver safe, fair and affordable motor sport. "FIA Sport is at the service of the development of our championships and the growth of our ASNs (national sporting authorities)," he says. "In this regard the FIA is more than a regulator, it's a key player in developing the future of motor sport in conjunction with promoters and organisers."

In essence, that means the development of grassroots motor sport, providing affordable and accessible competition to new generations. With the FIA having secured its financial future through a new bilateral agreement with F1's promoter last year, a new source of funding to achieve this goal has opened up and a Funding Review Commission has been established.

"The development of grassroots motor sport is one of the areas in which we have made the most progress in 2014," he says. "Besides the staging of our second Motor Sport Conference Week, which brought together ASNs from around the world, regional meetings have enabled us to identify the needs of our ASNs. It will now be possible to create appropriate development programmes.

"In terms of where the funding will come from, the Funding Review Commission has been working steadily and this year alone we shall be able to distribute some €2.7 million in grants for projects relating to safety, development, or to the management and administration of the ASNs."

ALL NEW IN F3 AND F4

Elsewhere, the FIA has taken significant steps towards building a new youth motor sport environment through the reshaping of the ladder by which young racers reach the sport's upper echelons.

Under the auspices of the FIA's Single Seater Commission, the federation launched the FIA Formula 3 European Championship, aimed at providing an advanced, highly competitive 'slicks and wings' category that would form a bridge between a driver's first steps in single-seater racing and the categories that exist just below Formula One.

Its launch, in 2013, saw the series begin to establish itself, but this year the category has taken off, becoming one of the most competitive single-seater series in Europe.

"We are very proud of the new F3 series, which was developed with a great deal of input from the FIA. This year's championship has maintained a high level of participation with a total of 31 drivers registered and it has also inspired a great deal of loyalty on the part of the teams taking part," says Valentin.

The series also entered into a broadcasting agreement with Eurosport. "That definitely helped to boost media coverage," says Valentin. "Also, I would say that the promotion of Max Verstappen to F1 (for 2015), as well as Esteban Ocon's title victory, provided more publicity. The championship now enjoys a well-deserved reputation as a breeding ground for future F1 champions."

This year the federation followed its revamped F3 series with the creation of a new category, Formula 4, representing the first step into single-seaters for drivers moving up from karting. While F3 is an international championship, F4 has been established as a national category run by ASNs. The first series launched in Italy this summer, with more due to be inaugurated in the coming year.

"So far, ASNs are responding very favourably to the concept," says Valentin. "This year Italy launched the first FIA-certified F4 championship and, on average, 22 cars were present at each event. For the future, Australia China, Japan, the United Kingdom, Spain, South America, Northern Europe and Germany have confirmed their involvement."

> "WE ARE VERY PROUD OF THE NEW F3 SERIES, WHICH WAS DEVELOPED WITH A GREAT DEAL OF INPUT FROM THE FIA"

RALLYING BOOST, WEC SUCCESS

The General Secretary confirms that the 'ladder system' is being applied to rallying as well. "We have implemented junior championships in WRC and the ERC, and the next step is to introduce them in regional rallies in 2015-2016."

Rallying has its difficulties, however, and the FIA is keen to see regional events, which have suffered a drop in entries, given fresh impetus. "Regional championships, except those in Europe, have been lacking participants and that is why we will allow nationally approved cars to participate in those series from 2015," he says.

One championship not experiencing difficulty in attracting competitors is the World Endurance Championship. Porsche returned to the top sports car category this year and in 2015 a fourth manufacturer, Nissan, is set to join the competition.

"Endurance is one of the flagship disciplines of our sport, with a history rich," says Valentin. "The creation of a world championship, built around the Le Mans 24 Hours, was not an easy task. Thanks to its inventive regulations, the WEC is oriented towards innovation and allows manufacturers to put forward the technologies that will soon be found in their road vehicles. It is these ingredients that are at the root of the WEC's success."

FUTURE HOPES

This is all part of the federation's larger plan to build a successful motor sport culture for the future, a difficult task when younger generations are faced with a multiplicity of opportunities.

"Hopefully these championships will encourage new generations of competitors," says Valentin. "Of course the aim is also to attract new fans through the promotion of these championships via social networks. The key is to have a wide range of well-structured and well-organised disciplines so that the public can understand the logic of these championships and follow a driver's career.

"We want to see motor sport continue to be as rich and varied as it was in the past, and open up more possibilities so that we can bring the passion of racing to as many people as possible." ■

AUTO / ISSUE #9

MOBILITY MATTERS

Andrew McKellar, the FIA's new head of its Mobility Team, believes member clubs can play a key role in helping to solve global transport issues

Faced with the rise of the connected car, a changing motoring landscape, exploding car sales in developing nations and the growing scourge of fatalities on the world's roads, the FIA's role of representing the interests of 264 motoring organisations in more than 141 countries has rarely been as broad, as challenging or – as the federation's new General Secretary for Mobility, Tourism and the Automobile Andrew McKellar believes – quite as interesting.

"It's a fascinating time," he says. "We are seeing a paradigm shift in the way people view the car and in mobility in general, which plays to the heart of what the FIA and its member clubs do. It can be viewed as a threat, but times of change also present fantastic opportunities, so we're in a really interesting position."

In January, McKellar will move his family from Canberra so that he can take up the post vacated by outgoing General Secretary Susan Pikrallidas, who leaves the role after six years. After a successful period with the Australian Automobile Association, where he is currently Chief Executive Officer, he's keen to take the knowledge acquired at an organisation that represents seven million members to a broader stage.

"I want to make a difference," he says. "There will be many challenges for the FIA Mobility team over the next few years.

"The overwhelming challenge facing many motorists today is access to safe, affordable and convenient transport," adds McKellar. "In many cases people are grappling with the increasing time pressures of everyday life, battling increasing congestion, the condition and adequacy of transport infrastructure or the costs of transport access and usage.

"We are seeing many innovative responses through growing access to digital technologies and communications, along with emerging models of collaborative consumption," he says. "The great thing for motorists is that these developments can offer new choices and greater flexibility. The challenge for motoring clubs is to adapt and respond to the changing demands of our members. If we do that we will continue to fulfil a valued and trusted role for them."

In his FIA role McKellar will adopt a broad portfolio, chiefly in continuing the effective servicing of member clubs' requirements of the federation, but also in delivering on the mobility goals set out by FIA President Jean Todt and Deputy President for Mobility Brian Gibbons for the duration of their second term in office. McKellar believes his strong club background will give him a solid foundation in tackling the first element of what he sees as a two-stranded task.

"Australian clubs have a strong member focus. They are quite strategic, continuously benchmarking against emerging competitors and seeking new opportunities to provide better services.

"I hope the experience I've gained through the AAA will provide a firm grounding for my new role. One of the key lessons I will take from the AAA is the importance of a strong stakeholder focus. We need to be responsive to our members' diverse needs. Many are looking for value added services, transparency and good communications. If I can get that mix right, then we'll be successful.

"I am hopeful that my recent connection to the AAA will assist in setting key priorities and defining the approach of the FIA Mobility Secretariat over the next few years," he adds. "I would emphasise a dual strategy based on effective member service and club development, as well as strong global advocacy.

"We need to provide a forum for exchange of knowledge among the developed clubs and harness that strength to support enhanced capabilities among emerging clubs. The FIA must support the efforts of its members by taking a stance on issues such as access to affordable mobility and enhanced road safety."

