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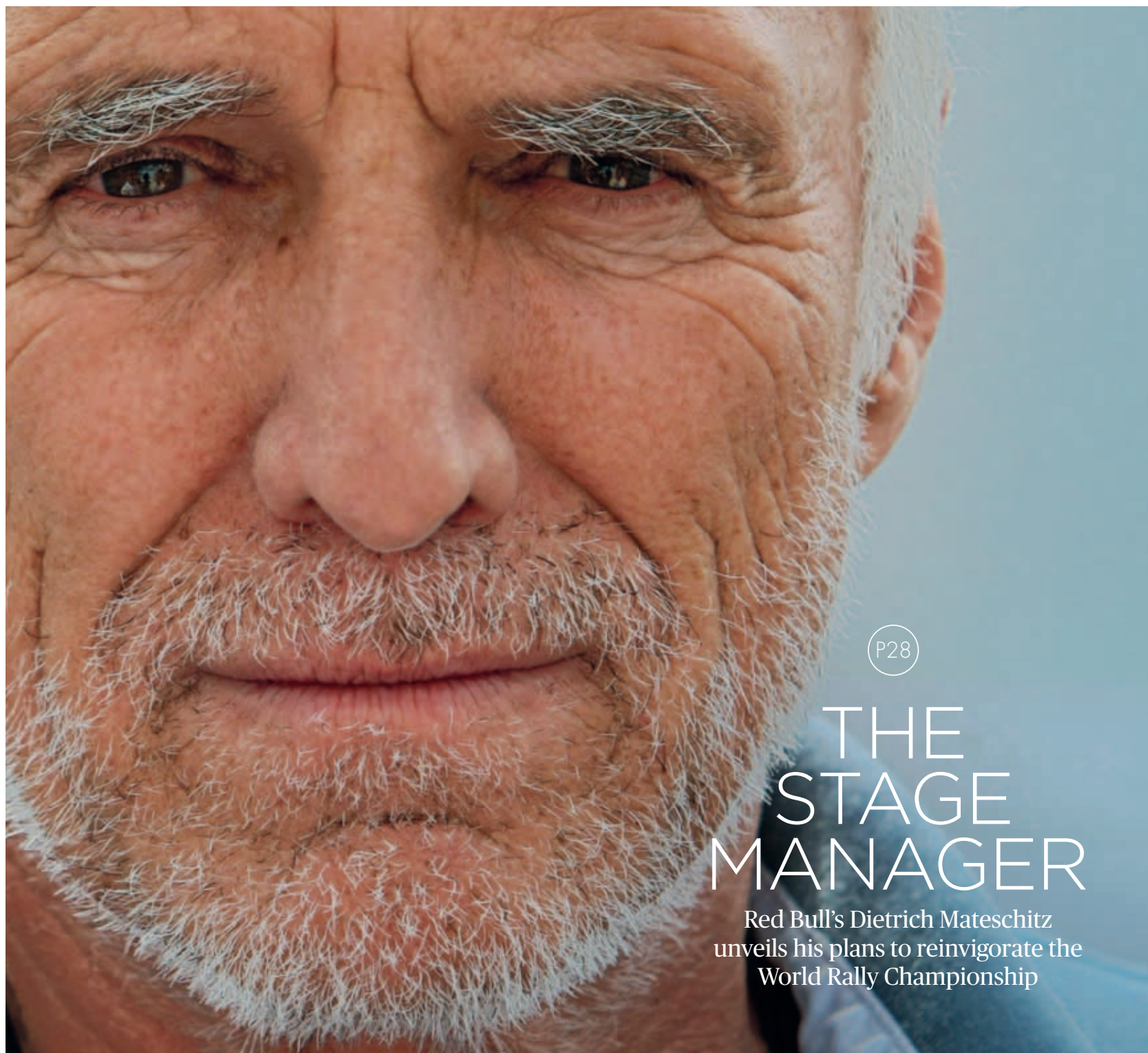
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Editorial Board:

JEAN TODT, NORMAN HOWELL,
GERARD SAILLANT, RICHARD WOODS,
TIM KEOWN, DAVID WARD

Editors-in-chief:

NORMAN HOWELL, RICHARD WOODS

Executive Editor: MARC CUTLER

Editor: JUSTIN HYNES

Copy Editor: JOHN LILLEY

Art Direction and Design HELEN NILAND

Photo Editor: CAS

Design Consultant: JAMES GREENHOW

Contributors: DAVID EVANS,
JOE SAWARD, MATT YOUSON

Logistics: KATE ROBSON

Repro Manager: ADAM CARBAJAL

Printing: MANOR CREATIVE

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JOHN PAP, JOHN RIGBY,

ANTHONY ROWLINSON, AVI SILVERMAN,

STUART SKINNER, TAMY VALKOSKY,

DIANA WATSON, CHARLIE WHITING



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Cover image: SUTTON IMAGES

A FAMILY AFFAIR

Welcome to AUTO, the international journal of the FIA family: the FIA, FIA Foundation and FIA Institute

This new and unique publication opens a window on the world of the FIA family, offering access to all of its areas of responsibility: as the governing body for motor sport; the federation of the world's automobile clubs; an international charity for road safety; and as a global think-tank promoting motor sport safety and sustainability.

But it isn't just about the FIA's work. *AUTO* also covers the latest and most pressing issues across all motor sport and motoring, its content reflecting such vital areas as safety, development and innovation.

Each issue will include news, features, interviews and photography from motor sport and motoring the world over. It will highlight all that is unique, significant and important in these industries, focusing on rigorous analysis and debate.

Our team have greatly enjoyed putting this first issue together and hope you enjoy reading it just as much.

ABOUT 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 232 national motoring and sporting organisations from 134 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

ABOUT 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.

ABOUT 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.

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Auto examines how motor sport is embracing sustainability from circuit design to electric racing.



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If you want to get the best of young racing talent then what better way to do it than have them schooled by the world's finest racing drivers.

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Auto dissects a crucial sporting or motoring moment. This issue, we analyse just how a World Rally team makes a lightning-quick service stop.

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After taking an ailing F1 team to a clutch of championship titles in just eight seasons, can Red Bull reinvent the World Rally Championship with the same success? Energy drink kingpin Dietrich Mateschitz thinks he can.

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From UN global summits to the round tables of the Clinton Global Initiative, the FIA is taking the road safety agenda to the corridors of power worldwide.



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While Toyota is rewriting the rules of endurance racing with its TS030 hybrid, Volvo is setting new standards of safety on the road with the V40, now equipped with pedestrian airbags.

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'WE BELIEVE IN THE POTENTIAL OF THE WRC. WE WILL TRY TO UNCOVER THIS POTENTIAL AND TAP INTO IT'

DIETRICHMATESCHITZ,REDBULL



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Hybrid power

ENDURING SUCCESS

When, in the summer of 2011, the FIA launched the World Endurance Championship with the express wish that the series become “a laboratory for innovation and the development of new technologies”, Toyota was among the first manufacturers to embrace the ideal. Absent from top level competition since its withdrawal from Formula One at the end of 2009, the WEC offered just the right platform for its ambition to score sporting success with environmental relevance. Just short of a year after it unveiled its plans for a hybrid challenger, the company’s decision to enter the series proved massively justified when its TS030 hybrid demolished the competition in the Six Hours of Sao Paulo, only its third race in the series. With Alex Wurz and Nicolas Lapierre at the wheel, the TS030 landed Toyota its first victory in an FIA world championship race since the 1999 Rally of China. It was also 20 years since the company’s TS010 had won at Monza, Toyota’s last success in international endurance racing.

The landmarks didn’t stop there, however, and the hybrid racer went on to take victory in the final two rounds of the inaugural WEC season, in Japan and China.

After the historic win in Brazil, Hybrid Project Leader Hisatake Murata said: “The project to develop a hybrid system for motor sport started back in 2006; at the time it seemed like an almost impossible task. But we have turned this dream into a reality.” □

‘TOYOTA’S TS030 DEMOLISHED ITS RIVALS AT SAO PAULO – ONLY ITS THIRD RACE IN THE SERIES’

PHOTOGRAPHY: TOYOTA MOTORSPORT



Nicolas Lapierre (centre left) and Alex Wurz celebrate their victory in the Sao Paulo Six Hours (main picture) with the jubilant Toyota team. Toyota’s TS030 went on to win in Japan and China to finish second in the LMP1 premier division of the WEC Championship



Volvo's V40 at the business end of an off-set frontal crash test. Its underlying chassis strength and airbags lifted it to a record 98 per cent adult occupant protection score; its external airbag helped it to an 88 per cent score for pedestrian protection



Mobility

STAR QUALITY

The latest Volvo V40 has achieved the highest-ever safety score in EuroNCAP crash tests. A five-star car, it distinguished itself in all four categories: adult occupant protection, child occupant protection, pedestrian protection and safety assist. New pedestrian airbag technology – where sensors detect potential impacts – triggers an external airbag which acts as a protective cushion. The innovation helped to lift the V40's score in pedestrian protection to 88 per cent, the highest ever in this category. And it scored 98 per cent in adult occupant protection, another record, thanks to the car's structure and safety systems. In safety assist it scored a maximum 100 per cent, through active safety systems such as auto braking and lane-keeping aids.

Michiel van Ratingen, Euro NCAP Secretary General, said: "In Europe, 14 per cent of road traffic fatalities are pedestrians. While in the last three years Euro NCAP has increased the requirements, the vehicle manufacturers have stepped up to the challenge, with the V40 setting a new standard." □



'IN THE SAFETY ASSIST CATEGORY VOLVO'S V40 SCORED A MAXIMUM OF 100 PER CENT'

PHOTOGRAPHY: VOLVO

News

Stories making the headlines from the world of the FIA family



Fund hits century

Following the close of applications for the 2013 Motor Sport Safety Development Fund, the number of National Sporting Authorities (ASNs) to have engaged with the grant initiative since its launch has reached 100. The number represents 77 per cent of all FIA-affiliated motor sport organisations globally and highlights the increased appetite for development of the sport at grass roots level.

Commenting on the landmark, FIA president Jean Todt said he was pleased to see so many FIA member clubs embracing the opportunities provided by the fund. “The benefits of the fund should be felt in every region and especially in motor sport’s developing markets,” he said. “I will follow the projects funded in 2013 with great interest.”

FIA Institute president Gérard Saillant added: “I am delighted that we have hit this landmark of 100 countries. It is a top priority for the Institute to ensure that by the time all funding has been exhausted, every ASN will have benefited in some way.”

(For details on how the Fund has aided clubs see page 80)

Mansell calls for action on young driver accident rate

Former Formula One champion Nigel Mansell has highlighted a ‘perfect storm’ of circumstances surrounding drivers’ first accidents in a new report co-authored by the UK Automobile Association and the Make Roads Safe campaign.

Mansell, a member of the Commission for Global Road Safety, along with Edmund King, director of the AA Charitable Trust, and FIA Foundation deputy director general, Saul Billingsley, launched the “Young Drivers at Risk” report into young driver safety at the UK’s Silverstone circuit.

The report’s findings centre on a survey of 20,000 motorists who have been involved in

car accidents. Nearly 40 per cent of drivers had been involved in an accident by the age of 23, and a quarter had crashed within two years of gaining their licence. Twenty-six per cent of car occupant deaths occur among young people aged 17-24.

To tackle such statistics, the report urges a Safe System approach to road safety. This includes greater investment in safe road design, awareness of the benefits of safety technologies such as electronic stability control, more visible police enforcement, and an incentivised approach to young driver insurance. The report also calls for drivers to be given more opportunities to drive in a safe, off-road environment before reaching 17 years of age.

“The latest casualty figures suggest that the number of deaths has begun to creep back up,” said Mansell. “And while road deaths among the young remain a serious problem in the UK, in many parts of the world they are nothing less than a crisis that’s out of control. Someone is being killed or maimed every six seconds. It’s an epidemic that is set to double within the next few years unless we take action.”



Nigel Mansell pictured at the launch of the ‘Young Drivers at Risk’ report. The research, undertaken by the UK’s AA and the Make Roads Safe Campaign, reveals that 26 per cent of car occupant deaths occur among those aged 17-23. “It is an epidemic that is set to double in the next few years unless we take action,” said the former Formula One world champion.



PHOTO: DPPI, JOHN FURLEY, MCKLEIN, ZENANI CAMPAIGN

FIA secures future of major championships

The FIA has secured the commercial future of the FIA World Rally Championship, the FIA World Touring Car Championship and the new Formula E electric car championship with commercial rights deals for all three series.

The federation has awarded a contract for promoting the FIA World Rally Championship to Red Bull Media House, in association with the Sportsman Media Group, a Munich-based sports marketing agency. The new promoters will be responsible for investing in and developing the WRC with a view to raising its profile, reputation and commercial value. This will involve close collaboration with the FIA, focusing on the introduction of live television coverage and developing a new digital media strategy.

The contract for the FIA World Touring Car Championship has once again been awarded to Eurosport Events. It marks the second renewal of an agreement dating back to 2005. The new deal will run until the end of 2017.

“The FIA is delighted to carry on this co-operation which has proved so fruitful so far,” said FIA president Jean Todt. “During the

eight years it has been promoting the World Touring Car Championship, the FIA and Eurosport Events have made a huge effort to ensure the championship grows in both on-track competition and popularity worldwide. The renewal of this agreement will further enhance the co-operation to make the championship even stronger.”

Eurosport CEO Laurent-Eric Le Lay said the company is “confident the WTCC has huge potential to grow up to the highest level in motor sport, attracting new car manufacturers and expanding its presence in key automotive markets.”

Finally, the commercial rights of the FIA Formula E Championship have been licensed to Formula E Holdings Ltd (FEH). The consortium of investors includes Spanish businessmen Enrique Bañuelos and Alejandro Agag, who will act as CEO.

“We see this as a great opportunity to create a new and exciting spectacle mixing racing, clean energy and sustainability,” said Agag. “We expect this championship to become the framework for research and development around the electric car, a key element for the future of our cities.”

Mandela supports Zenani Campaign

Nelson Mandela has pledged his support for the Zenani Campaign to save children from fatalities and injury on the world’s roads.

The global movement to protect children was established earlier this year in memory of Nelson Mandela’s 13-year-old great-granddaughter, Zenani, who was tragically killed in a car crash. The Zenani Campaign now contributes to the UN Decade of Action for Road Safety and is a Mandela Day initiative.

A Nobel Prize winner and former president of South Africa, Mandela posed for photographs wearing a Zenani Campaign wristband – to help raise awareness – on the day after his 94th birthday, at his home in Qunu, Eastern Cape, South Africa.

The campaign was launched by Mandela’s family, led by his daughter Zindzi and granddaughter Zoleka Mandela, together with the FIA Foundation, Road Safety Fund and the Make Roads Safe campaign.

Road accidents are the main killer of young people aged 10-24 worldwide, with the majority of casualties occurring in developing countries. One thousand young people in this age group are killed on the world’s roads every day.

The Zenani Campaign calls for the adoption of a number of measures to reduce fatalities, including safe crossings, footpaths and cycleways for schools, tougher sanctions on drink driving and speeding offences and improved protection for child passengers on motorcycles and in cars.

Such measures are not yet enforced in many countries and are urgently needed if the growing number of child fatalities and injuries is to be reduced.



Former South African president and Nobel Prize-winner Nelson Mandela is shown a wristband promoting the Zenani Campaign for children’s road safety by his great-granddaughter Zama.





FIA Institute launches environment scheme

The FIA Institute has launched an Environmental Certification programme offering National Sporting Authorities (ASNs), teams, circuits and promoters the chance to achieve the highest levels of environmental performance.

The initiative marks the first time an environmental accreditation system has been developed specifically for motor sport.

At the heart of the new programme is a Certification Framework, a management tool specifically designed to help motor racing stakeholders improve their environmental operation.

Organisations signing up for the programme will be rated on three levels of environmental performance, which will provide them with a measure of their achievements to date and

a benchmark against which to assess this performance.

Gérard Saillant, FIA Institute President, (pictured left) said: "This is a major step towards achieving the goal of our Sustainability Programme, which aims to establish the highest standards of environmental management in motor sport across the world. We will help all stakeholders to achieve this goal."