That advocacy focuses on a wide variety of areas, from lobbying for motorists' rights at regional and international level to the FIA's strong focus on road safety. The federation in partnership with the FIA Foundation has pushed hard for change over the past decade, and in particular since the launch of the United Nation's Decade of Action for Road Safety in 2011.

ROAD SAFETY TARGETS

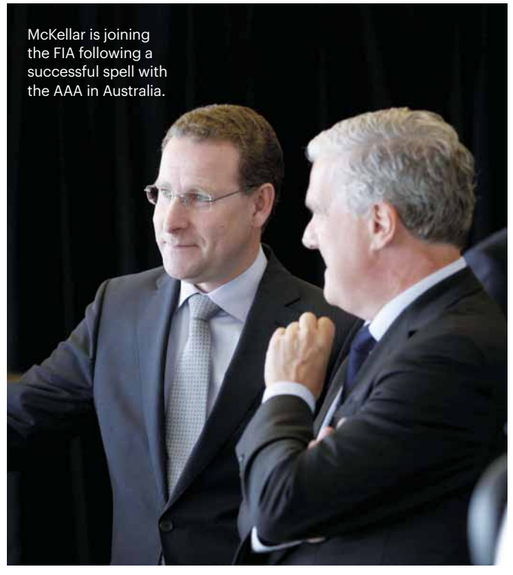
McKellar says the FIA must continue to develop its global advocacy on a scourge that sees 1.3 million people killed annually on the world's roads, and that the coming year is crucial to furthering the FIA and UN's road safety goals.

"I see two key approaches for the future," he says. "First, the FIA must strengthen its role as a leading global advocate for road safety. We have some great strengths in terms of leadership and expertise, and we can leverage the organisation's profile in order to talk to politicians and decision-makers around the world.

"Second, we must continue to support FIA members in taking practical action at national, regional and local level to raise awareness and deliver improved road safety outcomes through initiatives like the FIA's Road Safety Grants Programme.

"We are entering a crucial period," he adds. "Over the next 12 months there are significant opportunities to make substantial progress on the global road safety agenda. With the culmination of the UN post-2015 development agenda and the proposed Second High-Level (Ministerial) Conference on Road Safety (Brasilia, November 2015), there is a real opportunity to secure further political and financial commitment to improve road safety.

"The outcomes from these meetings can have a real influence on the flow of international development funding over the coming decade. If this is achieved it will certainly open the door to accelerate the reduction in road-related deaths and injuries around the world over the coming years."



McKellar is joining the FIA following a successful spell with the AAA in Australia.

> "THE FIA MUST LOOK TO FURTHER STRENGTHEN ITS ROLE AS A LEADING GLOBAL ADVOCATE FOR ROAD SAFETY"

CONNECTED MOBILITY

While McKellar is eager to build on the capacity of member clubs to lead advocacy campaigns, he is aware that clubs are going through a period of huge change in the public's perception of mobility. The increasing power of the connected car and the impact that may have on the traditional roadside service business model of many clubs, as well as the very real possibility that mobility will be taken out of the hands of the public altogether with the impending arrival of autonomous vehicles (to the concomitant detriment of club membership numbers), are concerns McKellar is all too familiar with.

"This is an issue which many clubs are grappling with," he admits. "It is clear that vehicle manufacturers and others in the automotive supply chain understand the imperative of building a more direct relationship with the customer. Motoring clubs need to actively position themselves to promote competition and consumer rights, and to develop new products and services that utilise connected technologies.

"While there is a very real competitive challenge for motoring clubs, many also have extensive B2B connections with manufacturers. Ultimately, the best opportunities for motoring clubs arising from the connected car are likely to come from strengthening these partnerships and collaborations."

BUILDING PARTNERSHIPS

In order to ensure a co-ordinated approach to these issues, the new Secretary General believes the FIA must act as an enabler, bringing clubs together to share ideas and best practice.

"The FIA is as strong as the clubs it supports. Many have much to share in terms of their member services, business models and advocacy campaigns. We must facilitate partnerships to help exchange that knowledge, particularly with developing clubs."

McKellar will begin to tackle that task in January, and the Australian is keen to get started.

"I've received some useful feedback from World Council members in initial talks leading up to my new role. I'm using this to develop a number of recommended actions in consultation with the President and Deputy President for Mobility."

"I would also say that we need to ensure the organisation and resourcing of the Mobility Secretariat is aligned to deliver on the expectations of FIA members. A tight-knit, motivated and capable team is absolutely vital to our future success." ■

Early risers

YOUNG CHAMPIONS

Racing drivers are getting faster quicker. AUTO examines why

TEXT: MARC CUTLER

Champions are getting younger than ever. This season alone has witnessed some of the youngest title winners in the history of motor sport being crowned.

Esteban Ocon, at 18 years and one month, is the youngest-ever winner of the FIA European Formula 3 Championship (including the earlier F3 Euroseries). Stéphane Lefebvre, 22, is among the youngest victors of the Junior World Rally Championship, and Lando Norris became the youngest-ever winner of the World KF1 Championship at a barely believable 14 years old.

So why are champions getting younger? How have they been able to reach such heights at such an early age? We gathered together this successful trio to find out.

THE RACING DRIVER

"We start to be professional earlier. I think that is why we arrive in single-seaters and it doesn't feel too different," says France's Esteban Ocon, who beat a host of more experienced rivals to the 2014 European F3 title.

Ocon started out like many other drivers in junior formulae karting at his local track. He rapidly progressed and was soon competing in national and international events. This is where the now 18-year-old first began his education in what it takes to become a champion. "Karting is much more professional nowadays," he says. "We were working in factories and in real race teams."

With the financial commitment that racing at top-level karting requires, there is no room for anything but professionalism. Even so, Ocon found the financial pressures tough and was handed a career-changing lifeline in 2010 when the Lotus F1 team began supporting him. "It was everything for me. If Lotus hadn't been there I would not have been able to race any more. I did not have the money to continue. I really want to thank them because without them, I wouldn't be where I am now."

It was a pivotal moment in Ocon's career and one that helped put him on the path to becoming a champion. With not only financial support but also training in a variety of diverse areas including driving technique and business ethics, the level of professionalism expected of him increased greatly. Ocon believes it contributed to him being a more complete racer at a young age. ▶

Esteban Ocon became the youngest-ever European F3 champion with Prema Powerteam after beating rival Tom Blomqvist to the title by almost 60 points.

"You work with a lot of people with a vast amount of experience," he says. "You get older quicker, I think. You realise what a racing driver has to do, and what he has to do be successful."

One of the most important traits to be successful, Ocon believes, is determination. "It is about doing it every day," he says with a clear conviction and belief. "We train every day. This year I have had maybe six days of holiday. If you want to win you have to work and you have to push. There is no secret."

This insatiable appetite for victory coupled with a strong work ethic helped Ocon on his way to this year's title. "It's been a tough year. We have been racing people who have been winning the season before, but I knew I had a chance to beat them, so I had to prepare hard."

In becoming the youngest-ever European F3 champion, Ocon is now firmly on the Formula One radar and recently impressed in tests with Lotus and Ferrari. But does he feel he is ready for a drive in the elite series at such a young age? He answers with conviction: "I have shown this season, along with Max Verstappen who will race in F1 next year, that we can be fast. There is no problem with that. The other side of the job, including the media, would be manageable. If you have good people around you, you can easily learn and do it quickly."

Above: Stéphane Lefebvre won three of the five ERC Junior rounds he contested, including here in Ypres.

THE RALLY DRIVER

To be a successful rally driver requires a variety of talents that must all be mastered, from adapting to changeable conditions through to making pace notes and repair skills. Stéphane Lefebvre, who at 22 has achieved the double honour of not only becoming Junior World Rally Champion but also the inaugural ERC Junior Champion, works hard each day to improve in these areas. "The most important thing I have learned is that you should not leave anything to chance," he says.

As with his circuit racing counterpart Ocon, Lefebvre began his motor sport career in karts and it too ignited an understanding in him about how to become a champion. "Karting was excellent preparation. It taught me the driving skills, the sense of competition, concentration and, most importantly, that nothing happens by chance. You must work to achieve your goals."

Winning a world title at such a young age requires a clear focus from early on, and that is something the Frenchman certainly had. "I always knew I wanted to be a rally driver. It was my dream since I was a child."

His formative years helped Lefebvre prepare for the tests and trials he would face racing on Tarmac, gravel, ice and snow once his rallying career began. "Karting was the best preparation for rallying both on a physical and a mental level," he asserts. To compliment his driving skills, Lefebvre realised he needed to be skilled in other areas, too. This led him to focus on his work away from the stages. "I take my education seriously and I have now got my mechanic's diploma. I have used it many times and I think every driver should be a little mechanic."

It was this commitment to examining every area of his development, combined with his pure pace, which earned Lefebvre a place in the Peugeot Rally Academy. His skill set continued to grow after his induction in 2011 and enabled him to become the third youngest Junior WRC title holder behind Ireland's Craig Breen (an FIA Institute Academy graduate) and WRC event winner Dani Sordo. ▶

ROOKIE OF THE YEAR

For the first time in FIA history, an award for Rookie of the Year will be presented at the FIA Prize-Giving 2014.

The award will be given to a top-performing driver in his or her first season within an FIA championship.

Eligible series include Formula One, the World Rally Championship, European Rally Championship, World Touring Car Championship, World Endurance Championship, World Rallycross Championship, European Rallycross Championship, European Formula 3 Championship and the CIK Karting KF World Championship.

The winner will be decided by the FIA Drivers Commission, led by two-time F1 world champion Emerson Fittipaldi.

Lefebvre has also become one of the youngest Junior WRC winners after dovetailing that campaign with his European championship efforts in 2014.

Maturity beyond his years has helped teenager Lando Norris to the world kart title with former racer Ricky Flynn's eponymous team, right.

YOUNGER CHAMPIONS FROM 2012-2014	2012	2013	2014
EUROPEAN FORMULA 3	Daniel Juncadella (21)	Raffaele Marciello (18)	Esteban Ocon (18)
JUNIOR WORLD RALLY CHAMPIONSHIP	Elfyn Evans (23)	Pontus Tidemand (22)	Stéphane Lefebvre (22)
WORLD KF1 CHAMPIONSHIP	Flavio Camponeschi (20)	Tom Joyner (22)	Lando Norris (14)

Lefebvre displays a level of maturity that is becoming increasingly common in younger competitors when describing how he achieved the feat. "I've learned to be patient, to manage the rallies differently and adopt an understanding of the larger picture and look beyond each stage." It is this level-headedness, key for a rally driver who is faced with so many hazards during a weekend, which shines through as the hallmark of a champion.

He is convinced of the benefits of being a young champion, too. "Champions are increasingly young and that is a good thing. It leaves more time for learning, alleviates pressure on career decisions and allows us to get our heads down and focus on making the right decisions."

With nine-time World Rally Champion Sébastien Loeb acting as a mentor to his fellow compatriot, Lefebvre's future looks bright.

THE KARTER

"If you keep working hard at it then you are able to do it, no matter what age you are." So says the youngest World KF1 Champion in history, 15-year-old Briton Lando Norris (just 14 when he won the title).

Competing against rivals who have as many years experience as you are old poses a problem in most other sports. Not in motor sport though, where the helmet obscures age differences and drivers compete in relatively equal equipment, particularly at the lower levels. So how has Norris developed into a world champion karter, capable of beating all comers, at such a young age?

"When I was in cadets I wasn't that good," he admits with youthful honesty. "I did improve in general racecraft though, and when I stepped up to Junior Rotax I did a season racing abroad. It was the first time I really got to show what I was capable of and that was a game changer."

With the extra attention came offers from the top international teams. Even at a young age, Norris had to make sacrifices to reach the level required by them. "I have missed a lot of school because race weekends last from Wednesday to Sunday, so that has been difficult."

A clear career plan was put in place, however, and he signed to a management company. "It has helped massively. We looked at everything I do including my racecraft and found things that I wouldn't have by myself." They have also helped to develop a work ethic expected and seen in all champions. "They've helped me improve so much and made me work so much harder. That has paid off more and more as I've gone up in each category."

The Glastonbury-born racer credits this as the most important lesson he has learned. "Keeping my passion and determination has been vital as I really want to win, and that translates into having to work really hard."

Has his age or size ever been a factor when racing? Norris answers clearly without hesitation: "I did get pushed around quite a bit at first because I am racing guys who are bigger than me. I had to become more forceful, which caused a few incidents, but it did help."

Adding an inner steel to his drive and raw speed helped Norris achieve his stunning feat in 2014. He sees no magic recipe behind it though and understands exactly why he was able to become world champion. "When I was younger, I looked up to drivers I'm racing against now and hoped that I could beat them. I then got to race them and did start beating them because I worked hard to reach their level. It pays off step by step, and I obviously got a massive pay-off by winning the world championship this year."

NEXT STEPS

Being a young champion doesn't necessarily lead to long-term success. The path to the upper echelons of motor sport is littered with those who burned brightly in junior series before expiring short of the summit. The principles of dedication and hard work, expounded by this year's young champions, need to be maintained if a driver is to achieve their career goals.

The trio of Ocon, Lefebvre and Norris have all achieved a great deal at a tender age, yet all are aware there is much more to do. As Norris says: "There is a very long way to go." ■

AUTO / ISSUE #9

Improving fuel economy

THE DRIVE FOR FUEL EFFICIENCY

With ever-more cars appearing on the world's roads, the pressure is on to reduce their environmental impact

TEXT: ANDREW WILLIAMS

“FUEL EFFICIENCY IS NOT SEEN AS A SEXY ISSUE, BUT IT’S IMPORTANT TO STAY FOCUSED ON IT”

SHEILA WATSON, FIA FOUNDATION

Against a background of concerns about energy security and the fragility of the global economy, as well as the ongoing drive to combat the environmental impacts of the automotive industry, policy makers worldwide are focusing on the pressing need to improve fuel economy.

The big concern is that while the situation is improving in the developed world, in emerging economies where the vehicle fleet is expanding fastest fuel use is obviously growing. It is a trend that threatens to have a huge economic and environmental impact, which could hamper efforts to meet global targets on climate change. So what can car manufacturers actually achieve? And looking beyond developed markets, what role can policy makers and other organisations play?

CALORIFIC VALUE

Great strides have been made in the development of electric and fuel cell-powered vehicles, and the assumption is that they can provide the answer to the unsustainable use of fossil-based fuels. Yet these technologies are still far from mature, and the growth in vehicles led by emerging economies such as China and India will still heavily involve conventional rather than electric technology.

Furthermore, many observers believe that fossil-based fuel power will still provide the best calorific value of any fuel source for the foreseeable future.