Restructured European F3 series aims to make racing ladder clearer

The FIA has announced a major restructuring of the FIA European Formula 3 Championship as part of its plans to simplify young drivers' progress from junior formulae towards F1.

The revamped series will get a new set of sporting and technical regulations, although the teams will still be allowed to run 2012 engines. The reworked rules mean that all aerodynamic development will be frozen to keep costs down. Volkswagen and Mercedes-Benz will be the two main engine suppliers, while South Korean manufacturer Hankook will provide suitable tyres.

The calendar will feature 10 events, each with three races, plus two practice and two qualifying sessions. That will add up to around four hours' track time per event for the series' young racers.

Six F1 circuits will be included on the championship calendar and the series will feature on the undercard of a number of headline FIA series events, including the FIA World Touring Car Championship (WTCC), the FIA World Endurance Championship (WEC) and DTM. This partnering will give young drivers the chance to showcase their skills in front of major motor sport figures.

Promotion of the new FIA European F3 Championship will be run by the FIA and ITR, the commercial rights holder of DTM.

Media coverage of the championship will be mainly focused on digital media and social networks, though there will also be live



Spanish driver Daniel Juncadella of Prema Powerteam races through the La Source hairpin at Belgium's Spa-Francorchamps circuit on his way to eventual F3 Euro Series championship victory.

television coverage of the series on some European networks.

"We started the process of restoring the European Formula 3 Championship to its former status last season," said Gerhard Berger, president of the FIA Single-Seater Commission. "After a positive exchange of views with all players involved, we're moving up another step by putting a stand-alone championship in place with a coherent and attractive calendar.

"We've done everything possible to cap costs, in particular by establishing stable sporting and technical regulations," he added. "We want to stress performance, to enable the best talents to show their skills. With this in mind we're putting together a worthwhile prize fund for the 2013 champion.

"Thanks to all these elements, partners, engine tuners and engine manufacturers Volkswagen and Mercedes-Benz, everything is in place to make the European F3 Championship the indispensable stepping stone for drivers who want to break into a professional career in top level motor sport."

Commenting on the restructuring of the series, FIA president Jean Todt said: "The European Formula 3 Championship is an opportunity to share the FIA's values through a new and exciting series, crucially aimed at a younger audience, be they drivers or fans.

"Our wish to establish a clear line of development for young drivers should make the path to Formula One economically more viable and professionally more accessible," he concluded.

PHOTO: FIA, LAT

Christensen wins Academy award

The FIA Institute Young Driver Excellence Academy's award for Driver of the Year 2012 has been won by Denmark's Michael Christensen.

The 22-year-old driver (pictured below) impressed with his talent on track, his willingness to learn and his enthusiasm and engagement with the programme. His understanding of the safety elements of the Academy's curriculum throughout the year was also impressive.

Christensen's prize will include help from Academy performance managers Alex Wurz and Robert Reid, who will introduce him to some of motor sport's most influential individuals as he plans the next steps in his career.

Wurz said: "Deciding on the award was very difficult as a number of this year's drivers could have taken it, but Michael proved to be the best all-round package throughout the programme. He gave a very strong account of himself, not just on track but also in the classroom and in support for our safety message."

Christensen himself was delighted with his award and now hopes to benefit further from the Academy programme.

"The award means a lot to me and I'm really proud of myself," he said. "It's a great feeling to know that Alex, Robert and all the Academy coaches like what I've been doing and my approach to the course. We have so many experts to take advice from at the Academy and it will be great to continue to use their knowledge to help my performance."

Christensen is just one of 18 drivers who all excelled by graduating from this year's programme. Each driver received a certificate to mark his achievement and all will now become ambassadors for the Institute and its safety message.



2012 FIA INSTITUTE ACADEMY GRADUATES

Mohamed Al Mutawaa, UAE
Klaus Bachler, Austria
Andrea Bate, South Africa
Craig Breen, Ireland
Andrea Caldarelli, Italy
Gabriel Chaves, Colombia
Jonas Gelzinis, Lithuania
Michael Christensen, Denmark
Jack Le Brocq, Australia

Michael Lewis, USA
Alexander Lynn, UK
Jose Andres Montalto, Costa Rica
Ramon Pineiro, Spain
Brendan Reeves, Australia
Pontus Tidemand, Sweden
Timo van der Marel, Holland
Sepp Wiegand, Germany
Lewis Williamson, UK



Graduates excel

Graduates of the 2011 FIA Institute Young Driver Excellence Academy have achieved great success this season.

Three of the Academy's alumni dominated the World Series by Renault, winning the top three categories in the series. Spain's Albert Costa won the Eurocup Mégane Trophy, Belgian Stoffel Vandoorne took the Eurocup Formula Renault 2.0 title and the hat-trick was completed by Robin Frijns, who took victory in the top Formula Renault 3.5 championship.

Frijns' title win earned him a test with both the Sauber and Red Bull Racing Formula One teams at the recent Young Driver Test in Abu Dhabi and the young Dutchman was later announced as Sauber's test driver for the 2013 F1 season. He was joined on track by fellow Academy graduate Alexander Rossi, now an official test driver for the Caterham F1 team.

Elsewhere, Norwegian rally driver Andreas Mikkelsen won his second Intercontinental Rally Challenge title and 2012 graduate Craig Breen won the Super 2000 World Rally Championship.



FIA Institute Young Driver Excellence Academy graduate Robin Frijns celebrates winning the 2012 Formula Renault 3.5 title at the series' final round in Barcelona last October.

Car makers fail Latin test

ACCR President and FIA Foundation trustee Carlos Macaya.



Major motor manufacturers are selling new cars in Latin America that would not meet basic crash test standards in Europe, according to Latin NCAP, the new car assessment programme for South America and the Caribbean. Models from Renault and Chinese company JAC received just one star in the organisation's latest crash tests. Max Mosley, chairman of Global NCAP, the umbrella body for regional NCAPs, said: "It is shocking that major manufacturers are willing to offer one-star cars for sale in Latin America when as a matter of routine their cars achieve five stars in Europe."

The Renault Sandero's one-star rating was blamed on the unstable performance of its body shell and lack of airbags, while the J3 from Chinese manufacturer JAC gained one star despite having two airbags, as its body shell strength, essential for protecting occupants in a crash, was deemed deficient. In a statement, Latin NCAP said: "Airbags cannot compensate for poor structural crashworthiness. Latin NCAP strongly believes that consumers should not be misled by manufacturers that are relying on airbags alone to give a false impression of safety. Just including an airbag will not guarantee safety." In response, a Renault statement read: "The Renault Sandero, sold in South America, conforms to the local laws and regulations. Currently there is no requirement for any airbags to be fitted to new vehicles in this region. Renault welcomes any improvement in the legislation for vehicle safety and the specification of its local products will change accordingly. In advance of any legislation change, the specification of all Sanderos will include a driver and passenger airbag fitted as standard from March next year." Latin NCAP noted that there has been progress in the region as other cars tested achieved a four-star rating and

'WE ARE BEGINNING TO SEE REAL BENEFITS IN TERMS OF IMPROVED ROAD SAFETY'

CARLOS MACAYA, ACCR

two manufacturers have fitted airbags as standard in the models tested. In the latest tests five models achieved four stars, emphasising the combined benefits of improved body shell strength, airbags and seat belts. The four-star models are: the Ford Fiesta KD, Honda City, Renault Fluence, Toyota Etios hatchback and VW Polo hatchback. The remaining model tested, the Volkswagen Clásico/Bora, scored three stars, held back by poor structural integrity. In an encouraging additional step forward, Ford and Volkswagen have confirmed that airbags for driver and front passenger will be fitted as standard in the Ford Fiesta and the VW Clásico/Bora for all Latin NCAP markets. Latin NCAP welcomed this initiative in advance of forthcoming legislative requirements in some major Latin American countries. Another sign of progress in these tests has been the achievement, for the first time, of four stars for child protection by two models, the Ford Fiesta and the Honda City. With phase three completed, Latin NCAP has now tested 26 models including most of the region's best-selling cars. Carlos Macaya, FIA Foundation trustee and president of the Automobile Club of Costa Rica, said: "Now that Latin NCAP is in its third year, we're starting to see real benefits in terms of improved road safety for Latin America. There are now more four star cars entering the market and the message is clear - much higher standards of vehicle safety are not only perfectly possible, but absolutely crucial across the region. The upward trend in safety must continue. We cannot tolerate anything less as lives depend on it." Latin NCAP was launched in 2010 as a three-year pilot project to explore the potential contribution a regional system of independent crashworthiness can make to road safety in Latin America and the Caribbean. It replicates similar programmes developed over the past 30 years in North America, Europe, Asia and Australia.



Brazilian President pledges support for UN Decade of Action

Brazilian President Dilma Rousseff has pledged her country's support for the UN Decade of Action for Road Safety in a speech to the General Assembly of the United Nations. Speaking at the opening of the General Assembly's 67th session, Rousseff said the Decade of Action represents an important initiative in preventing "a leading cause of death among the world's young people" and committed Brazil's government to working to reduce road traffic deaths and injuries. "To this end, our government is preparing a wide-ranging awareness-raising campaign together with the FIA," she said. Following her address, FIA president Jean Todt, accompanied by Global Road Safety ambassador Michelle Yeoh and Brazilian two-time Formula One champion Emerson Fittipaldi, met with UN Secretary-General Ban Ki-moon and Rousseff to discuss collaborative efforts to curb the global rise in road injuries and fatalities. Rousseff's speech to the UN came in the wake of a visit to Brazil by an FIA delegation led by President Todt just a few weeks earlier. The

delegation, which included Yeoh and Fittipaldi, hosted a conference in Sao Paulo in association with the Inter-American Development Bank (IDB) entitled "Paving the Way to Road Safety" at which Todt and IDB president Luis Alberto Moreno agreed to work together on a strategy to improve road safety in Latin America and the Caribbean. The conference was held as part of the FIA's Action for Road Safety initiative. The conference was followed by a meeting with Rousseff in Brasilia at which she committed to working with the FIA on road safety in Latin America, an issue she confirmed she would raise at before the United Nations.

Brazilian President Dilma Rousseff addressing the 67th UN Assembly recently. During her speech she highlighted road safety issues in Latin America and promised to establish a road safety awareness programme in the region.



Rallycross goes global



"The championship will be run at existing tracks in Europe in 2013 and combine the best aspects of traditional mixed-surface rallycross action with an exciting new racing format that will offer drivers and spectators more races in an easily understood visual event that has a clear path of progression from heats to finals," said Martin Anayi, managing director of rallycross for IMG Motorsports. "Rallycross has the components to be the perfect 21st century motor sport; it's short, sharp, full of action and has some great personalities," he added. "We need to keep those core elements that make rallycross so special, but repackage it and present it to an audience that has not yet discovered how great it is." As the championship promoter IMG will be responsible for all commercial aspects of the series, while the FIA will continue to oversee all sporting, technical and regulatory aspects. Soon afterwards IMG announced that it has signed a deal for Monster Energy to sponsor the series next year. "Being a part of this championship from the beginning is a great opportunity for us and we look forward to working with IMG to grow this fantastic sport," said Jamal Benmiloud of the energy drink brand. "We can't wait to get involved with rallycross fans next year and we're looking forward to an exciting season."

IMG, the international sports and entertainment company, has agreed a 10-year deal with the FIA to develop European Rallycross into a world championship. The deal, which begins next year, is the first such arrangement between the FIA and IMG and will see the series rebranded as the FIA Rallycross Championship.

The European Rallycross Championship currently consists of 10-rounds in the United Kingdom, France, Austria, Hungary, Norway, Sweden, Belgium, Netherlands, Finland and Denmark. The new championship will continue to focus on its European heartland but the format will be tweaked to make the championship more "exciting".

PHOTO: DPPI, NCAP, GETTY IMAGES, HANSEN MOTORSPORT

AUTO ASKS:

'Can an electric car championship thrill as much as traditional racing?'

The evangelist

Paul Drayson

Team owner, Formula E backer and sports car driver

The motor industry faces few challenges bigger than the need, first, to develop technologies that meet strict upcoming emissions regulations – and then to bolt them into cars people want to buy. But it has to be done, and where better to refine this mix of common sense and temptation than motor sport, which has long been a test bed for fresh thinking and technical development.

In 2014 the FIA will launch Formula E (see p69) which should attract a new universe of fans, but motor sport needs to go further in its search for performance with sustainability. These days you can race hybrids and all kinds of conventionally engined cars, but the industry needs to showcase electric drive in plenty of other series as it develops better batteries and better motors.

It's a great technical challenge, but electric racing isn't just about innovation, it's also about consumer perception of what electric cars are and what they can do, and even how they sound. We started in 2006 with bio-

ethanol fuelled sports cars and proved that you can win with these in LMP1 and GT2. Then we built the Lola Drayson B12/69 EV with pure electric drive. And that's when we made a curious discovery: at our *Autosport* Show stand last January, where we launched the car, a real demographic split emerged. Teenagers thought the car was cool, but not many over 40 were interested.

Add the fact that audiences for conventional motor sport are getting older and you can start to believe that electric racers will deliver a generation of more youthful fans to motor sport. To appeal to the young, the cars should, I think, be as radical as possible. I have a thing called 'the 15-year-old test'. What you want when you show a 15-year-old something is for them to say: "Wow, that looks cool" or "Wow, that sounds cool". In other words, we've got to integrate completely with modern interactive IT, so 15-year-olds can sit at home and virtually race with our cars. We need to use social media.

And what about noise? A good question to which I think the only answer is to build the electric cars and see how they sound. And that is what we've done. Personally, I think a grid of 20-30 such cars would make a fantastic noise. So if we can change perceptions and make them cool through motor racing, we'll have the strong marketing platform the industry needs to help it make a commercial breakthrough.

At the moment all-electric cars are dismissed as dull, slow and limited, a perception based on what most people see on our streets. It's a perception that the sport with its ultra-high-performance technology is ideally placed to sweep aside. Let's accelerate new electric technologies that deliver performance with sustainability, and then put them within reach of buyers, because all-electric cars will inevitably become a big part of urban living. So far, a PR sticking point has been that there's no high-profile motor racing series to showcase the excitement that all-electric cars can deliver.



The racer

Nicholas Prost

Trophée Andros Electrique champion and Lotus test driver

I have raced in the Trophée Andros Electrique series in France from the start. I won the first two titles and was third in year three. The biggest challenge came in the first year when we had to adapt the cars to ice racing.

Electric engines tend to deliver power and torque suddenly, but on ice it's important to have a smooth power delivery to minimise wheel spin. So racing was all about finding the right throttle settings. The chassis were not so very different from regular four-wheel drive ice racing cars, so they were great fun.

That's why I think the electric races were as good, if not better, than the more conventional Trophée Andros. The tracks and races were short, so the events were perfectly adapted to the technology. I also liked the fact that as there was no noise, you could hear the whine of tyres and studs on the ice. In the end it was a different kind of hybrid sport, somewhere between motor sport and snowboarding.

To be quite honest I wasn't so keen on racing these cars on the streets at Pau in 2011. They were built for ice racing and so were not well-suited to tarmac – they were a bit heavy, didn't have much power and

had no aero, but the ride-height was high. In short, that event didn't show off electric motor sport at its best.

But it did show that one of the challenges for the series will be to ensure equality of performance. The cars were supposed to have the same spec, but batteries do lose some of their potential over time, so the newer cars had an advantage.

Noise is important. Listening to a good V12 singing along is great, isn't it? On the ice, it wasn't really a problem because you could hear the snow, the tracks were very short and the spectators were very close to the cars. But on normal race tracks, I think noise could be a problem.

For drivers, though, the transmission in electric cars makes them quite noisy, but I've never been bothered if I couldn't hear the engine behind me. Maybe we'll just have to work on the cars and dial in some kind of entertaining futuristic noise.

I don't think that the length of short sprints is a problem, because we don't need really long races. Look at the WTCC, the races are short, but the racing is intense.

I think electric race cars have a future and will have credibility, but to attract fans the series must offer good racing. Basically, we need to use the benefits of electrical technology. The engines were great on the ice and they'll be great on smaller race tracks and street circuits too. But I don't think they should be raced at events like Le Mans or Indianapolis. If we offer some really good racing, people will get excited. And maybe the younger generation, not being used to hearing 6.0-litre V12s, will be more open to a new kind of motor sport.