According to Peter Frise, Professor of Mechanical and Automotive Engineering at the University of Windsor and CEO and Scientific Director at Canadian research network AUTO21, the energy density of present-day batteries is “only about 10 per cent” that of any fossil fuel. He says that despite extensive research and development efforts on new batteries, that statistic has not changed markedly over the past few years.

Doctor Chris Bannister of the Powertrain and Vehicle Research Centre at the University of Bath agrees that liquid fuels have an inherent advantage in terms of energy density and ease of storage and transportation. He predicts that fossil-based fuels “will continue to be the most significant contributor for the foreseeable future”.

However Sheila Watson, Director of Environment and Research at the FIA Foundation and Executive Secretary of the Global Fuel Economy Initiative (GFEI), believes that given the increasing number of vehicles in developing countries, and the fact that the internal combustion engine is likely to remain a significant part of this trend, a focus on improving fuel economy with readily available technologies will be vital.

Watson says all the evidence demonstrates that, even by 2050, the internal combustion engine will remain an important part of the means by which vehicles are propelled, and stresses that fuel efficiency gains are likely to remain an important way of mitigating the environmental effects of the global automotive industry. This is not to say that alternative technologies can big ignored – quite the contrary. Improved efficiency of conventional engines should go hand-in-hand with further efforts to establish new technologies such as electric vehicles.

“Fuel efficiency is not necessarily seen as a very sexy issue, it’s not as exciting as electric vehicles or new forms of propulsion, but it’s important to stay focused on it,” she says.

INDUSTRY INITIATIVES

In both developed and emerging markets, Frise says that the main technological focus for improving fuel economy is centred on efforts to reduce vehicle weight through the use of lightweight, “high-strength materials, downsized powertrains and other components and systems”. Advanced internal combustion engine technologies, multi-speed electronically controlled transmissions and new bio-based fuels are also strong factors. ▶

Dr Chris Bannister and the University of Bath have been working with Jaguar Land Rover to achieve CO_2 cuts.

Peter Frise of the University of Windsor says the energy density of current car batteries is “10 per cent” of fossil fuels.

Citroën’s C4 Cactus Airflow 2L concept car, unveiled at the Paris Motor Show, boasts a fuel economy of 141mpg and uses a range of lightweight materials.

Renault’s radical EOLAB prototype is being used as a test-bed for fuel economy improvements destined to appear on production cars by 2020.

Sheila Watson of the FIA Foundation and GFEI says there is huge potential to improve fuel economy globally.

THE GLOBAL FUEL ECONOMY INITIATIVE

Since its launch at the Geneva Motor Show in 2009, the Global Fuel Economy Initiative (GFEI) has emerged as a key player in the ongoing quest to improve vehicle fuel economy. The GFEI is a partnership of six organisations – the FIA Foundation, which runs the secretariat and is one of the founding partners, as well as the International Energy Agency, United Nations Environment, International Transport Forum, International Council of Clean Transportation and the University of California.

Sheila Watson, GFEI Executive Secretary and Director of Environment and Research at the FIA Foundation, describes the initiative as a "powerful partnership of serious global players" who believe there are huge gains to be made from improving fuel efficiency in vehicles by ending fuel waste and "stopping the situation where fuel is essentially thrown away because engines are less efficient than they could be".

The GFEI's chief aim is to promote research, discussion and action to improve fuel economy worldwide. This includes working closely with governments to develop policies that encourage vehicle fuel economy improvement and supporting regional initiatives that provide consumers and decision-makers with the information needed to make informed choices.

It has been suggested that the average fuel economy of the global light duty vehicle fleet can be improved by at least 50 per cent by 2050 relative to 2005 levels.

Says Watson: "We've got the technology, we know the vehicles are going to be bought, and we know for example that the vehicle industry and consumers will invest $400 Trillion in new vehicles and fuels between now and 2050. So we've got to shape those purchasing decisions and manufacturer investment decisions to ensure that this very simple and absolutely accessible target is achieved."

The GFEI's work is split into three parts – data development and analysis of fuel economy potentials by country and region, support for national and regional policy-making efforts, and outreach and awareness raising with a variety of stakeholders, including car makers.

"Because we have so many experts in our partnership and network we are able to back up all our work with evidence," she says. "You'd be surprised how little evidence there can be for obvious issues. For example, we've established the only global data for fuel economy levels in different countries – an important benchmark against which to measure progress."

Watson says the capacity-building work the initiative carries out globally is also central. Here, in response to a request for support from governments and policy-makers, the GFEI provides a specially developed 'tool kit' – a repository of best practice on fuel economy policy development, ranging from regulation and fee-based schemes to labelling and import control restrictions.

"We encourage policy-makers to gather some of the key stakeholders in the country, including manufacturers and if possible fuel experts, parts experts, NGOs with an interest, consumer organisations and government representatives," says Watson. "They discuss the issue and then work through the tool kit and decide what is best for their circumstances."

The GFEI is pushing the fuel economy issue to the centre of key policy processes globally. Energy efficiency is becoming a major priority for policy-makers and the GFEI is an important contributor to the UN's Sustainable Energy for All initiative (SE4All), which is shaping new global targets on energy for the next 15 years. The GFEI is also ensuring that fuel economy is a focus during intergovernmental negotiations on climate change.

Watson believes there can be real progress on fuel economy, but says there is a sense of urgency. "We've done research which says that in the next decade alone we can save $2 Trillion globally just by using cost-effective fuel economy technologies. We want to work with manufacturers, but time is running out and this is existing technology we're talking about."

According to Christophe Aufrère, Vice-President of Technology Strategy at Faurecia, which supplied lightweight front seats, a glass-fibre composite vehicle floor and a compact and lightweight exhaust line for the Renault EOLAB prototype, every 10kg shaved off the weight of a vehicle lowers its fuel consumption and leads to a drop in CO_2 emissions of 1g/km.

"The best way to cut CO_2 emissions from vehicles is to make them drastically lighter," he says.

"The second best way is to recover heat lost in the exhaust system. Faurecia is developing technologies that can recover part of this available thermal energy to help reduce fuel consumption by up to seven per cent. Once captured, the energy can be used to heat the cabin or accelerate engine or gearbox-warming time. Towards 2020, Faurecia is also working with car makers on new energy recovery technologies to turn heat into electrical or mechanical power that can be immediately used by the vehicle."

As part of the EOLAB project, Saint-Gobain Sekurit is developing a range of infra-red reflective and low-emissive glazing, which allows car passengers to reduce air-conditioning usage and as a consequence CO_2 emissions by "improving passive comfort". The company is also working on lightweight mineral or organic glazing that can help reduce vehicle weight.

"The aim of this partnership with Renault is to optimize the glazing in order to decrease weight and ensure the same quality and better aerodynamics," says Doctor Volkmar Offermann, Marketing Director at Saint-Gobain Sekurit.

In the UK, Bannister reveals that a recent project involving the University of Bath, Jaguar Land Rover and a number of other industrial and university partners managed to achieve a 23 per cent reduction in engine CO_2 through extreme downsizing of the Land Rover's baseline 5.0-litre NA V8 petrol-driven engine – and a total vehicle reduction of 36.8 per cent when including savings due to improved aerodynamics, reducing weight and a start-stop system.