PHOTOGRAPHY: DPPI, LAT

The engineer

Rob White

Deputy managing director, Renault Sport

Motor racing must have a link with road cars and road car technology. If you look at the cars on the streets today you'll see normal propulsion, supercharged and hybrid power, and different fuels along with full electric. Motor sport therefore has to represent this mix of technologies as well. As to whether or not this is the right way to go, I say it absolutely is. As electric technology becomes more important to the world in general, it's completely right that motor sport should follow suit. And the racing won't be diminished by the use of electric technology.

The noise a car makes is generated by different elements: aerodynamic performance, transmission, exhausts, tyres and of course the propulsion itself. So it isn't just the engine. On a motorway, for instance, vehicle noise is down to the aerodynamics more than the power unit. It is, however, a fact that electric road cars make very little noise and since we've grown accustomed to hearing loud racing cars, a quiet racing series may not be to everyone's taste. Perversely, though, noise can also be a problem – more and more tracks are restricting the levels of noise, so having overall quieter series has to be considered. The racing will still be exciting regardless of the decibel level – in fact quiet racing means you'll be able to hear those tyre squeals and slip.

But we do need to clarify the point. As electric technology takes on a more important role in motor sport in the coming years, that doesn't mean the quality of the racing will reduce. Electric racing may even attract new types of fans, drawn by the technology and the novelty of the cars. Potentially they'll be younger, although current fans may still be interested if the racing is good enough and

the technology on show is still at a pinnacle in its field.

In short, there must be a place for electric propulsion in the global motor sport landscape, but there are technical reasons why the cars will be restricted to shorter stints and lower absolute performance relative to F1 cars. But that shouldn't be seen as a problem. F1 races are extremely long compared with other single-seater categories, where races generally last around 20 to 40 minutes. These other races are still exciting in more of a sprint format. At the other end of the scale, Le Mans lasts 24 hours and is a classic. So race length itself isn't an absolute measure of success.

For any new motor sport category to succeed, many factors must be united in an ideal blend: technology, raw performance, driver skill, team performance, commercial aspects and so on. Regardless of whether the cars are electrically powered or not, drivers will still want to win races, teams will still want to score points, and that means there will still be overtaking, there will still be drama, and there will still be the 'show'. □

'ELECTRIC CAR RACERS WILL STILL WANT TO WIN RACES AND TEAMS WILL STILL WANT TO SCORE POINTS'

ROB WHITE



THERE'S GOING TO BE AN ACCIDENT >

Months of preparation go into the precisely calibrated collision that produces the twisted, broken chassis you're about to see. This Subaru will slam into this test rig at the Millbrook development facility under the watchful eye of FIA Institute research consultant Andy Mellor, who is here testing potential improvements to the roll-over protection system fitted to competition rally cars

A blustery November day in the middle of England. But, as autumn stares winter in the face in this corner of Bedfordshire, work goes on. The scene looks similar to a James Bond film set, with cameras, laptops and levels of technology that would impress Q. There's final fussing over four ordinary-looking Subarus covered in sensors, accelerometers and potentiometers. One of the cars is now placed on its side on a flatbed trolley. Facing a wall.

An accident is waiting to happen. More nervous glances. More talking into handheld radios. In three, two, one...

The car is fired, roof first, towards its impact target. Only the whirr of the rails, as the flying floor runs along its tracks, breaks the silence. Then, *bang*. The silence is well and truly shattered.

Welcome to the FIA Institute's latest round of ground-breaking research into Roll Over Protection Systems (ROPS). Having long poured over post-crash data, the FIA Institute is immersing itself in a more hands-on approach, making detailed studies of the component parts of roll-cages and what constitutes the optimum protection for competition cars. And now those investigations are taking the researchers to the very heart of the accident.

A roll-cage is relatively self-explanatory: it protects a car's occupants in a roll-over accident. To do that, it has to be exceptionally strong. But there's more. And today, at the Millbrook proving ground, *AUTO* is learning just how much more there is.

FIA Institute research consultant Andy Mellor frames the question that explains the tests: "Should a roll-cage be strong or energy absorbing? In fact, it needs to be both – a compromise. But metallics tend not to behave like that – they're either strong or stretchy."

All four cars are fitted with roll-cages, each built from a different type of steel: first, T45 – a chrome-manganese, aerospace-standard



A series of near identical and precisely angled collisions in simulated roll-over accidents test the resilience and strength not only of the steel used in tubular cages fitted to competition cars, but also the quality and nature of the welds; a high-speed camera (below) freezes every detail; Mellor (right in picture, far right) inspects the set-up



metal; then 15CDV6 – a chromium-molybdenum-vanadium product reckoned to be the strongest and potentially the most suitable for welding; ROPT 510, which attempts to combine strength and ductility; and finally CDS, the most economical and ductile alternative.

The cars have been prepared by Prodrive, one of Britain's most successful and respected motor sport firms. Prodrive technical director David Lapworth is watching his work hit the wall.

The first impact, centred mainly on the Subaru Impreza's windscreen A-pillar, causes significant bending and damage to the T45 roll cage. Mellor, Lapworth and the rest of the team descend on the car immediately after the crash. Notes are taken, data logged, stats stored for later deep analysis.

"That first accident was a reconstruction of a serious, but not catastrophic crash," says Lapworth. "That was a roll, if you like, with the car impacting the ground at 30km/h and the top of the A-pillar taking the full force. We're looking to replicate the vertical drop of the car. This isn't about a big, dramatic, head-on impact; it's about the roll-over protection system. When a car rolls, it rarely drops off a cliff and lands square onto its roof. Think about firing a gun horizontally and dropping a bullet from the same height, the bullets would hit the floor at the same time, and with the same vertical speed. That's what we've got here."

Mellor adds: "This is about the resistance of the roll cage to both force and energy. It's not a static load test."

In the second crash the 15CDV6 roll-cage is put to the test. From the outside the deformation looks similar. A quick glimpse inside the car reveals significantly different deformation patterns. And the Institute's use of cutting-edge technology to monitor stress, stretch and shift levels in the cage is at work. The physics of what just happened is being calculated on a raft of laptops, all of which are readying reams of data aimed at reducing the danger involved in future roll-over accidents.

Mellor is looking over shoulders, staring at screens. Both he and Lapworth have been working on this project for two years and are impatient to see the results. They want to see the science. But they must wait. We've just seen the performance of the two high-performance steels (T45 and CDV6) typically used for World Rally Cars. Next will be lower strength but more ductile materials often targeted at club racing (ROPT 510 and CDS).

Mellor leans in and inspects the damage from the crashes.

"We're looking for strong materials with compliant joints which will deform," he says. "Ideally, we want the cage to deform by up to 400mm without any joints in the cage failing."

The cage itself is only part of the equation. What binds the sections of steel tube together is the weld – which raises the perennial question of the best welding solution. Is it TIG (Tungsten Inert Gas) or MIG (Metal Inert Gas)? Today will also go some way to providing that answer.

'WHEN A CAR ROLLS IT RARELY DROPS OFF A CLIFF AND LANDS SQUARE ON ITS ROOF'

DAVID LAPWORTH

The optimum solution – if such a thing exists – is a cage that, in Mellor's words, is both strong and stretchy.

"During a side impact into a tree, you want ultimate energy absorption," says Lapworth. "Controlling intrusion is desirable, but energy management between the driver and the tree is critical. But during a roll-over accident you must limit intrusion of the roof to avoid direct contact with the driver's helmets. This requires both strength and energy absorption from the cage. Some degree of deformation of the cage and intrusion towards the drivers is unavoidable in order to manage energy, but the distance between the point of impact and the crew inside must not be exceeded."

Another major benefit of being under the skin of an accident in this way is the potential for further developing the roll-cage design.

"Once we have all the results," says Mellor, "we will go away

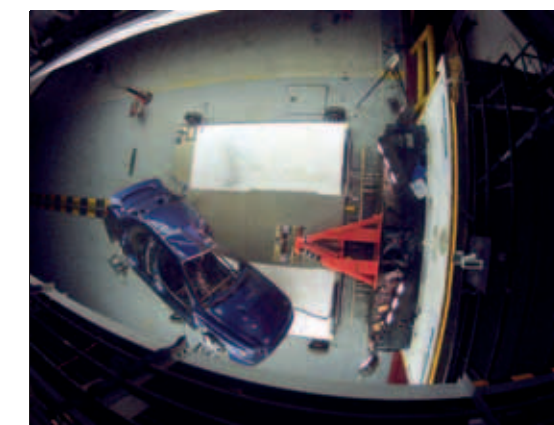
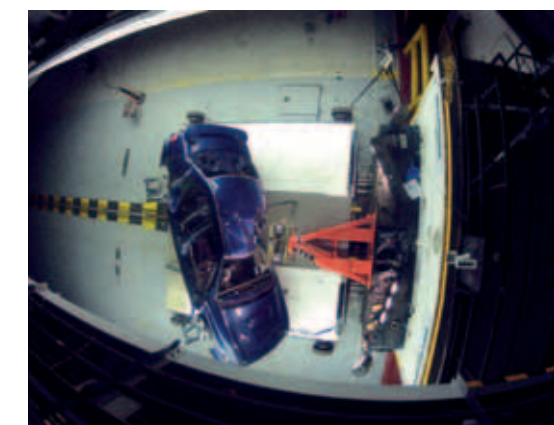
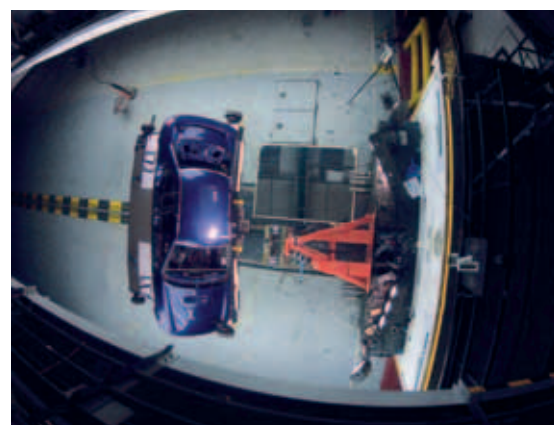
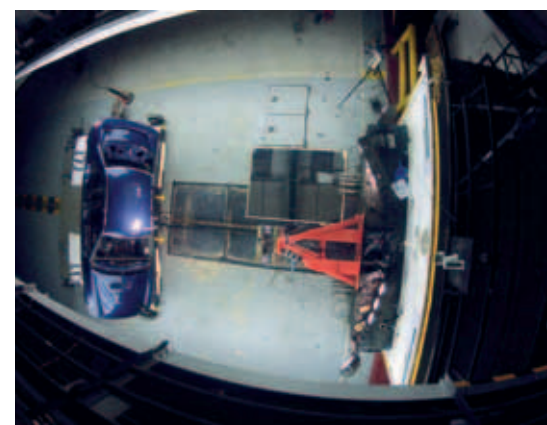
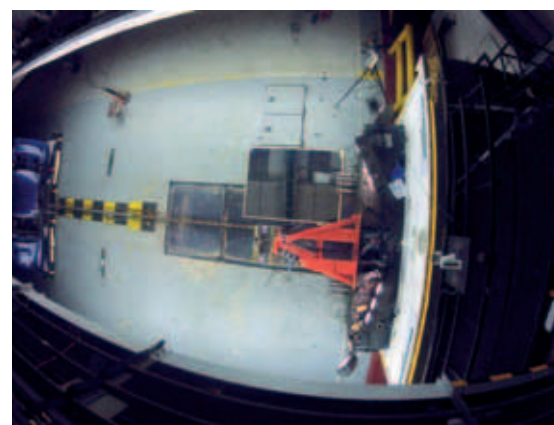
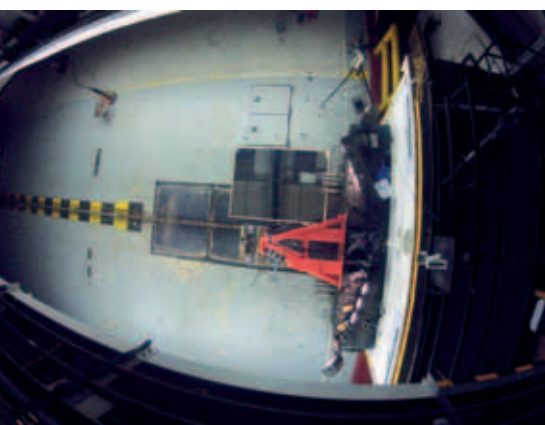
and look at the [ROPS] design and most likely take that on to the next phase of research. We have to remember the conflicting requirements of ROPS: it has to protect those inside, but at the same time provide space for emergency extraction of the crew; and also allow for the possibility of rescue teams needing to cut through the tubes with the jaws of life after an accident.

"Today we've had a unique look inside an accident, which makes this pioneering work. What we'll study now is the sequence of failures within the roll-cage. For example, when the triangulation bar fails, the cage can lose its structural stiffness. So replacing those joints with something more elastic or tolerant may allow more bending in the joints while keeping the whole structure more intact."

But that'll be for another day and another accident. Having spent much of his working life overseeing roll-cages going into race and rally cars, Lapworth is as experienced in this field as they get. He is keen for the results from this test to further help define the FIA's current technical regulations regarding ROPS.

"The regulations have evolved over time," he says, "which is only natural with so many new formulas and categories coming in, but what we now have the chance to do is look at rewriting that regulation definitively."

Now, though, in the gathering gloom, there's a sense of a worthy and worthwhile job well done. Never has so much hot metal been scrapped in such a good cause. □



THE GRATEFUL LIVING

From racing drivers to doctors to film makers, many people have many reasons to be grateful to Professor Sid Watkins, Formula One's doctor, pioneering neurosurgeon and founding president of the FIA Institute, who passed away in September 2012. He is much missed by all who knew him and on whose lives and careers his impact was so profound



Rubens Barrichello

Former F1 driver and record-holder for the most grand prix starts in the history of the sport



Thanks to Sid Watkins' expert attention, Barrichello's F1 career lasted 17 years longer than it would otherwise have done following his massive off during practice at Imola, 1994

Sid was a very special friend. I was close to Ayrton Senna and from the first moment I arrived in Formula One, Sid took me as a friend as well. I always felt I was in good hands with Sid, and I think that all the drivers felt the same way.

We knew that if we were in an accident the first person there would be Sid and that he would look after us. Things are pretty stressful after a big crash and having Sid on hand was a reassuring as well as calming influence. He was like our guardian angel, but with a cigar and a sense of humour. Away from the racing, he was a very funny guy, always telling stories and jokes.

Of course, I had a particular reason to be thankful because at Imola in 1994 he saved my life. Beyond that I'm also sure there were other occasions when the safety changes he helped to bring about meant that accidents I was involved in had less serious consequences than might have been the case. We'll never know for sure, of course, but I do know one thing for certain – at Imola his intervention was crucial.

I don't really remember the accident, but I was going very quickly through the Variante Bassa on a fast lap when the car went sideways. After I braked I have no memory of what happened, but I have

seen the video. The car lifted over the kerb and flew into the barriers, then somersaulted.