"THE BEST WAY TO CUT CO_2 EMISSIONS FROM VEHICLES IS TO MAKE THEM MUCH LIGHTER"

CHRISTOPHE AUFRÈRE, FAURECIA

Dr Volkmar Offermann, MD at Saint-Gobain Sekurit, which has produced low-emissive glazing for Renault.

Faurecia's Christophe Aufrère believes the best way to cut CO_2 emissions is by making cars "drastically lighter".

PHOTOGRAPHY: SHUTTERSTOCK

FUTURE IMPROVEMENT AND MITIGATION

FIA Foundation research shows that the global fleet will triple by 2050, with upwards of 80 or 90 per cent of these vehicles in emerging markets.

"We should not just sit back and celebrate any progress that has been made in developed countries," says Watson. "Fuel economy is still an issue for North America and the UK, but arguably it's even more of an issue for the rest of the world where the new cars will be, and where all too many of those vehicles will not be covered by regulations or requirements about their fuel economy.

"We believe that even if the fleet triples, which is quite something, with as many cars in China as there are on the planet currently, we could stabilise emissions from vehicles if we improved their fuel economy using existing cost-effective technologies."

THE POLITICAL DIMENSION

Looking ahead, there is a pressing need for global coordination on fuel economy to ensure that the gains that must be made – and are achievable with available technologies – are put in place particularly in developing countries. This is the work that is being advanced by the GFEI, coordinated by the FIA Foundation. It is an agenda that is starting to be accepted at the highest political levels. Key targets developed by the GFEI – such as halving the amount of fuel used by all new cars globally by 2030 – have been adopted by the United Nations in discussions over the new global development goals to cover the next 15 years. This agenda is also part of the UN's climate change negotiations.

As Watson says: "Such processes promise to have a real impact in the countries facing the biggest challenges on fuel economy, supporting the development of policies and strategies to make dramatic reductions in fuel use."

Brandon Schoettle, Sustainable Worldwide Transportation Project Manager at the University of Michigan Transportation Research Institute, believes that recent updates to the CAFE regulations in the USA are a good start to ensure progress continues with light-vehicle fuel economy in developed countries.

"One thing to keep in mind, though, is that the car makers can only make fuel-efficient vehicles and the public still decides if they want to buy them," he says. "Recent advances in fleet fuel efficiency have come from both improved offerings from the manufacturers as well as the public demanding vehicles with improved fuel economy on all levels, not simply shifting demand to smaller cars to get the improvements. When all vehicle types see improvements in fuel economy, that is when the fleet sees the big improvements that have occurred in the past several years." ■

Legends

"THEY FIND IT *VERY* HARD TO CONVINCE ME OF THINGS I DON'T THINK ARE RIGHT"

He's referring to 'his guys' at Mercedes F1, but then Niki Lauda has always been forthright in his opinions, and here he lets loose with them

TEXT: TONY THOMAS

The banner fluttered light on Monza's late-summer breeze. Red-daubed letters on a bedroom sheet, hanging from the Rettifilo grandstand: "*Solo un grande guerriero torna in botta*," it said. "Only a great warrior returns to battle."

The words had been written in honour of Michael Schumacher, that greatest of Ferrari heroes, in praise of his return to Formula One competition with Mercedes after a three-season pause.

They might just as accurately have been applied to another past Ferrari great, a generation earlier. Perhaps even more so.

It was at Monza, of course, that Niki Lauda famously got back in the ring, scarred and bloodied after the 1976 German GP smash that so nearly killed him. Only six weeks after the accident, he wasn't fit for competition. The burns on his face that would so transform his appearance were far from healed. Fluid on his lungs, caused by internal scarring from smoke inhalation, prevented him from operating at full cardiovascular capacity. Yet compete he did, just 33 days later, having missed only two grands prix.

As he describes in his vivid autobiography, *To Hell and Back*, he appeared "slightly singed" but outwardly strong. He knew, however, that to show weakness would have been the end of that year's championship fight, possibly his career: "I said then and later on that I had conquered my fear quickly and cleanly. That was a lie but it would have been foolish to tell the truth and play into the hands of my rivals by confirming my weakness. At Monza I was rigid with fear."

He qualified fifth – fastest Ferrari – and finished fourth. There was last year's title to defend; this year's still up for grabs. For Lauda, racing on was pragmatic, logical, not an act of cavalier heroism. "My matter-of-factness in automatically resuming my career as soon as all systems were go was disconcerting: some thought it betrayed a lack of dignity, others found it downright unappetising," he says. "But the only logical step appeared to me to get back into the world championship arena as soon as I could hold a wheel properly. Some of the newspapers said at the time that I must have burnt out a few circuits in my brain as well, but my chosen course of action was the best I could have taken for my physical and mental well-being."

The 1976 title went to Lauda's friend and rival James Hunt, by a point, in circumstances too well documented to need repeating. But Lauda fought back to win the '77 title, only to quit Ferrari amid acrimony, for Brabham and two more seasons, before a sudden F1 retirement in 1979. ▶

"I MET WITH NICO IN VIENNA, AFTER SPA. I APOLOGISED TO HIM FOR MY QUICK REACTIONS"

At first F1 seemed to have lost this doughtiest of competitors, as Lauda focused on setting up and building his own airline. The pull of track competition (and the need for a big pay cheque from Marlboro, title sponsor of his new-for-'82 team, McLaren) would prove too strong, however, and three races into his comeback, he won again.

Had there been any doubts as to the wisdom of this warrior's return to the fray, Lauda was answering them comprehensively – and in characteristically direct style – by winning on track. His talented team-mate John Watson finished ahead in both the 1982 and '83 seasons, but he was dropped, abruptly, at the end of that second year in favour of a young French hot-shot called Alain Prost. Six years Lauda's junior, wickedly fast and smooth, Prost was about to prove the toughest team-mate Niki had ever partnered and, as he admits now, at first he didn't know how to handle his rival's sheer speed.

Reflecting on their titanic brawl for the 1984 title, during a pause from his responsibilities as non-executive chairman of the Mercedes F1 squad, he recalls that at the end of the '83 season he had pushed his team – forced them – to introduce early a TAG-turbo-engined version of the MP4 chassis that would be campaigned in '84.

"I had developed this car with the turbo engine myself," he says. "John Watson unfortunately left me and suddenly I had Prost next to me. Which in the end was annoying.

"In the beginning I thought, 'No problem. A Frenchman can't be better than an Austrian. He will have no chance.' But he taught me a lesson because in qualifying we had this stupid 600 horsepower more and qualifying tyres for *one f***ing lap* – I hated this. It was ridiculous! But Prost used it much better than I did because he didn't have a problem with it. So he always blew me off in practice."

Lauda, truly, was getting his butt kicked and not until round nine, the US GP in Dallas, did he manage to place his McLaren ahead of Prost's on the grid. After only a handful of races, however, he'd already figured that while going head-to-head on pace was a fight he'd never win, there might be another path to victory.

"After three races I realised I was going quicker and quicker in qualifying but he was going quicker still. The difference was five-tenths in the beginning and I got it down to two-tenths, but he was still in front of me, so I could not catch him on a qualifying lap.

"So I changed immediately my strategy and said, 'I'm going to work for the f***ing race from Friday to Saturday to make sure that my race set-up is better than his', and this made me in the end world champion."

It did – just. The points gap come season's end was 0.5 in Lauda's favour, still the closest finish in world championship history.

"I was a better racer than Prost at the time," says Lauda, matter-of-fact. "He fell off a couple of times, which I did not. And therefore I could take it to the end by winning by half a point. But it was only because I was thinking how to beat the guy in another way, without just driving quicker."

The parallels with this year's Hamilton-Rosberg rivalry at Mercedes are obvious and tantalising to explore: the quick-yet-canny Rosberg cast in the Lauda role, versus the explosive talent of Hamilton/Prost.

"The situation is similar, yes," Lauda reckons, "but even more so now because they are equal, these guys. My guys [Lauda's endearingly avuncular description of the two young aces he mentors] now drive within 3/1000ths of a second with the same car. With Prost there was a difference in speed. So it's more difficult today."

Such an intense battle, running to the final race after 19 rounds, was destined always to lead to conflict off-track as well as on, and Lauda emits a rueful grunt when asked about 2014's Belgian GP flashpoint, where a duelling Hamilton and Rosberg clashed – with Rosberg more obviously at fault.

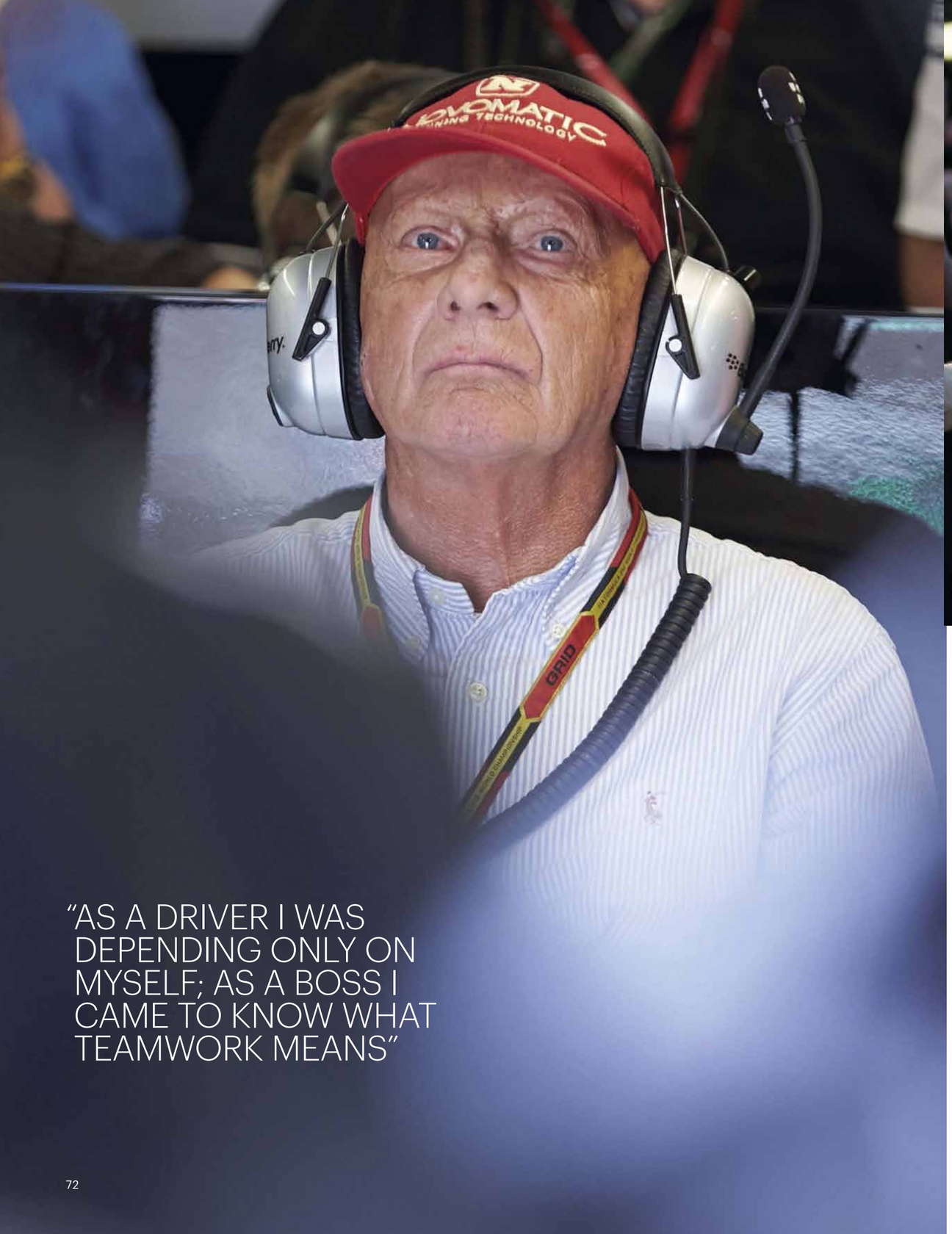
During the post-race aftermath in an adrenaline-drenched paddock, both Lauda and co-team principal Toto Wolff made heat-of-the-moment comments suggesting team orders would now have to be imposed. Lauda and Wolff, indeed, both described Rosberg's too-tough rebuff of Hamilton's attempt to pass on lap two as "unacceptable". And that was the public version. Behind closed doors, we gather, the air turned blue...

A few months on, though, and with that particular bomb defused, Lauda admits that making anti-Rosberg statements, publicly, before he had spoken to his driver was wrong – although his view of the incident remains unchanged.

His method of dealing with the potentially toxic fallout of this overheated moment reveals much about the management sleight-of-hand that's been essential in preventing a feud between two drivers, one of whom was guaranteed to be world champion, given the dominance of their car.

"I had a meeting with Nico in Vienna," Lauda explains. "It was organised at short notice the week after Spa. I then apologised to him for my quick reactions, because I did not see him or speak to him. This is wrong. ▶

Lauda won the second of five races in 1984 at the French GP in a calculated campaign that saw him finally overhaul team-mate Prost by just 0.5 points – the closest margin in world championship history.



"AS A DRIVER I WAS DEPENDING ONLY ON MYSELF; AS A BOSS I CAME TO KNOW WHAT TEAMWORK MEANS"

As a former world champion, Lauda has a good understanding with Rosberg and Hamilton at the all-conquering Mercedes F1.

"Nevertheless I told him that from my point of view he had not been right. Why in the second lap? That this accident can happen is not a problem. It is normal. But why in the second lap? That they fight each other... Okay, wing touches happen. If he had hit Vettel or somebody else, no problem. But if you hit your team-mate, on the way to a championship for Mercedes, it's not a good move. We had a good discussion about it. A constructive discussion."

As the elder statesman in Mercedes' F1 management triumvirate that also includes technical chief Paddy Lowe, Lauda brings a uniquely informed perspective to the delicate business of massaging the egos of superstars, while also helping set the strategic tone.

"We've only had one serious discussion about these things – only in Spa. There was nowhere else we had a problem, so really we've had peace between the two, no aggravation. In our meetings before the race they are relaxed, they know what they are doing. They know the responsibility for Mercedes – that we want to finish first and second. This is a team order. And then one or the other wins the race and the other one has to be second."

The winning of three world title and 25 grands prix grants Lauda a natural authority in conversations with drivers and he admits, with no shred of bombast, that there's a degree of respect between him and his charges due to their shared experience and common language.

"Yes, there's a bit of respect, no question. And they know I'm on their side anyway. Sometimes management is pissed off with me because I tell them what's going to happen. We had a board meeting in Stuttgart with all our bosses there and I said: 'They will hit each other'. 'How can you say this?' they asked. 'Because I know.'