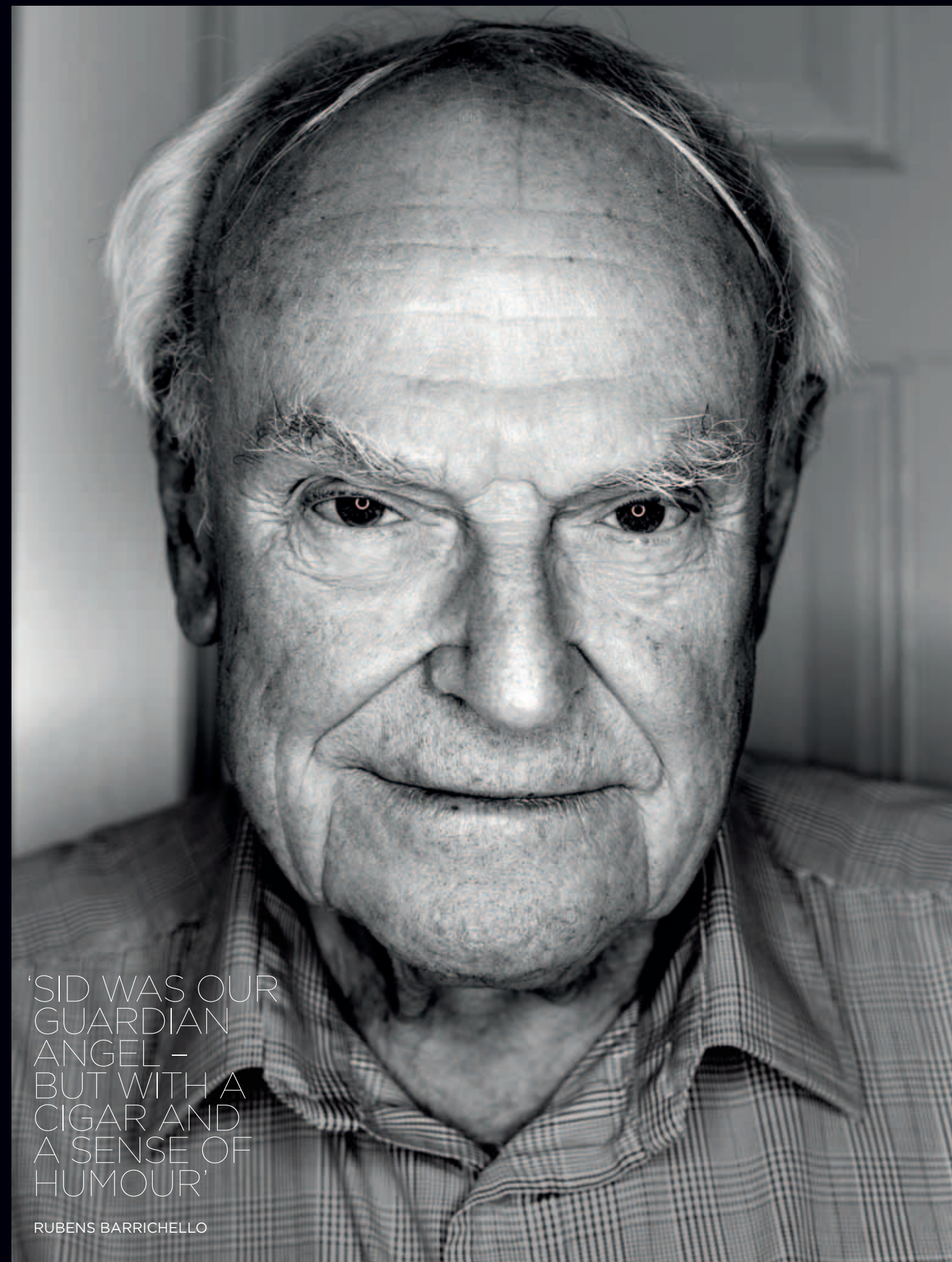
It was a really big impact and I swallowed my tongue. So I couldn't breathe and was suffocating. In such circumstances you have only a few minutes before the brain begins to die from lack of oxygen.

Sid arrived at the scene very quickly and began to work on me. It wasn't easy because he had to get my helmet off and it took some time to do that. He told me later that I'd 'died' for six minutes, which was right on the limit. But he managed to sort it out and I was able to breathe again.

The first thing I do remember was waking up in the Medical Centre and Ayrton Senna was looking over me. It felt good to be alive. I had a bruised hand and a little bit of a break in my nose, but that was it. It was amazing. When I saw the video I realised just how fortunate I'd been and what the Prof had done for me.

The cars and circuits were improved after that because Sid and others realised that things had to change. The cars became a hell of a lot safer, which saved more lives too, because the changes meant that we could survive accidents of incredible violence. We're all very thankful for everything Sid did for us. And I will miss him greatly. >

PHOTOGRAPHY: JON FEINGERSH/GETTY IMAGES



'SID WAS OUR GUARDIAN ANGEL – BUT WITH A CIGAR AND A SENSE OF HUMOUR'

RUBENS BARRICHELLO

Peter Hamlyn

Consultant neurological and spinal surgeon, University College Hospital London



On Wednesday 12 September 2012 the world lost not only its foremost sports doctor but also a pioneer of modern neurosurgery.

Sid Watkins singlehandedly tamed the most potentially dangerous sport of our time, Formula One, while becoming a master of our most challenging surgical arena, the brain. Incisive, utterly engaging, with an intellect matched by a generous heart, he

had embraced two careers either of which would have overwhelmed most men. His work impacted on safety across all sports and nations, as well as neuroscience itself. As a neurosurgeon and one who's also active in sport, I fully appreciated his contributions in both arenas.

I have seen the Watkins approach bear fruit in many sports – boxing, horse racing, rugby, football, ice hockey, athletics. Even



Watkins (left) with Hamlyn in theatre; both have devoted themselves to neurosurgery and to ensuring the safety of competitors in all sports



ballet benefited. Welcoming this approach the then Sports Minister, Kate Hoey, set up a working group on safety and medicine in sport and appointed me as chair. We applied the Watkins methods at both amateur and professional levels and now there isn't a governing body that doesn't have risk assessment and safety at its core. When the IOC inspected our London 2012 Olympic bid they asked us if "the medical facilities would reach F1 standards". At Seb Coe's invitation I was able to reassure them that not only could we deliver these standards but that we had invented them.

For Sid even this wasn't enough. He led neurosurgical units in New York State and then London, pioneering brain surgery for Parkinson's disease and introducing the first implantable brain electrodes to Britain. Designed to relieve crippling disorders of the brain and spine, their success was dependent on extremely accurate placement. Sid's remains the definitive atlas upon which such surgery is based. His medicine was an inspiration to us all.

I joined his neurosurgical team in August 1983 and on day one I saw him make a young boy – who had been paralysed by a disabling brain disorder – walk again by placing an electrode deep into his brain. The boy's family had been told by the country's experts that he was incurable. This kind of surgery has to be done with the patient awake so, to put him at his ease, Sid whistled and told naughty jokes throughout the whole procedure.

As with other men of his generation, his charitable work was considerable yet unsung. In 1992 he helped me establish the Brain and Spine Foundation, a national charity acting for the victims of neurological disorders. To have forged such change in two environments as pressured as neurosurgery and F1 requires immense courage. Sid Watkins should have been knighted.



Manish Pandey

Writer and producer of the film *Senna*



Formula One is a very small, very closed world. When we set out to make *Senna* we knew no one. As time went by, we made small inroads helped by introductions from the Senna family, and slowly, little by little, we explored a range of voices for our film. We knew, beforehand, that certain figures would be invaluable in creating an image of the greatest racing driver of all time. But we had a feeling, from the very beginning, that Professor Sid Watkins' voice would

be the soul of our story. Indeed, there was a version of the film, which I nicknamed "The Doctor and the Monk", about the repeated and increasingly intense encounters between the Prof and the ascetic Brazilian racing driver. Their history, as Prof recalled, was fascinating and was interwoven from Senna's second race, in South Africa in 1984, to his last, at Imola, 10 years later.

When I first spoke to Prof he probed a little, trying to fathom my knowledge and motivation for making the film (he was to tell me, later, that he feared we might be like other unscrupulous 'film-makers' he had met, merely bent on giving a sensationalist account



McLaren team gathers behind Mark Blundell in their support for Häkkinen at Adelaide, 1995

Mika Häkkinen

Two-time Formula One World Champion



I first met Sid Watkins in 1989, two years before I got into Formula One. I was racing in British F3 and had had a big crash at Snetterton and needed to get medical clearance to go racing again. Sid was the FIA doctor I had to see, so I went up to London and was quite nervous about what might happen. But he put me at ease straight away, in a funny way. When I walked in I introduced myself and he pushed a cup

towards me, saying: "Smell that! What am I drinking?" And I said, "Coffee" and he said: "OK, there's not much wrong with you." It was a bit odd but I found out that when you have a big bang on the head things like taste and smell get affected. And that was a test. Obviously we did a few more, for reactions and that sort of thing, but everything was OK. And that first question put me at ease.

Sid was a great guy. I saw him more regularly from 1991 onwards when I came to F1 and he'd be wandering the paddock, smoking his cigars. He was so cool, so relaxed. But one thing he didn't like was people who thought they were superstars. Doctors see people suffering all the time, so when they see fit and healthy people complaining and behaving like prima donnas they're not impressed.

I wouldn't be around today if it hadn't been for what Sid did with F1 safety. In that era there were a lot of dramatic things happening to quite a few drivers, notably Ayrton Senna, Roland Ratzenberger, Karl Wendlinger and others. Sid pushed for changes to make the cars and circuits safer. That helped us all. When I had my big accident, in Australia in 1995, Sid supervised the Australian doctors. Then I was flown back to Europe and Sid's hospital in London. It wasn't fun, but I'm still grateful that he took such good care of me.

of Senna's last days). But he was sympathetic from the beginning with what we hoped to achieve, and agreed immediately to come and see us when we were all next in London.

At a fantastic lunch at Odins, one of his favourite London restaurants, he made us laugh, made us think and made us cry – all the time, still probing gently, until he was satisfied that we were, indeed, coming from the right place.

After that, it was as if a dam had burst. Prof spoke freely and expertly. His interviews were compelling and detailed, from how he treated Senna's dehydration and fatigue after that first South African race; to their encounter over Martin Donnelly's mangled Lotus; to Senna's emotional victory at home in Brazil (Prof literally removed each of Senna's gloves and had to help him, exhausted, from his car); to the accident in Mexico in 1991 and, finally, to that black weekend at Imola.

But as well as being a voice within the film and giving us a context for many of the facts we had researched, Prof led us into that small, closed world of F1. Holding hands with a Titan in the pit lane is the best and only credential people in F1 will accept. That Prof accepted us and provided references that those who run the sport accepted, opened doors at the very highest levels.

When the film had been completed, I sat nervously beside him in our production company's private cinema and held my breath as the lights came up. He had tears in his eyes and simply nodded his approval. "You told it right, lad," he whispered. □



Watkins' relationship with Senna (left) was suffused with respect and affection; seal of approval from Watkins (above) for the head and neck support (HANS) which protects drivers' necks in severe crashes

The Big Interview

THE STAGE MANAGER: DIETRICH MATESCHITZ

The announcement that Red Bull is to become the new promoter of the World Rally Championship took many by surprise, but for company kingpin Dietrich Mateschitz the move is simply a logical extension of his brand's philosophy and its continuing fascination with motor sport

PHOTOGRAPHY: XFB



Dietrich Mateschitz is an unconventional man, and a secretive one. Not many know that as well as being the driving force behind the Red Bull drinks company he is also its marketing lodestone. Indeed, he is all the brains behind an energy drink that remains the pacesetter in a multi-billion dollar market that didn't exist 30 years ago.

For some, that would be the cue for a life lived on the front covers of business magazines, feted as a marketing maven with a Midas touch. Not so for Mateschitz. He shuns the camera or being filmed, and resolutely avoids the glare of personal publicity. Replacing it is a quiet, determined quest for the next great marketing tool.

Initially, as with so many before him, that tool took the shape of sponsorship, Gerhard Berger becoming Red Bull's first 'athlete', a signing predicated on Mateschitz's long-standing love of motor sport.

Berger's carrying of the can was soon followed by the endorsement of other sportsmen and women – many others – until the company had taken star



approval beyond the realm of simple pay and promote and created an overarching ethos in which sport and the youthful, globe-trotting lifestyle associated with it became a function of the drink and not the other way round.

There was more to come. Sponsorship exposure, Mateschitz reasoned, was simply a by-product of the event or star being paid – the real key to publicity was the people taking part.

The philosophy favouring ownership of a team rather than an event sparked a spending spree of epic proportions, beginning with the launch of Red Bull Racing in 2005. Since then Mateschitz has invested in a second F1 team, Toro Rosso, a NASCAR team, four football clubs, an air race series, a motorcycle stunt championship and, most recently, a multi-million dollar investment in the successful attempt by daredevil Felix Baumgartner to freefall from the edge of space.

Now Mateschitz has turned his gaze on the World Rally Championship, where, until now, Red Bull has restricted itself to a title sponsorship role with the Citroën Total World Rally team and its nine-times world champion, Sébastien Loeb. That situation took a surprise turn recently when – following the FIA's issuance of a tender for a new promoter for WRC – in came Red Bull, or rather its Media House arm, to take over the commercial



The main hall hosts myriad exhibitions, art-shows and live events, but mostly it houses his collection of planes, helicopters and racing cars. He welcomes you with his large smile and equally large handshake. In jeans, loafers and check shirt, he's disarmingly easy-going, waving you to an armchair in the unlikely surroundings of Arnie's Room, two floors up in the glass and steel tower.

In a rapid question and answer session Mateschitz discusses the reasoning behind the bidding and winning of the right to promote the WRC, as well as revealing some of the steel and focus that have served him so well as he's taken Red Bull to the very top.

Q *The public doesn't know you as a WRC fan. Why become involved and why now? Some might say you're simply a very rich sports fan indulging your passions?*

A None of these commitments have anything to do with passion or fun; they have to make sense, for the Red Bull brand directly and/or as content for Red Bull Media House. If certain commitments happen to be fun as well as making sense, which is sometimes the case, then that's great, but it doesn't make them any less appropriate.

Q *Do you have specific memories of rallying – your first one, a driver who made a big impression on you?*

A We've been following rallying as well as all the other big motor sport series for many years. In Austria we've been part of the national rally scene for over 20 years, and Raimund Baumschlager has been one of our athletes since Red Bull first launched. In the past few years our

'WE'LL TRY TO UNCOVER AND TAP INTO THE WRC MEDIA POTENTIAL'

promotion and exploitation of the second biggest motor sport series in the world.

Red Bull Media House is the most extreme extension of Mateschitz's brand philosophy. The reasoning is simple: if you run the team and the athlete, you control both the medium and message. Content becomes your vehicle for promotion and broadcasters will readily accept valuable content, even if it comes with in-built advertising.

Thus, the job of Red Bull Media House is to manage this content, via its TV station, broadcast content production facilities and digital channels. Partnering the FIA as it becomes the vehicle through which the WRC is relayed, fits seamlessly into the master plan. Alongside them is a Munich-based media rights company, The Sportsman group. But there's no doubt about which is the senior team here, and which the junior.

And it's this that *Auto* has come to talk to the Red Bull boss about. Mateschitz does not really have an office. He receives visitors in Hangar-7, a stunning egg-shaped construction right by the runway at Salzburg Airport.

PHOTOGRAPHY: DPPI, RED BULL CONTENT POOL





focus has been on Sébastien Loeb and on the Dakar Rally, which we were involved in with VW.

Q What can the series offer Red Bull that the partnership with Citroën doesn't? And will the partnership with Citroën continue? Would that be a conflict of interests?

A Our decision to get involved in the WRC was primarily based on the interests of Red Bull Media House, firstly to exploit the series for Red Bull's own media such as Servus TV or Red Bull TV, and secondly for the distribution of global rights. Red Bull's involvement with the various drivers and teams is independent of that, so there can be no conflicts of interest.

Q The WRC has suffered in recent years. Can it be turned around? Would you, for example, consider bringing back spectacular events like the Safari Rally? Is this the sort of 'statement' event you would like to see on the calendar?

A It's true that we believe the potential of the WRC to be bigger than it has appeared in the media in recent years. We will try to uncover this potential and tap into it. Only time will tell how this pans out in practice and how successful our efforts will be. Regarding any possible new events, we're not yet in a position to make any statements.

Q Perhaps the golden age of WRC was with the very fast but dangerous Group B cars and the big personality drivers

'AS FOR MOTOGP, MAYBE WE HAVEN'T FOUND THE RIGHT TEAM YET'

of the 1980s. Is that a spirit you'd like to recapture?

A I don't think it makes sense to relive the past. Rally driving should definitely not be any more dangerous than it already is. Big personality drivers are always important in any motor sport, which of course also means you can cover the various drivers' profiles in the media and set priorities accordingly.

Q When Red Bull became an F1 team owner you began with definite marketing strategies – the team's large Energy Station motorhome, the Red Bulletin paddock magazine, the Formula Una girls – do you have similar strategies in mind for WRC?

A If we have a few ideas that make sense, why not?

Q You're partnered with a relatively small and unknown sports right management company. Tell us a little about this partnership and how you see it working.

A The Sportsman Group isn't one of the biggest agencies, but they have some good people, expertise and know-how in areas where Red Bull does not, and



vice versa. I believe the partnership can work very well.