"And the drivers know that I also defend them. I'm the only one who speaks the same language – being part of them and part of the management. So we have a very good relationship. They find it *very* hard to convince me of things I don't think are right."

Nor are they alone. One of the more remarkable chapters of Lauda's life concerns the battle he fought against Boeing after a Lauda Air *767* crashed in 1991 killing all 223 on board. The accident investigation found that an incorrectly deployed reverse thruster had caused the plane to become uncontrollable, resulting in its fatal dive.

Boeing was ultimately forced to admit the crash was not caused by 'operator error' – but only after Lauda, a qualified airline pilot, threatened to recreate the accident scenario in another *767*. Realising he was determined and stubborn enough to do so, Boeing blinked.

Lauda's terrifying resolve was sourced in his feeling of personal responsibility for those killed and for the importance he attached to being part of a team – *his* team at Lauda Air.

"As a driver," he says, "I was depending only on myself". But as a boss, "I came to know what teamwork means.

"So I enjoy this group of people," he continues, "I enjoy racing with them, especially with the success of winning the constructors' championship. It was a *team* effort. It was down to me to be quick or slow and wank around in a car, but to get everybody together in the right direction, fighting hard to win, is another achievement."

You look at that face, reflect on the stories written into its scars, and wonder where the drive comes from, the inner compulsion always to face the fight.

Lauda, predictably, offers an unsentimental analysis: "I don't know. But it's there and I hope it stays forever. Whatever I did in my life, I decided 'I want to do this', and then there was nothing that could distract me."

Not a moment, even, for an occasional look back at a life remarkably lived?

"I don't care a f***! I never kept a trophy. Never kept an airplane, nothing. I have everything in my head because this is the experience I have. And I use it every day."■

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PHOTOGRAPHY: DPPI

Ayrton Senna racing McLaren's MP4/4. The car took the Brazilian and Alain Prost (right) to a total of 25 F1 podium finishes from a possible 32 in the 1988 season.

Freeze frame

THE OLD ONE-TWO

Up until Mercedes' outstanding 2014 F1 season, no team had come close to matching the staggering level of domination achieved by the 1988 McLaren MP4/4

If ever proof was needed of Mercedes' complete domination of the 2014 Formula One season, it came at last month's Brazilian Grand Prix. With victory for Nico Rosberg and second place for Lewis Hamilton the team recorded its 11th one-two finish of the campaign, smashing a record that had, for 26 years, seemed untouchable.

In 1988, when McLaren rolled out its new MP4/4 for testing at Jerez, two-time champion Alain Prost is reported to have returned to the pits after a handful of laps to tell team boss Ron Dennis that this was a car with which the team could undoubtedly win the championship. The Frenchman wasn't wrong, though the title would in the end go to new team-mate and great rival Ayrton Senna.

That the MP4/4 was so dominant was a surprise, as many had expected that season's tough new rules limiting fuel loads and turbo boost to hurt McLaren and its turbocharged Honda, aiding its normally-aspirated rivals.

The opposite was the case. At the opening round in Brazil, Senna qualified on pole but gear change problems saw him take a restart from the pitlane. Prost, meanwhile, simply blitzed the opposition at the start, building a two-second gap after the first lap. Senna scythed through the pack and was second by lap 20, and the order was set. They took the first of what was to become a total of 10 one-twos that season.

The parallels with this year's performance by Mercedes are clear. In 1988 McLaren led 1003 laps, with Ferrari next on just 27. In 2014 Mercedes had, up until the Abu Dhabi Grand Prix, led 937 laps to Red Bull's 73. The MP4/4 scored 15 out of 16 pole positions, while the W05 Hybrid, ahead of the finale, had also only lost out once, to Williams' Felipe Massa in Austria. For McLaren, the standing of the MP4/4 as one of F1's most dominant cars is not lost, but it has, after 26 years, been matched in emphatic, undeniable style.

AUTO / ISSUE #9

AUTO looks at some of the outstanding numbers in a record year for the FIA's six world championships