Q Two manufacturers, Ford and Mini, have already pulled out of the 2013 championship, though they will still support privateer teams. How do you attract manufacturers back, and do you even need them?

A Of course, a broad range of marques is important to the WRC; it doesn't really matter whether they're works teams or privateer teams backed by works outfits. The important thing is that the teams and their drivers should perform well, are competitive and put on a good and exciting show.

Q What does motor sport do for Red Bull and vice versa?

A They complement each other perfectly. My answer to the question as to whether Red Bull is integral to our motor sport commitment or whether Red Bull needs motor sport is this: which is most important when you're walking, the left foot or the right foot? I think that answers the question perfectly.

Q Can you explain Red Bull's philosophy, and the difference between ownership and sponsorship? If ownership is important, why not a Red Bull MotoGP team?

A There's a clear difference, in both qualitative as well as quantitative terms. With sponsorship, you buy a rear wing or advertising hoarding at a football stadium or ice

hockey arena, or whatever event, for X amount of money. With ownership, you're 100 per cent responsible, you're part of the landscape and your contribution to success, or lack of it, is considerable. As for MotoGP, never say never; maybe we just haven't found the right team yet.

Q Is Formula E – to be staged in city centres like so many other Red Bull events – of interest to Red Bull? And is there a desire to get involved in other forms of motor racing?

A We only recently received the documents relating to Formula E and we'll look at them closely. But it's still too early to say how interesting the project is for us.

Q The NASCAR experiment was shelved. What went wrong?

A We questioned the cost-benefit ratio and also whether the target group was right.

Q What about Toro Rosso? Are there plans for its further technical development? Other teams have moved ahead this year (Force India, Sauber, Williams), while Toro Rosso seems to be falling back. What can be done?

A Toro Rosso is still our rookie team and its goals differ from those of Red Bull Racing. But that's not to say we're happy with the development of the car. Significant improvements need to be found and are being called for.

Q Could you explain the thinking behind the Media House?



Dani Pedrosa (opposite) wins the 2012 Red Bull US MotoGP race at Indianapolis; Toro Rosso's Jean-Eric Vergne, a points winner in 2012, pits during the 2012 Chinese GP (top left); Mateschitz with Red Bull Racing's chief designer Adrian Newey (above left); Baumgartner (in Red Bull livery) makes his record-breaking 39km-high 833mph leap (left)

PHOTOGRAPHY: RED BULL CONTENT POOL; RED BULL RACING

Racing bulls

Red Bull's involvement in motor sport seems unceasing, and with its new WRC deal it may well be accelerating

A few months ago the Triple 8 racing team, the most successful in V8 Supercars in five years, announced that from 2013 it would be sponsored by Red Bull. Then its Media House print, broadcast and digital media arm was quietly revealed as the new WRC promoter.

Two major announcements, but for Red Bull they were simply the latest extension of a huge involvement in motor sport dating back to its earliest days.

In 1989, Mateschitz asked fellow Austrian Gerhard Berger, then racing at Ferrari, to be the energy drink's first ambassador. That worked so well that Red Bull soon moved into full-blooded sponsorship, bankrolling the F1 Sauber team for 10 seasons until it decided, in 2004, to become a team owner in its own right. It bought the ailing Jaguar F1 team in 2005 and Red Bull Racing was born. Then it poached superstar designer Adrian Newey from McLaren, and the rest is history – after just eight seasons, Red Bull has taken three consecutive Constructors' titles.

While most teams source future driving talent from lower formulae, Red Bull opted to buy the Minardi F1 team in 2006 and rebuild it as its junior arm, to school the drivers it filters through a nursery that sponsors drivers in series ranging from F3 to Formula Renault to GP3.

In rallying, Red Bull sponsored Raimund Baumstieger in the Austrian championships, then expanded to become title sponsor of the Citroën WRC team and multiple champion Sébastien Loeb in 2008.

It's a similar story on two wheels. While it hasn't yet explored team ownership, it does have title sponsorship of both series' races in the US, and branding on riders such as Dani Pedrosa and Stefan Bradl. It also operates the Red Bull Rookies Cup, the 125cc junior series that supports MotoGP rounds.

And that's just the tip of the iceberg: from karting to DTM, to rally raid to owning its own circuit – the Red Bull Ring in Spielberg, Austria – Mateschitz's fingers are in every conceivable motor sport discipline.



A Having found ourselves in ever greater demand as a content provider internationally, a Red Bull Media House was the next logical step. It's a logical line extension to the Red Bull brand, although it was already our ambition to be not just international but all-encompassing, ie, to cover all media markets – print, TV, new media, music, etc.

Q Explain the philosophy behind controlling the image via distribution of your own media?

A The philosophy is more about the distribution of editorial content, via media partners as well as through our own channels.

Q Was the Red Bull Stratos event, in which you helped Felix Baumgartner in his quest to freefall from the edge of space, the ultimate expression of that philosophy?

A We don't like superlatives, but Red Bull Stratos was an outstanding achievement and to some extent a genuine milestone. As well as the three world records set by

Felix Baumgartner we also broke a few media records in terms of coverage and impact.

The interview is over. Formal handshakes and smiles all round: more people to see and charm, more deals to be done. Mateschitz's laid-back demeanour disguises a restless mental and physical energy, demanding perfection, drive, loyalty and creativity from the small inner team he has had around him for many years.

It'll be interesting to see what he and the Red Bull Media House can make of the World Rally Championship. For sure, a multi-platform digital solution will be explored and the long-term deal should provide the breathing space to allow something special to happen.

Whether it can revive rallying's glory days remains to be seen, of course, but, with Mateschitz's other chief asset, Red Bull Racing, winning its third Formula One constructors' title in a row after just eight seasons in the sport, clearly anything is possible. □

PHOTOGRAPHY: LAT; RED BULL RACING; MCKLEIN

WRC's story so far...

The sport's public profile has risen and fallen in recent decades, and is now ready for its biggest boost ever

Unlike Formula One, the World Rally Championship will find global promotion an exciting new concept – the first deal was only signed in 2011. But that doesn't mean there hasn't been any active promotion of the world's finest rally series. The FIA originally did the job itself, but took a big step when it sold the TV rights to Bernie Ecclestone's firm, International Sportsworld Communicators, in 1996.

Ecclestone, in turn, sold ISC to David Richards in 2000 and from that point on promotion of the WRC really took shape, courtesy of Richards' thorough knowledge of a sport in which he was world champion co-driver in 1981.

He masterminded Subaru's hugely successful participation in the WRC from the early 1990s, turning a then minor Japanese manufacturer into a world-beater.

In 2000, Richards turned his expertise onto the WRC as a whole, investing heavily in the formalisation of areas such as the results and tracking systems. He also trialled live television coverage from the stages.

Richards then sold ISC to North One Television in 2007. It became North One Sport three years later, when it was sold to Convers Sports Initiatives. But when the CSI funding failed to materialise the agreement fell apart, in December 2011.

Great strides were made during the Richards years, when the sport joined the mainstream. Rallying's traditional point-to-point style was shunned in

favour of a cloverleaf system, which based an event on a central service point to help ease the burden of producing television pictures. While that move wasn't universally popular, it undoubtedly helped to raise the sport's profile.

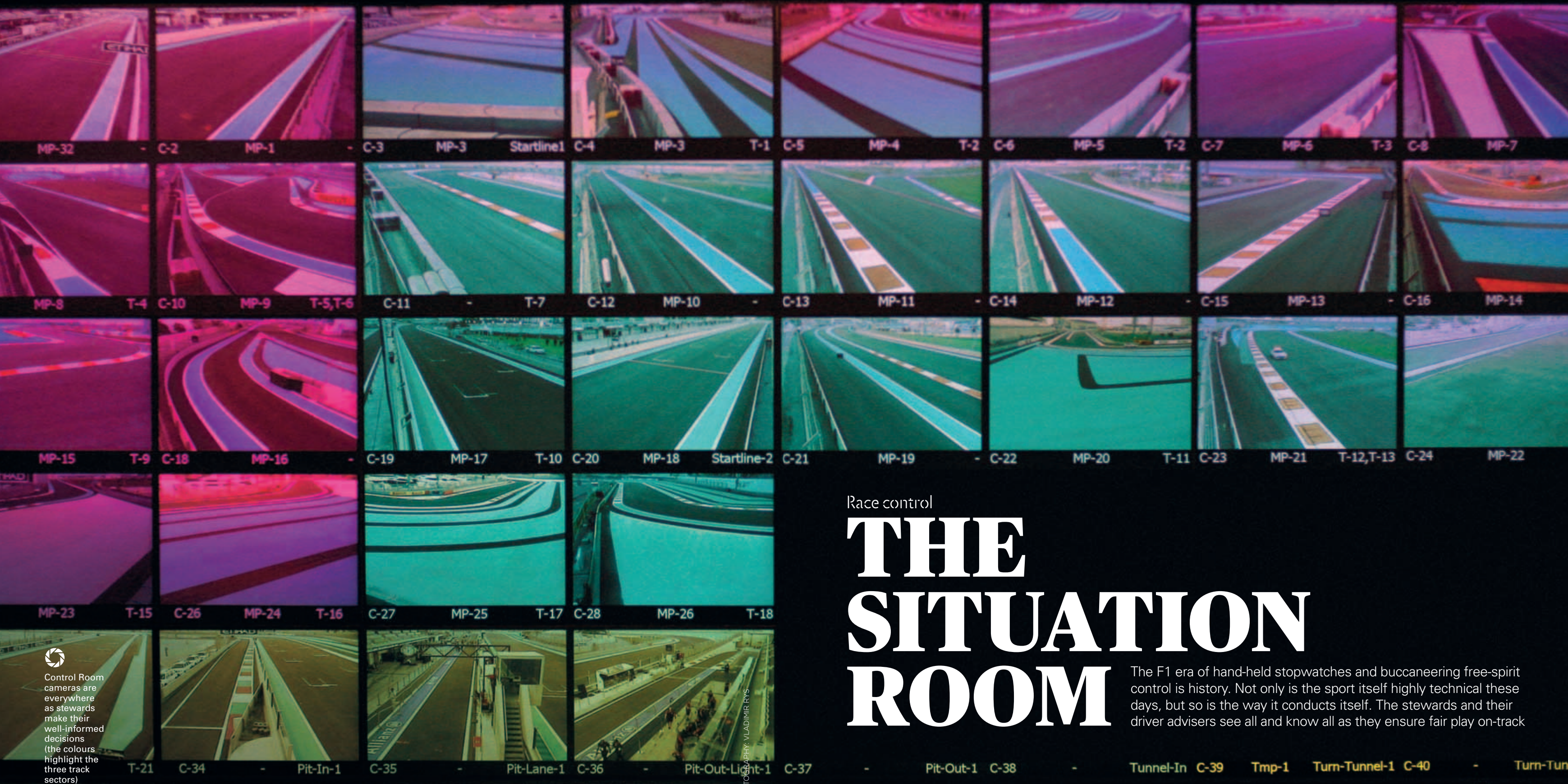
Today, live TV remains a large part of the promotional challenge facing the WRC, as does the potential on offer from digital and new media coverage. But given the more complex nature of rallying – a sport denied the clarity of a first-past-the-post win – and the fact that events last for three days rather than two hours, and the geographical challenges of the WRC, the internet is increasingly being seen as a likely perfect match for future media coverage.

Stakeholders in the series are keen to see complete and universal live coverage being offered on the series' website WRC.com. And rising demand for the WRC was highlighted when well in excess of 100 million watched the wall-to-wall television coverage of Sébastien Loeb celebrating his ninth consecutive world title at his home event, the Rallye de France, in October this year.

So, as the new promoter looks for ways to spread the WRC word, it could do worse than tap into the passion and excitement of the million fans who regularly brave the Andes in a southern hemisphere winter to cheer their heroes through Rally Argentina.

The WRC really is that good.





Race control

THE SITUATION ROOM

The F1 era of hand-held stopwatches and buccaneering free-spirit control is history. Not only is the sport itself highly technical these days, but so is the way it conducts itself. The stewards and their driver advisers see all and know all as they ensure fair play on-track

Control Room cameras are everywhere as stewards make their well-informed decisions (the colours highlight the three track sectors)

PHOTOGRAPHY: VLADIMIR RYS



ut on track at Abu Dhabi's Yas Marina circuit things are moving pretty quickly. It's only the second free practice of the grand prix weekend but the action is already hotting up as Sebastian Vettel and Lewis Hamilton trade fastest laps in pursuit of ultimate qualifying pace. The radio transmissions to the drivers advise them of potential hazards, keep them posted on car behaviour and tell them when to pit.

Back in the circuit's control tower, however, the pace is altogether more sedate. In Race Control the fizzing radio transmissions are just a soft, white-noise intrusion on the focused silence. Twenty-two pairs of eyes are fixed on a vast bank of screens, each showing a different corner, a different view of the on-track action.

Information, in the most minute detail, floods through but is processed and acted upon as the situation warrants, while posts scroll up on screen with almost metronomic regularity: 'Mercedes yellow wide T4', 'McLaren yellow wide T3', 'Lotus red wide T4'. A query appears from a marshal post asking if Race Control is happy with the position of a photographer at the bottom of the Corkscrew, near Turn 3. A check is made and the marshal post is told the position is fine and the focus on the track action continues.

On the other side of the building, in the Stewards' Room, the same sense of composure holds true. Here, stewards Lars Österlind, Radovan Novak, driver steward Derek Warwick and local ASN steward, Khaled Bin Shaiban, studiously follow the session as an operator cycles through the multitude of audio and visual options available to them. There's little talk beyond the occasional comment on the state of the timesheet.

'WE HAVE A WEALTH OF DATA MOST PEOPLE WON'T BE AWARE OF'

GARRY CONNELLY

This is how things get done in Formula One's command and control centres. From the moment an incident occurs on track to the instant a decision is delivered, the process is all about keeping calm and carrying on. The basis for that is a carefully-constructed system called Racewatch which makes the judgement on an incident well informed and almost foolproof.

"We have an extremely good system in Race Control that is able to detect incidents for us," says race director Charlie Whiting, who presides over the nerve centre and who will be most familiar to F1 TV viewers as the man who pushes the button to start the race. "The system is programmed to highlight any incident – for example, if a driver goes too quickly in a section under yellow flags. That's based on GPS tracking and timing, but the software also has a number of other inputs and is programmed to respond accordingly."

And the response is swift. In the following day's third practice session, Sergio Pérez is caught speeding in the pit lane and incurs a €2600 fine. Later, the firebrand Mexican is cited for allegedly impeding Bruno Senna in qualifying. The stewards review all the available footage and hand the Sauber driver a reprimand.

Their day is about to get a lot more complex, however. At the end of qualifying third-fastest man, Vettel, slows and pulls over on track. The Red Bull Racing driver climbs out of his car and trudges towards pit lane. The stoppage constitutes a possible breach of the regulations and the stewards are immediately called to investigate.

It's a long, slow process as Vettel and team representatives are called to give their explanation and then the officials wait on technical reports from the race scrutineers. At last, though, Vettel is deemed to have breached fuel regulations by not having enough in his car – a full litre – for a sample to be taken, and he's relegated to the back of the grid. It's a sensational development in an already knife-edge championship battle, but it's the sort of decision race stewards make all the time, as Garry Connelly – a regular chairman of race stewards who this year officiated at seven grands prix including the season finale in Brazil – explains.

"It's a big responsibility but one that's become a lot less of a burden simply because of the technology now at our disposal. We have a wealth of data, that most >



All is quiet concentration as a wealth of data and video streams into the Control Room presided over by the race director, Charlie Whiting (far left)



PHOTOGRAPHY: VLADIMIR RYS

people won't be aware we have access to.

"First of all, we have all the video feeds – the pictures that have gone to air; the vision captured by FOM but which hasn't been put to air; the closed circuit cameras around the track, and all the onboard material as well."

The vast amount of camera footage available to the stewards is backed up by a stream of data that feeds into both Race Control and the Stewards' Room.

"We have GPS tracking, which shows where cars are at any given time," says Connelly. "We also have access to all the team radio transmissions, which are very important as they allow us to know if a team has warned a driver that he's about to impede another car and whether a driver has ignored that information."

"Finally, as of this summer, we can now obtain real-time telemetry from the cars. That's really useful as we can overlay telemetry information from an incident with data from previous laps, so we can tell if a driver has done something like failing to back off under yellow flags."

"Linking all this together you can come up with a complete picture of what's going on. You have a mass of information that isn't available to the public or the teams. That's why decisions are sometimes taken that people have trouble understanding, but they simply don't have all the information the stewards do."

And if meting out suitable punishment is still a cause for debate among the stewards, there is also the vast store of historical precedent for the stewards to draw on.

'YOU CAN COME UP WITH PENALTIES BASED ON HISTORICAL DATA'

CHARLIE WHITING



Whiting (left) as the race director must decide on matters as diverse as the positioning of a trackside photographer and whether to refer an accident to stewards who will assess an offence and adjudicate on suitable penalties

"We keep all the incidents from recent seasons on video on a hard drive, and all of that is available to the stewards," says Whiting. "It's an invaluable resource because, of course, the same stewards are not at every race. This way they can refer back to all that past footage and it helps them make a more informed and consistent decision."

"The stewards also have a list of penalties they can refer to dating back to 2003," he adds. "It's categorised by offence and penalty, so the stewards can quickly see who's done what, where, and what penalties were handed out. That way they can, for example, look at all the penalties given for causing a collision over past seasons and then cross reference that with the video and you pretty quickly come up with suitable

PHOTOGRAPHY: VLADIMIR RYS

penalties for 'crimes', based on historical data."

Connelly, however, insists that the stewards' investigations often go deeper than even that, with consideration also being given both to how an incident impacts on a race and a driver's previous race history.

"Take a driver who has caused a collision," he says. "Typically the offence is punishable by a drive-through, but more recently there have been a couple of occasions where a stop-go has been imposed. That has typically been because the offence has been a second one or more by that driver during the season. So you do look at the driver's record."

"We also now take into account the consequences of the penalty. This wasn't done previously and it might lead people to think that there are inconsistencies, but

if someone is coming third in a race by 50 seconds, then giving them a drive-through is not a penalty, potentially. So you do look at the consequences.

"You've also got to look at the consequences of their action. To relate this to a civil situation, if I throw a punch at you and miss, I'm probably going to get charged by the police with attempted assault or something like that. But if I connect and break your jaw, I'm going to get charged with assault causing bodily harm or something like that. That could lead me to suffer more dire consequences. It's the same action, but the repercussions are much different each time."

Connelly points to Romain Grosjean's one-race ban as a situation in which history, precedent and outcome all fed into a decision he presided over.

"That incident could have completely changed the outcome of the FIA's premier championship," he says. "But what Romain got the extra penalty for was not that, or at least not wholly for that. When you're a relatively new driver to Formula One and you have the privilege of driving in a potentially winning or podium finish car, you're mixing it with a group of drivers who have many years more experience than you do at the sharp end of the field. It therefore behoves you, in our view, to exercise greater care and attention because you are, with all due respect, the new kid on the block and maybe a little out of your league compared with the guys around you at that end of the grid."

"It was a very serious decision and one that was taken only after lengthy weighing of the facts, the evidence, history, everything," he adds. "However, every decision weighs heavily on the stewards' minds. No decision to penalise a driver is ever taken lightly."

In the past the weight of race-affecting decisions was regularly handed to a group who all too often had >





Driver advisers, such as Derek Warwick (left, assisted by a technician) bring added credibility to decisions concerning driver behaviour

'I FEEL IT'S ALMOST MY JOB TO BE A LAWYER FOR THE DRIVER'

TOM KRISTENSEN

little or no experience of racing at a high level and, unsurprisingly, confidence in the process on the part of drivers and teams was occasionally in short supply.

But that changed in 2010 when the FIA began regularly to bring in a number of former and current racers to the Stewards' Room to add a driver's perspective to proceedings. One of the first called up was eight-time Le Mans winner Tom Kristensen. The Dane made his stewarding debut at the 2010 Australian Grand Prix, has officiated three times since and says it's a role he takes very seriously.

"I take it as a big responsibility, because I just don't want to make a mistake," he says. "I want to have all the facts in front of me in a very short time and make the right decision. And this is the pressure of being in that room. You need to gather all the information possible in as short a time as possible and make the right decision in a short space of time too."

Audi sports car star and two-times Le Mans winner

Allan McNish agrees, admitting that his first event, the Monaco Grand Prix in 2011, was a daunting experience. "It was quite a baptism of fire, because while I'd spoken to Tom [Kristensen] and Alex Wurz about how it works, when you get there you realise that there's a huge responsibility not just on your shoulders but on all the stewards' shoulders," says the former Toyota F1 driver. "The decisions you make can effectively turn a race weekend or a season, if you're working at an end-of-year race as Tom did in Brazil. In that respect, you have to be very professional about it, you also have to be aware of the part you can potentially play in proceedings."

In Kristensen's view the role of drivers' representative on the stewards panel is just that. "I feel that in some ways it's my job to be there almost as the lawyer for the driver," he says. "But nowadays there is so much information at hand – all the onboard, the real-time data, radio transmissions – that while you can quite easily justify an action, the question is: does that justification match the data. Sometimes the answer is no."

According to Connelly, the addition of drivers of the calibre of Kristensen and McNish has had a profound effect on how judgements are made at grands prix.

"This has been in my view one of the most revolutionary and outstanding initiatives taken in the sport for years," he says emphatically. "It brings a depth of experience and

knowledge to the Stewards' Room that is irreplaceable. The drivers take it seriously too. They are constructive and they are, in some cases, tougher than the toughest stewards I've ever worked with."

Race director Whiting agrees, adding that it is the intuition of an experienced driver that often makes the difference to how situations are read.

"They have a common sense approach to incidents that helps the process enormously," he says. "Guys like Tom Kristensen will be able to look at an incident and immediately say, 'I understand why he did that'. That speed of analysis is invaluable to the other guys in the room. The input from people like Tom, Allan McNish, Mika Salo... all of them, is fantastic. It also adds credibility to decisions in the eyes of the drivers."

McNish agrees that, for F1 drivers, having a peer in the judgement mix has made the handing down of penalties a more believable process.

"I do think driver involvement has given a little bit of extra credibility to the process," he says. "It's a face and a name that the other drivers know. It's someone who has lived their experience and it's someone the drivers can speak to in a slightly different way. Unless you've experienced going through Eau Rouge at 175mph, experienced the g build-up on the steering wheel, the



PHOTOGRAPHY: VLADIMIR RYS



Two of the FIA's most experienced stewards, Lars Österlind (above left), and Radovan Novak, consult with driver advisers before deciding on penalties

reaction of the car going up and over the top of Radillon, then it's very hard to understand what happens when an incident occurs in that environment."

If that makes the whole process sound relentlessly positive – as if the business of grand prix stewarding is now a warm and fuzzy endeavour warmly embraced by drivers and teams alike – then it isn't. Whiting admits that drivers are still often dismayed by what they see as inconsistency in the penalties handed out and frequently ask for cut-and-dried sanctions for particular crimes.

"At the drivers' briefing in Korea, for example, they were calling for a one-size fits all, five-grid place penalty for impeding," he says. "My answer to that is 'no problem, it's very simple for us to do that'. It would take the choice out of the stewards' hands and would be similar to the mandatory five-place penalty for a gearbox change – end of... But, you have to be careful what you wish for, because while you might feel justice has been done on once occasion, the same rule will inevitably bite you on the backside on another day and you might not be so happy with a harshly defined rule then."

There is also a feeling in some quarters that the sport is becoming increasingly litigious, with teams demanding investigation of even the most minor hampering of their drivers' progress. But Connelly is sanguine about the >



Whiting faces the drivers at what he prefers to think of as a drivers' meeting rather than briefing. It's a chance, he says, for him to listen as they raise matters of concern



Briefing encounters

The modern Drivers' Briefing gives F1's *pilotes* an opportunity to debate and settle any issues

If Race Control and the Stewards' Room are where the letter of the law is applied each race weekend, then the Drivers' Briefing is where the rules are taught in the first place.

Each Friday evening of a race weekend the drivers pause in their preparations for qualifying and shuffle up to an appointed

location where race director Charlie Whiting informs them of any special considerations to bear in mind at the circuit they're racing on. Whiting explains that while in the past such briefings might have been schoolmasterly affairs where driver input was frowned upon while lessons in track dangers and correct



etiquette were imposed, modern briefings are more about letting drivers air their views.

"Very rarely do we talk about what to do at Turn 5 or Turn 6 or whatever," he says. "Prior to the race weekend I produce a three- or four-page set of briefing notes pertinent to that event, and the teams get that on a Thursday, so often there's not a lot to discuss about the circuit itself or any changes that have been made. However, because it's on a Friday evening it will obviously feature anything that's occurred to them about the track during

the first two practice sessions.

"Largely, though, the briefing will normally centre on what happened at the previous race, meaning any issues the drivers have on their minds about procedures or on-track behaviour or incidents, that sort of thing.

"My attitude is that I always try not to preach to them. I consider them to be drivers' meetings, rather than briefings. It's a forum for them to air their views and make whatever points they want to make. They are intelligent people and it's good to treat them as such." □



Connelly is a regular stewards' chairman, and officiated at seven grands prix in 2012, including the finale in Brazil



'WE'RE GETTING GOOD, HELPFUL FEEDBACK FROM THE TEAMS'

GARRY CONNELLY

that goes from each set of race stewards to all the stewards in the championship after each race, and that goes into all the decisions and why they were taken. That's very helpful and, again, a lot of good ideas come out of that."

Currently those ideas include the possibility of introducing a points system on superlicences so that instances of bad behaviour would build cumulatively, leading to an eventual ban.

"We've discussed it only once so far, but we'll discuss again the possibility of introducing a system whereby if you are penalised three times for causing a collision then you get a one-race ban," says Whiting. "I know president Todt is keen on introducing a points-based system, whereby you might incur a certain number of points for a certain offence, and then if you reach a certain total you would lose your licence for a race. That makes sense on paper but I think it would need a lot of discussion to get right."

Kristensen, meanwhile, believes there is scope for a new sanction, a penalty less severe than a drive-through.

"I think it would be good to have something that's a little bit less severe than a drive-through," he says. "Sometimes a drive-through can be very harsh and definitely spoil someone's whole race, especially if they're going for points, unless you're running at the very front. Perhaps there could be a penalty in which you're held for a slightly longer time at a pit stop."

The future of how F1 rules on the split-second decisions that can make or break a race is open to question. But just as F1 itself has morphed, over the past three decades, from a championship built more on the pursuit of excellence than on its achievement, into a technological powerhouse defined by an obsessive focus on perfection, so the Stewards' Room has developed from a coterie of knowledgeable fans gathered around a couple of TV sets, into a group of highly informed experts operating at the cutting edge of technology.

The ultimate point of all that technology is straightforward, however, as Kristensen concludes: "When the chequered flag is shown, the score should be on the board, everybody should understand exactly why it is that way and everybody should leave feeling the right result has been achieved." □

teams' zealous pursuit of justice, saying that, by and large, the current rules have fed into the situation.

"It has become more legal, though I wouldn't call it that – I think the teams are just being more precise. Five years ago a lot of the alleged impeding incidents you wouldn't even bother investigating. But those were pre the current qualifying format and the current tyre regulations. Under the current regulations some of those impeding incidents have the potential to cause enormous damage to a team's quest for points.

"If you've used your last set of more advantageous tyres but the lap has been compromised then it could have a big say in how your race goes," he adds. "For example, at one race this year, Nico Hulkenberg was forced to use another set of tyres because of a relatively minor impeding incident, but that cost him a set of tyres. That meant he started the race with one less set than the people that caused him to use that set. Is that fair? There are always new aspects of the sport to consider."

And that extends to improving the stewarding process, as Connelly acknowledges.

"There's always room for improvement. I don't think the system will ever be perfect because we're all human beings," he says. "But we are striving for improvement all the time. We're getting very good feedback from some of the teams, very constructive feedback and that's really helpful. We also now have an internal communication



PHOTOGRAPHY: VLADIMIR RYS; SUTTON IMAGES

THE POLITICS OF SAFETY

A sustained 10-year drive led by the FIA Foundation has, for the first time, put road safety on the agenda of world leaders at a global ministerial conference

In June 2012 more than 190 heads of state and ministers gathered for the Rio+20 summit in Brazil. Its theme, “a pathway for a sustainable century”, marked the opportunity to confront some of the world’s biggest development challenges: the impact of the economic crisis, food shortages, global poverty and climate change.

Crucially, another, key, yet previously overlooked issue, was also addressed: safe and sustainable transportation. This was in stark contrast to all previous conferences dating back to the 1992 Earth Summit, also held in Rio, which paid scant attention to transportation and ignored road safety entirely. Thus the whole issue of road safety had been left out of the Millennium Development Goals, even though road accidents cause more fatalities than the communicable diseases, such as tuberculosis and malaria, that were included in the goals.

The Millennium Development Goals’ targets for cutting deaths among children aged 0-5, and for getting all children into school, became global rallying points, all to great effect. But far less attention has been paid to the single greatest cause of death and injury among school-age children: road crashes, which are the number one killer worldwide of young people aged 10-24.

In Rio this year, there was no complacency. A series of sustainable transport initiatives were launched, leading to an unprecedented and major breakthrough: the inclusion of road safety in the Rio+20 communiqué, the first time the topic had been recognised and accepted as a mainstream sustainable development issue by the international community.

Such a development was a major success story in a sustained 10-year advocacy drive by the FIA Foundation, the Make Roads Safe campaign and the Commission for Global Road Safety, chaired by Lord Robertson of Port Ellen. This effort has resulted in the first ever global ministerial conference on road safety, a UN commitment to a Decade of Action with a fatality reduction target, a global plan of recommended action for the decade, and a commitment to joint action by the world’s major development banks.

Ahead of the Rio+20 summit, Lord Robertson’s Commission issued ‘Safe and Sustainable Roads, an agenda for Rio+20’, a report prepared by international development expert Dr Kevin Watkins. It calls for safe and sustainable transport to become a key priority >



UN Secretary-General Ban Ki-moon addresses the United Nations Conference on Sustainable Development, Rio+20, June 2012



PHOTOGRAPHY: LATINI CONTENT/GETTY IMAGES



‘MICHELLE YEOH REALISED SHE COULD SAVE AN ENORMOUS NUMBER OF LIVES, AND I’M GRATEFUL TO HER’

BILL CLINTON

of the international community and to build on progress towards the Millennium Development Goals. Its message was supported by a statement ahead of the summit from a group of 13 major international road safety NGOs, which described road traffic injuries as a preventable “human, economic and environmental disaster”.

In parallel, the Russian Federation led efforts to secure the inclusion of road safety in the pre-summit negotiations among UN member states on the text of the communiqué. The Russian Federation, since it hosted the Moscow Ministerial in 2009, has consistently played a leading role in pushing the agenda for a UN Decade of Action for Road Safety.

The inclusion of road safety in the Rio document – titled “The Future We Want” – was a vital step in establishing the importance of both road safety and sustainable transport. As well as raising the issue’s profile on the global political agenda, it will also give added



Michelle Yeoh (above, left); Lord Robertson (right) UN is improving road safety for children (below); (opposite, left to right) ex-F1 world champion Emerson Fittipaldi, Brazil’s President Dilma Rousseff, UN Secretary General Ban Ki-moon, FIA President Jean Todt



momentum to negotiations to have it included in the targets due to replace the Millennium Development Goals which expire in 2015.

As well as enjoying political progress, the Rio conference also emphasised practicality. Under the banner of the Zenani Mandela campaign, 12 organisations combined to make a voluntary commitment to improving road safety for children globally. The Zenani Mandela campaign has been set up by the Nelson Mandela family together with Make Roads Safe and the Road Safety Fund in support of the UN Decade of Action for Road Safety. It is an initiative named in memory of Nelson Mandela’s great-granddaughter, Zenani, who was tragically killed in a car crash in June 2010, aged just 13.

At the Rio summit, under the banner of the Zenani campaign, global partners committed themselves to action to help prevent child road injuries. The joint commitment promotes safe and sustainable transport, focusing on measurable pilot projects designed to protect children on roads in urban areas of middle and low income countries. Following Rio, the campaign will advocate safe and sustainable mobility in the run-up to UN Global Road Safety Week in May 2013.