FIA MOTOR SPORT IN NUMBERS

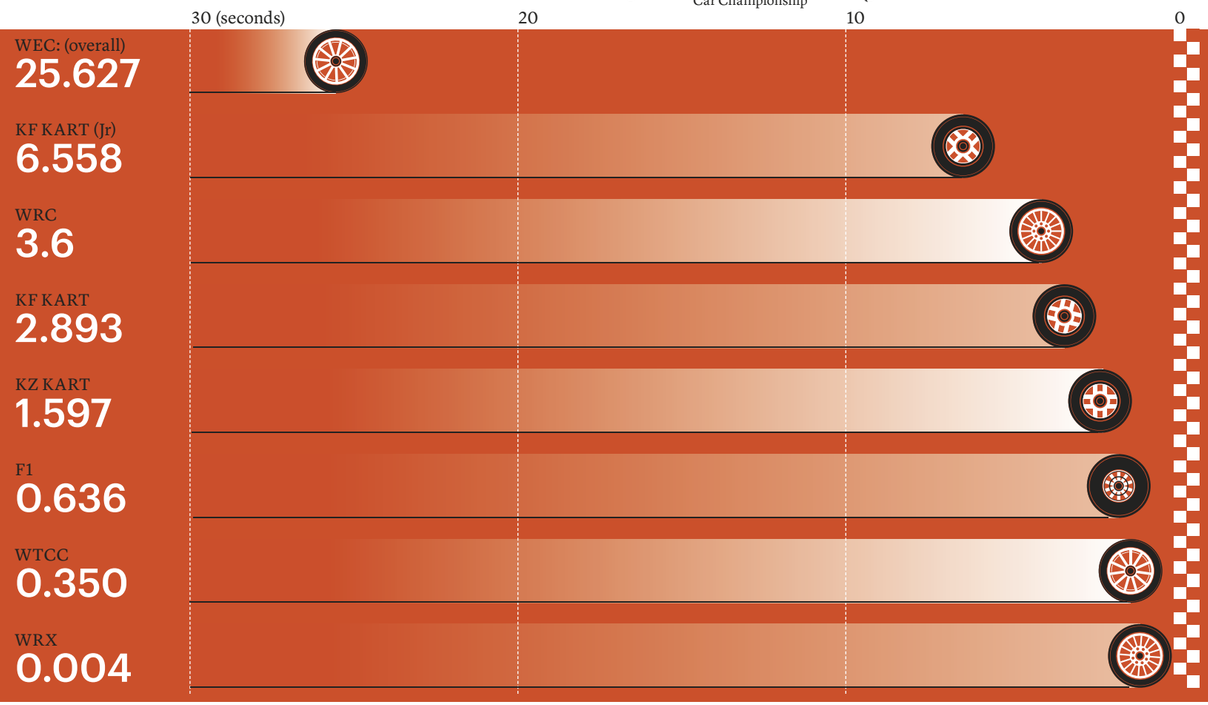
2014

AGE OF YOUNGEST POINTS SCORER
KF JUNIOR
Lando Norris

OLDEST WINNER OF 2014
WTCC
52
Gabriele Tarquini

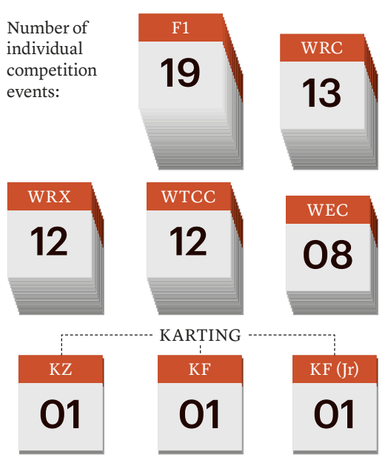
56
NUMBER OF NATIONALITIES COMPETING IN WORLD CHAMPIONSHIP EVENTS

CLOSEST FINISH OF 2014



67 TOTAL NUMBER OF WORLD CHAMPIONSHIP EVENTS

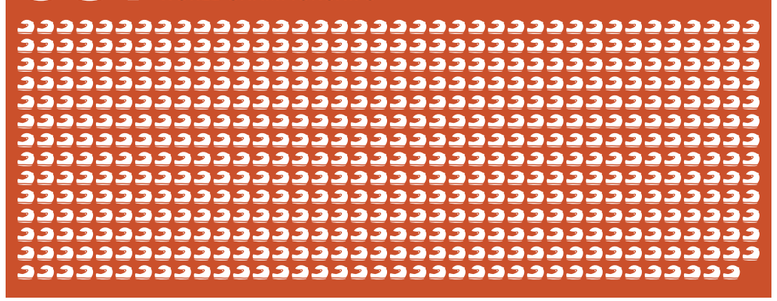
Number of individual competition events:



It was a year of new records and outstanding statistics across the six FIA world championships – Formula One, World Rally, World Touring Car, World Endurance, the new World Rallycross Championship and karting. The numbers are telling: from a 14-year-old world champion to a 52-year-old race winner; from a record number of world championship events to the closest finish in rallycross history; and a total domination of F1 from Mercedes drivers Lewis Hamilton and Nico Rosberg.

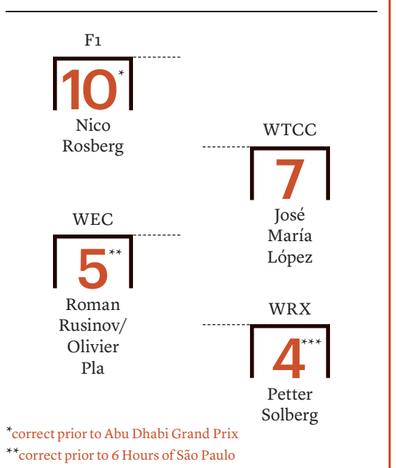
Every competitor played their part, with more than 500 different drivers representing 56 nations across 67 events. And each number tells a story.

531 TOTAL NUMBER OF DRIVERS TAKING PART IN WORLD CHAMPIONSHIPS



MOST WINS

MOST POLE POSITIONS (where applicable)

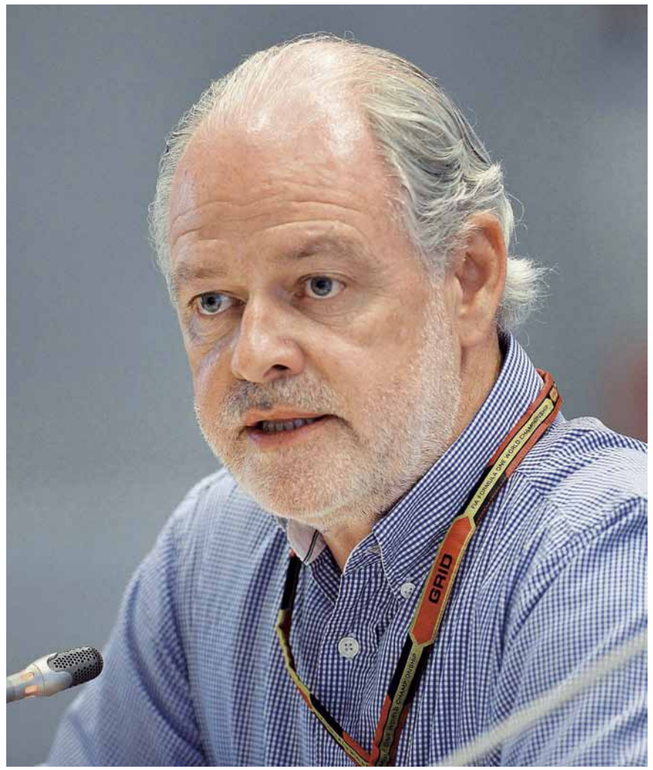


*correct prior to Abu Dhabi Grand Prix
**correct prior to 6 Hours of São Paulo
***correct prior to World RX of Argentina

Final lap

F1'S MR FIX-IT

Richard Cregan, the mastermind behind Abu Dhabi's grand prix, this year switched his focus to Sochi with an aim to not only deliver a successful race but also develop motor sport in the region



Q You were Chief Executive at Abu Dhabi's Yas Marina Circuit for more than five years. How did your involvement with Russia's Sochi Autodrom come about?
A It came out of what we had helped establish at Yas Marina. Following that, Bernie Ecclestone asked if I was interested in taking on the Sochi project. I had thought about setting up my own business at some stage and so we launched [consultancy company] Rasgaira. It's a three-year contract, to the point where they will be able to deliver the grand prix themselves.

Q When you went to Sochi for the first time, how far along the road were they towards hosting the grand prix?
A It was quite far down the road. [Track designer] Hermann Tilke had been working on it for about two-and-half years in terms of the basic project plan and the master schedule for the building. My first visit was at the end of 2012 and you could see there was a huge amount of work being done. The main grandstand complex, pit building and team buildings were completed as shells before the Olympics. They were very serious about getting it done to a standard that reflects Formula One and their ambitions.

Q The grand prix was obviously a success but how important is it for new circuits to look beyond the inaugural event?
A Really important, I cannot emphasise that enough. It's really important that circuit investors sit down and think about what you want to happen on the Monday after the grand prix. A big part of our job is putting together a strategy of what comes next – putting in place a year-round business plan, a five or a seven-year strategic plan for the region. We get involved with local government, the tourism authority, making sure that investors have a chance to maximise their return. In that regard, what we're doing in Sochi is very similar to what we did in Abu Dhabi: making sure that it's either zero or minimum cost to the government as a year-round facility.

Q Does the business plan rely wholly on motor sport?
A You try to develop different pillars of support for you business. One would be MICE business (meetings, incentives, conferencing and events), another is community and, of course, a third is motor sport – not just F1 but sustainable motor sport. One of things we've done in Sochi is agree a deal to deliver the Red Bull Air Race next May. We're talking to various race categories. We'll probably have four or five major events during the year that will line up with holidays, etc. Motor sport is central to what we do, but in terms of business consulting it's only one of the pillars we would be working on with a promoter or investors. In some respects we focus more on other pillars, in terms of year-round sustainability, which is becoming increasingly important. You also need to incorporate flexibility at the design stage. We have a good relationship with Hermann Tilke and [fellow designer] Peter Wahl, and we're looking at some new projects where we're able to have some input into the design phase.

Q To build that sustainable business model, is working with a country's National Sporting Authority (ASN) a factor?
A Definitely. Again, that's one of the pillars of the whole project. What we have established in the UAE is one of the best examples of how an ASN and promoter work together to not only deliver a grand prix, but also develop a year-round motor sport business as well as sustainable motor sport in the region. You are not only developing a fan base, you're developing your competitor base, the amount of licence holders, you're promoting safety and you're developing programmes for young drivers. I don't think you can successfully deliver a grand prix in future unless you have a real partnership with the ASN. It's not just about a contract, it's about delivering the race and making people feel part of it, because most are volunteers.

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