Also in the wake of Rio there has been further recognition of the emerging importance of safe and sustainable transportation at one of the world’s most high-profile events for development donors, the Clinton Global Initiative (CGI) in New York.

Former US President Bill Clinton chose to highlight the road safety philanthropy of the FIA Foundation at the annual meeting which encourages and supports global development initiatives. Clinton reviewed progress of the Foundation’s 2010 CGI Commitment to “deliver vaccines for road safety”, focusing in one of the plenary sessions on the Foundation’s support for helmet wearing initiatives by the AIP Foundation in South East Asia. He was joined on stage by the



PHOTOGRAPHY: JULIANA THOMAS/CLINTON GLOBAL INITIATIVE; YOUNGNA PARK/CLINTON GLOBAL INITIATIVE; FIA; SAO PAULO FOUNDATION; EMBARQ BRASIL



A basic road running through an impoverished Brazilian favela, or shantytown, which is typical of areas where road injuries and fatalities are rife, especially among children



Saul Billingsley (left), Deputy Director General of the FIA Foundation, and Holger Dalkman, Director of EMBARQ, an organisation dedicated to sustainable transport, announce their road safety voluntary commitment at Rio+20

global road safety ambassador, Michelle Yeoh.

Clinton said: “Providing financial, technical and policy support, their leadership has helped to activate road safety efforts, including helmet distribution and awareness campaigns, and parental use of vehicle restraints for children, training of police forces and traffic laws.”

Clinton also praised Michelle Yeoh for her work campaigning on road safety globally: “I talked to her about this a few years ago and she realised that in this area she could actually, through personal intervention, save an enormous number of lives in countries where she has had an enormous impact because of the life she led, and I’m grateful to her for doing this.”

Following the plenary session at the CGI, leading policymakers met to discuss strategies to achieve safe and sustainable transport. This session was chaired by FIA President Jean Todt, and included US Transportation Secretary Ray LaHood, as well as 40 more international experts and opinion-makers in the road safety and sustainability field.

The FIA has launched its own campaign in support of the UN Decade of Action, asking motor sport stars to work closely with the 200-strong network of automobile associations in 134 countries that comprise a large part of the Federation. The FIA is focusing on educating youth, hence the importance of sport stars as role models.

It is also collaborating with the International Red Cross Committee, other global sports federations and the World Economic Forum, along with corporate partners, such as Michelin, and a raft of national and regional road safety organisations.

It also hosted a joint event in Sao Paulo earlier this year with the Inter-American Development Bank (IDB), which led to a meeting between Jean Todt and Brazil’s President Dilma Rousseff. The outcome was that President Rousseff raised the importance of committing to road safety in her opening address to the UN Plenary Session. This, like Rio+20, was significant because it placed road safety high on policy agendas of many global institutions and groups.

One such powerful advocacy group involved in global road safety >

‘INVESTMENT WILL BE NEEDED IF THE WORLD IS TO COPE WITH A DOUBLING OF THE NUMBER AUTOMOBILES IN THE NEXT 10 YEARS’



is that made up by the world's leading multilateral development banks, including African Development Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, the European Investment Bank, the CAF Development Bank for Latin America, the Inter-American Development Bank, the Islamic Bank and the World Bank.

At Rio+20 they released a joint statement, "Commitment to Sustainable Transport" highlighting the banks' commitment to the Decade of Action for Road Safety and proposed that "at least one of the new sustainable development goals (SDGs) to be formulated should be for sustainable transport".

This RIO+20 commitment also confirmed they expect to provide loans and grants amounting to US\$175 billion for sustainable transport over the next 10 years.

Investment on this scale will be needed if the world is to cope with an unprecedented doubling of the number of automobiles on our roads over the next 10 years. It took more than 100 years for the vehicle total to reach one billion, but the two billion mark will most likely be reached soon after 2020. This will create unique challenges for road safety, energy demands, air quality and urban congestion. Nevertheless, a range of policy approaches now available will help to ensure that such an anticipated increase is sustainable and that transport becomes increasingly safe, efficient, clean and affordable. These initiatives include new technologies for vehicles and investment in infrastructure and transport networks.

That is why the Rio Summit's recognition of safe and sustainable transport and the continuing advocacy campaign in support of the Decade of Action and the SDGs are so important. The well-being of millions of people across the world depends on it. The FIA Action for Road Safety and the FIA Foundation's continuing advocacy on this matter are a guarantee of commitment to this vital global issue. ▣



High level discussions were held at the Clinton Global Initiative annual meeting 2012 in New York, where former US President Bill Clinton (above) highlighted the road safety philanthropy of the FIA Foundation. The FIA President, Jean Todt (top, far left), also led discussions at the CGI

PHOTOGRAPHY: JULIANA THOMAS/CLINTON GLOBAL INITIATIVE; BLOOMBERG/GETTY IMAGES



The drive for global action on road safety

The FIA Foundation's 10-year campaign delivers the UN Decade of Action for Road Safety

- 2003**
London conference by the FIA Foundation calls for UN action with World Health Organisation Director General, Dr Gro Harlem Brundtland
First UN General Assembly resolution sponsored by the Sultanate of Oman. World Report on Road Injury Prevention published by WHO-World Bank
- 2004**
World Health Day for Road Safety launched by President Jacques Chirac
UN Road Safety Collaboration established to co-ordinate UN agencies and partners
- 2005**
World Bank Global Road Safety Facility established as global funding mechanism
- 2006**
First Make Roads Safe report from Lord Robertson's Commission for Global Road Safety calls for US\$300 million action plan and ministerial conference
- 2007**
First UN Global Road Safety Week and launch of one million petition by Make Roads Safe campaign
Russian Federation offers to host Ministerial Conference
- 2008**
Michelle Yeoh supports Make Roads Safe campaign as Global Ambassador
- 2009**
Second Make Roads Safe report from the Commission for Global Road Safety calls for a Decade of Action
President Dmitry Medvedev opens first Global Ministerial Meeting on Road Safety held in Moscow, hosted by Russian Federation.
Multilateral Development Banks announce joint road safety initiative
Bloomberg Philanthropy announces largest donation for road safety of US\$125 million
- 2010**
UN General Assembly approves Decade of Action and the first global target for fatality reduction
- 2011**
Third Make Roads Safe report from the Commission for Global Road Safety calls for road safety to be recognised as a global development issue.
Global Plan for the Decade prepared by UN Road Safety Collaboration
Decade of Action launched with more than 400 events in over 100 countries
- 2012**
UN General Assembly resolution welcomes Global Plan Rio+20 summit recognises road safety as a development issue



DRIVING

INSTRUCTORS

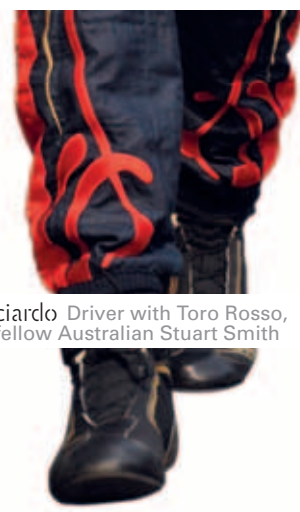
The pressures on Formula One drivers, some barely out of their teens, are vast and complex. Not only must their physical fitness be top-notch, but their minds must be free from distraction and as focused as their bodies. So, bring on the trainers, sports psychologists and other support crew to help drivers like Daniel Ricciardo deliver their talent, speed and race craft



Didier Coton Ex-Mika Häkkinen manager, now handles Charles Pic's business affairs



Ayao Komatsu Race engineer for Lotus's Romain Grosjean, now in his fourth season



Daniel Ricciardo Driver with Toro Rosso, trained by fellow Australian Stuart Smith

PHOTOGRAPHY: CRISPIN THRUSTON



James Milligan Bruno Senna's trainer and therapist at Williams was formerly at Lotus



Olivier Panis Monaco GP winner is now supporting Charles Pic, along with Coton



John Booth Marussia team principal overseeing Timo Glock and Charles Pic

Motor sport is still a cult of the individual. Natural talent is venerated more highly than practice and hard work because, quite simply, it's difficult to teach someone to

drive or ride quickly. Support networks do exist, however, and while less feted than they are in other sports, their role is just as vital. There are no hard and fast rules, but in a sport as technology-driven as F1 it's noticeable that it's often the human factors rather than the science that shape the preparation and support a driver needs.

A good example is the mentor role. In recent years there has been a rise in the number of experienced drivers returning to the paddock to offer advice to the younger generation. Highly effective this year, for example, has been the partnership between Charles Pic and Monaco Grand Prix winner Olivier Panis – but his mentoring doesn't take the form you might expect.

"I'm not teaching Charles how to drive; he knows how to do that," says Panis. "Mostly I'm showing him ways of working in the Formula One paddock. You have to understand the cars but you also need to know the culture, the people, maybe even a little of the politics. You have to understand how the media operate and how you fit in. It's a shock when you arrive – so it's good to have someone to help.

"Coming into F1 at 20, 21, to me these are kids. It's why I think they need someone behind them to explain quietly the way things are, the way things work, the way they need to talk, the way they need to think if they want to have a long career."

When Panis talks about "how well Charley is doing", his tone takes on a paternalistic edge, though he isn't a fan of parents having a prominent role in a driver's career. "My son has started motor racing and he's now in Formula Renault 2.0.



'TO GET THE MOST OUT OF HIMSELF A DRIVER NEEDS TO STEP INTO A CAR WITH A CLEAR MIND'

DIDIER COTON

grey hair and the sleepless nights."

Coton agrees that the manager's job is sometimes to be a sounding board for the driver, though he says there's a big difference between talking about racing and about how the driver should race, "because I've never been a racing driver and I'd be talking rubbish".

Instead, that task falls to the race engineer. While the engineering process appears repetitive and scientific, many engineers insist the hard numbers are only part of the job. Ayao Komatsu, Lotus race engineer for Romain Grosjean, uses qualifying as an illustration. "Sometimes you want the car to stay in the garage until the last possible moment. Some drivers >



Coton is a busy man in the pit lane, advising Lewis Hamilton (right) as well as Charles Pic on business matters; Pic (main), consults with his race engineer; and Panis (far right) has also taken Pic under his wing in 2012



It's complicated trying to manage the career of your son. I've seen many fathers who want to do it, but I don't know that I've ever seen it really work. For me, I'll find people to manage the career of my son, so I can be his father: I don't want to end up fighting with him over motor racing."

Panis's own management/mentoring team was World Champion Keke Rosberg and driver manager Didier Coton. It's with a pleasing sense of continuity that Coton and Panis now work together to manage Pic, Coton handling the business side so Panis, in his own words, can concentrate on being the *directeur sportif*. Perhaps best known as the manager of Mika Häkkinen, Coton also works alongside the Finnish

double World Champion, managing Williams test driver Valtteri Bottas. He also has a supporting role with Lewis Hamilton during the racing season, operating as a consultant to XIX Entertainment, the company that manages the English driver.

"Managing a driver is a big responsibility," says Coton. "We're talking about somebody trusting you to take his career forward. It's only a slight exaggeration to describe it as a 24/7 job.

"The ultimate target – for me at least – is to have a driver become World Champion. It isn't always possible, but if you have a driver with the potential you have to always be thinking two or three years ahead: 'This is the direction I'd like him to go in; that is a

team I think would be right for him.'

"Attention to detail is what will help your driver move forward. We make sure we find the right environment and we find the right people: that means coach, trainers, a nutritionist if necessary, PR people, marketing people if needed. That is part of the manager's job. The other part is negotiating the best contract possible.

"There isn't one part of that which is more important than another. F1 is a sport where performance is measured to a thousandth of a second. To get the most out of himself you need a driver to be stepping into the car with a clear mind. The manager's job is to unload from him any other concerns: we're supposed to be the ones who have the

PHOTOGRAPHY: SUTTON IMAGES

are happy to wait, happy to accept your reasoning – but others just can't do that. They can't sit there, watching everyone go out on track setting times. They become nervous. It can reach a point where it's better to send them out. As always you have to judge the situation – but the situation isn't always just a question of traffic and the state of the track.”

According to Komatsu, that doesn't necessarily imply a strong need to bond between driver and engineer. He insists that very much depends on the driver's personality. “Some drivers need a personal relationship, others don't care. You can't look at them as a group. I think you have to start from zero every time you begin a new partnership. As an engineer you have to approach the situation with an open mind: try to understand what *this* driver needs.”

There's a school of thought that suggests a driver needs less input the older he gets, to a point where he's so well versed in his trade that advice becomes superfluous. Marussia team principal John Booth disagrees:

“I think they need as much help but in different ways. Every driver needs something different. It doesn't matter if it's a 16-year-old guy coming out of karts or [Marussia's 100-race veteran] Timo Glock because, no matter how experienced they are, F1 brings with it a lot of outside pressures.”

Booth's team has now given F1 debuts to three rookies. With a wealth of experience he should be well placed to offer advice but says that, as team principal, his relationship with the drivers is actually more remote in F1 than it would be in any other series. “I'm at one remove from the day-to-day management of the drivers. I don't miss a lot but I think it's important that I am slightly more distant, so I can get the global picture.



When I was running our F3 team, we were 14 people operating three cars for three drivers. When an outfit is that compact, you naturally spend much more time with the drivers. In Formula One we have 70 people at the circuit out of 180 in total and there's no way a team principal can devote so much time to any one area of the team.”

While Booth was a pioneer in the employment of specialist coaches, he says that at the track, along with the race engineer, much of the day-to-day driver support rests with the trainer. “Nowadays the physios aren't just there to give the driver a rub down – they're friends, travelling companions: similar age, similar outlook on top of having the knowledge to be a trainer and dietician.”

Sauber's Josef Leberer is perhaps the father of modern F1 training methodology, coming into the sport in the late 1980s when brute strength and Mars bars were considered good race preparation.

“Prost and Senna were more or less the same age as I was when I started at McLaren. Ron Dennis understood the importance of properly preparing the drivers. So much money was spent creating the best technology, it made sense to have someone get the drivers ready as well. Originally it was a case of doing their massage, preparing them for the race and cooking their meals. A healthy, organic diet was part of the regime, but in the 1980s organic foods weren't so easily available – >



Sauber physio Leberer takes on board the comments of Sergio Perez at the Chinese GP, 2012 (right); Cotton with Mika Häkkinen at Interlagos 1999 (top) and with Lewis Hamilton (far right) in Barcelona in 2012



PHOTOGRAPHY: SUTTON IMAGES

'IN HARD RACES, WHEN THINGS GET DEMANDING, IT'S THE FIT GUYS WHO CAN DO MORE'

JOSEF LEBERER

so I ended up taking food around the world for the drivers and preparing it myself."

In recent years Leberer's experience with Sauber has often involved him working with rookie drivers. He argues that the training required for a rookie is different from what an old hand needs. "You do plan differently for a new guy. The loading and physical demands of driving an F1 car are different from, for example, GP2. Most obviously the race is twice as long.

"We work on the core muscles and those in the neck – and the real hard work is done in the off-season because the more you work, the fewer problems you have once the racing begins. We'll have lots of repetition in his training so he builds up muscle memory and becomes comfortable with the load and discovers how much he can handle. Ultimately he'll be able to spend more time responding to his engineers, more time driving well. There's lots of information to process in the car and it's better that he concentrates on using his talents than thinking about how his body feels."

Alongside the physical necessity, Leberer believes fitness is also essential to mental conditioning: "Fitness makes a driver faster. In difficult climates, in hard races, in tough situations... when things get really demanding, it's always the fit guys that can do more, can function nearer their best, can push for longer than the competition. But there's more to it than that. If you're strong physically, and *know* you're in good shape, then often you're stronger mentally too.

"It also helps your team: you're the motivator, the team knows that you're doing everything you can do to get the most from the car. This is very important. When you know that you have more left than the other guys, and your team know that you'll be strong, this is when it all starts to come together and the combination of car and driver takes a step forward."

James Milligan, Bruno Senna's trainer, adds that keeping a driver at his physical peak is something of a balancing act. "As the trainer you're making sure that when you're building muscle tissue for strength, power and endurance, you're building just enough to give him what he needs, but not exceeding it. Some drivers can bulk up very easily – and while it looks good, you're carrying a lot of deadweight in the car. You're literally carrying extra kilos for no reason."

Like most trainers, Milligan admits it isn't

all about physical fitness and nutrition.

"We're also there to keep the driver company," he says. "Then there's things like making sure their kit is in the right place. That sounds trivial but it's all about making sure the driver is focused purely on driving and not whether he's got everything back from the laundry. It gives them confidence to concentrate on their job without worrying about any of the other stuff."

Arguably, the trainer is the most important link in the support network – indeed for some drivers the only link. "I don't have a manager or anyone like that," says Toro Rosso's Daniel Ricciardo. "My support network is pretty much just Stuart [Smith], my trainer. He's another Aussie, but lives about 10 minutes away from me in England. Away from the races I spend a lot of time with him, doing physical preparation and organising my diet.

"If my mum and dad come to the race then I might get a hug at the end of the day, but other than that Stu is pretty much my support network at the track as well. That's how I want it: I don't like too much going on around me when I'm at 'work' because I think it can be a bit chaotic."

Ricciardo subscribes to the view that the support network works best for comparatively young drivers, having learnt his basic fitness skills and nutritional knowledge in Formula BMW, which provided dedicated advisers. Today, he says the advantage of having a trainer is all about the quality of the experience.

"I wouldn't skip training if I didn't have a trainer to push me along, but I think the quality and discipline is better for having that oversight. Obviously my trainer knows a lot more about the body that I do, which is valuable if I pick up a slight injury. He has the experience to know what I can do to protect myself – whether it's changing my regime or just taking a day off."

"It can come down to things as subtle as being able to monitor energy levels: he reads me quite well and knows when it maybe isn't a great day for a specific workout. It covers my back and makes sure we get 100 per cent of the benefit from the work rather than the 90 per cent I'd get on my own."

And therein lies the rub. A good support network doesn't create a great driver, but it does contribute to making sure a driver has unfettered access to every last scrap of talent at his disposal. □



Few parts of an F1 driver's body are as severely tested as his neck – trainer Stuart Smith gives Daniel Ricciardo the once over



PHOTOGRAPHY: TORO ROSSO, DPH

An alternative view...

Cycle race preparation has an almost military discipline to it



Chris Hoy's six Olympic golds, which make him the most successful Olympic cyclist of all, did not come easily; his support programme was exhaustive

Support teams are common enough fixtures in most professional sports, and it's interesting to see that the unique demands of motor racing require a similar, though perhaps more basic, level of support.

Holding the dual roles of team principal at Team Sky and performance director of British Cycling, Dave Brailsford is credited with being the brains behind the UK's recent ascendancy on two wheels. His athletes dominated in 2012, the standout moments being Bradley Wiggins' victory in the Tour de France, and the eight gold medals at the London Olympics, including the two for Sir Chris Hoy that made him the most successful Olympic cyclist of all time.

Brailsford says the backroom operation is broken down into performance (race tactics, race preparation, race training), performance support (physiology, nutrition, physiotherapy, performance analysis, medical services, biomechanics, psychology, R&D) and systems (logistics, equipment, commercial activity, marketing, communications, governance). Under those headings a team is assembled to support the individual rider.

"Looking at someone like Chris Hoy, we create 'Team Hoy' around him," says Brailsford. "We decide who sits in and around Team Hoy, and who inputs into the performance plan. There will be a coach, supported by a nutritionist, a strength and conditioning trainer, a performance analyst, a physio and a sports psychologist, plus anyone else necessary to get him ready."

Brailsford equates the role of coach with that of project manager, responsible for the day-to-day planning of the rider's preparation, co-ordinating the input from other specialists and being the primary

point of contact. Having everything flow through the coach is the key to keeping things manageable.

"The trick is to make sure the inputs are co-ordinated," he says. "The advice from all the 'ologists needs to be aligned. You don't want the strength and conditioning guy trying to bulk on power at the same time the nutritionist decides it's time to shed some weight. Any one of those expert advisers may be more prominent at a given phase than another. But it's all co-ordinated."

"From an athlete's point of view they don't need to worry about managing 10 different relationships. They just need the key relationship with a coach. It's the coach's job to facilitate and manage all the other inputs. That work needs to be practically invisible to the athlete, carried out by a well drilled team working for the project manager. The athlete should be focused on what they need to do, and what their performance plan is and what they're trying to achieve."

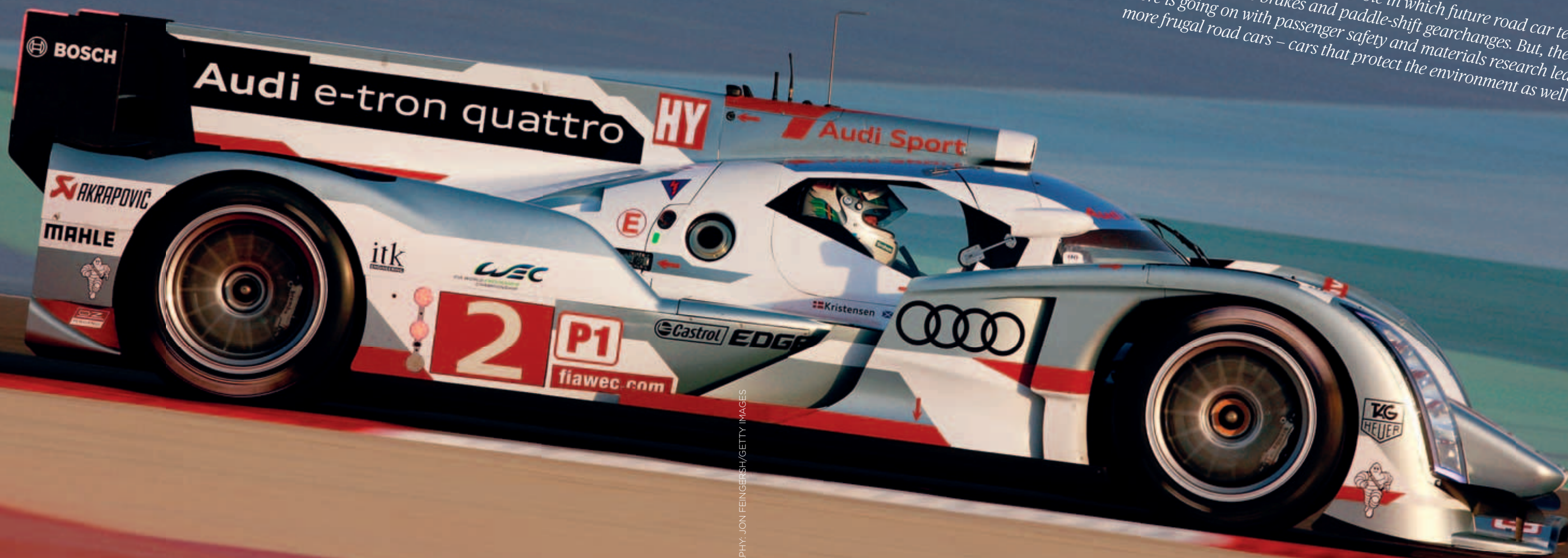
The importance of proper support is underlined by Brailsford's belief that those at the pinnacle of their sport stay there by being the best at using the resources available to them. "The people who get to the top of the pyramid are truly starting to understand how to get exactly what they need, at the level they need, from the support network around them," he says. "Bradley Wiggins, for example, really understands how to be coached and work with a back-up team."

"Bradley has learned a lot about himself over the years – but he still needs coaching and expert support and guidance when necessary. Riders like him, as they grow in experience, get better and more refined in their understanding of how to use the system to their advantage."

From race to road

YOUR FAMILY CAR TEST LAB

Motor sport has long been a crucible in which future road car technologies are forged – think disc brakes and paddle-shift gearchanges. But, these days, even more is going on with passenger safety and materials research leading to lighter, more frugal road cars – cars that protect the environment as well as people



PHOTOGRAPHY: JON FEINGERSH/GETTY IMAGES

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otor sport has always been a revealing test bench for automotive development. It's a more extreme environment than the road, it operates on much shorter development cycles and produces instant, tangible results. And for more than a century it has been a catalyst for safer, more technically advanced road cars.

But over the past two decades increasing specialisation in elite motor sport has seen the flow of big-ticket items reduce to a trickle as the nature of the cross-fertilisation has changed. In the modern era, racing and rallying tend to donate ideas and skills rather than systems and hardware. That's as true in the field of safety as any other.

The head of Audi Motorsport, Dr Wolfgang Ullrich, frequently notes that the development of road-relevant technology isn't just a by-product of his company's forays into motor sport, rather it's the *reason* Audi goes racing.

Alexandre Prémat's massive crash at the Adria Raceway in Italy, in 2010, dramatically highlighted the huge forces at work on touring cars, and the terrible consequences when those forces slip out of control. For engineers, though, the data gathered from Prémat's A4-DTM as it flipped and rolled to destruction was an invaluable resource that enhanced driver safety on and off the track.

In the wake of such extreme accidents, Audi Sport will work closely with the company's production car accident research department, because a high-energy crash is as relevant to production cars as it is to the racing team. "It's particularly the case with regard to the absorption of forces through carbon structures or hybrid constructions and the control of decelerations," says Dr Martin Mühlmeier, head of technology at Audi



Alexandre Prémat (left) showed that extreme accidents are survivable on track; rallying has a more obvious connection with road cars

Sport. "Conclusions can be drawn about the forces and accelerations affecting the driver during the accident."

Regardless of whether an accident takes place on a high-speed oval or country road, the effects on the driver and passengers – subject to the level of restraint – are the same. Testing has demonstrated that people can withstand high accelerations or decelerations in frontal and rearward impacts. Significantly more critical are changing rotary accelerations – for example, those generated when a car somersaults simultaneously about its longitudinal and transverse axes. That's when it gets dangerous for the human brain. Accidents such as the one at Adria, where this kind of twin-axis rotation occurred, are studied in detail. The analysis is made with help from measured data recorded by the black box electronics within the chassis, as well as video recordings.

Audi Sport says its findings following events like Prémat's crash are not just shared with the company's road car division but are developed jointly. "Obviously you don't want such crash 'tests' during a race, but they do supply valuable data," concludes Ullrich.

The FIA World Rally Championship – no stranger to high-speed impacts – has long been an incubator of road technologies. Perhaps it is most apparent at Prodrive, where an automotive engineering offshoot sprang up in the late-1990s to exploit properly some of the car designs that propelled the likes of Colin McRae,

Richard Burns and Petter Solberg in the WRC.

While Prodrive has also enjoyed success on track, Matthew Taylor, chief engineer in the vehicle dynamics department, argues that rallying is much more likely than track racing to produce safety technologies. "Advances in engine technology and fuel are coming from the track," he says, "but the rally car environment is much more applicable to dangerous situations for road cars. The track environment is well controlled, taking much of the unknown out of the equation.

"In rallying, the stage changes every day, with every car and with all the vagaries of weather. That aspect of pushing the car into the unknown is comparable with a normal driver encountering the unexpected. How that road car deals with the unknown is remarkably similar to how a rally driver has to deal with it. The better the car is at carrying out commands, the more likely it will be that the accident is avoided. I think that's the direct association between the two, and why the technology link is a very strong one."

A case in point is Prodrive's Active Torque Dynamics system. ATD appeared in WRC at the end of the 1990s and Prodrive built a road car demonstrator soon after. However, the automotive industry can take its time, so a decade passed before the technology appeared on the road – another reason why the link is sometimes indistinct – but today it has found a home in both heavy off-road commercial vehicles and with various car >

PHOTOGRAPHY: DREW GIBSON/ASTON MARTIN RACING; VODAFONE MCLAREN MERCEDES; LAT; CIK/FIA



Wolfgang Ullrich: finding road-relevant technology is the main reason Audi goes racing. "Race crashes do provide valuable data"

The connected future

Cars and roadside infrastructure will one day talk to each other, just as they do in F1

Once crash mitigation technology reached an impressive level of maturity, the automotive industry turned its attention to crash avoidance. Now that diminishing returns are setting in there as well, a third generation of road safety – the connected highway – is coming into focus.

This concept has cars exchanging information with road infrastructures as well as each other. The connected car would be aware of its surroundings, informed about the condition of road ahead. It's an area in which McLaren, through its McLaren Electronic Systems business, believes motor sport has a role to play.

"Clearly you can use information for better dynamic traffic management, you can start linking with fixed systems in cities and you can also start looking at the condition of the cars to help with things like predictive maintenance before something goes wrong," says Peter van Manen, managing director of McLaren Electronic Systems.

Implementing this technology on the road calls for a dependable method of sending and receiving data as well as a reliable road-side infrastructure. While a relatively new concept for the road, it's something that has been used in Formula One since the mid-1980s.

"There are some technical issues and elements of straight physics that need to be overcome, but we're able to deal with a lot of that thanks to what we've learned and experienced in Formula One," says van Manen. "Issues, for example, like how to connect to a fast moving vehicle in a fast-changing environment and still get reasonable bandwidth [ie a very high volume of data] coming off it.

"The infrastructure most likely to be used on the roads is the very widespread mobile phone networks that exist in many countries – whether it's GPRS, 3G or the new 4G networks. Again, you can learn a lot from what we do in motor racing. Cars will be moving from areas of good telephone coverage into areas of poor coverage, so you can save up data, then send it when the coverage improves.

"Our telemetry systems work in the same way at the track: if you go into an area of poor reception, things don't just stop; you basically wait until you're back in a reception area and then start sending the data again. The key is making the system robust and dependable. You can then start using the live location and context information to adapt and improve performance, efficiency and safety."



Car to pit dialogue involves cars as well as drivers



Dick Glover, research boss at McLaren, believes composite road car chassis will eventually spill into the mainstream; the MP4-12C production line (below) at McLaren's Woking plant

irrelevant when conventional materials are discarded. It's in this arena that motor sport becomes useful.

McLaren pioneered carbonfibre technology more than 30 years ago. In 1981 it raced F1's first carbonfibre monocoque, and followed that in 1989 with the carbonfibre McLaren F1 road car. In 2003 it used resin transfer moulding technology to construct the carbonfibre tub of the Mercedes-Benz SLR, and the current MP4-12C and recently launched 12C Spider both have carbonfibre chassis. While strong, lightweight and extremely crashworthy, supercars may not seem the most relevant examples for technology transfer, but car technologies proven in low-volume sectors frequently make an eventual switch to the mainstream.

"I think that scenario is very likely," says Dick Glover, director of research in the vehicle development department at McLaren Automotive. "There's a lot of activity around it: the world at the moment is looking for the best way to make composite cars in high volume. The raw material itself, although more expensive than steel, isn't the big problem. The big problem is automation."

The major advantage carbonfibre has always had is its exceptional strength for a very low weight pay-off;



manufacturers (although consultancy discretion tends to make Prodrive coy about saying which).

ATD enhances safety and performance through an algorithm that manages the amount of torque delivered to each wheel, using a driveline with lockable diffs. Traditionally, controlling traction in these vehicles requires a high-level of driver skill. The purpose of ATD is to manage that process for the driver, freeing him to concentrate on speed and direction.

On a rally stage ATD will get a car around a corner as quickly as possible, but on the road it has a different function. Many accidents on low-grip surfaces (such as snow or wet tarmac) are avoidable, but once the vehicle begins to slide and exhibit 'non-linear' behaviour – ie, it doesn't respond with the expected linearity to steering or brake inputs – the driver, unused to the sensation, either continues to dial in more input or simply freezes, unable to process vehicle behaviour outside his normal experience. Such situations should be recoverable but frequently result in crashes.

"Rather than becoming unable to turn in as the car starts to run out of grip, we can say that it's going to be able to turn in until the point where it can't possibly generate any more grip," says Taylor. "ATD will maintain the car's ability to go around a corner, right up to the point where it's physically impossible."

ATD is a rare example of conventional technology transfer. But in the less tangible sphere of process expertise, Formula One is suddenly finding itself relevant again. The introduction of the carbonfibre chassis made racing largely tangential to the development of structural safety in road cars, but today's obligation to cut emissions has suddenly made weight-reducing materials such as carbon composites highly relevant.

There are problems, of course: the automotive industry understands the properties of steel and aluminium very well, but has no experience of building safely using composites. The industry's understanding of chassis construction, built up over a century, starts to become

the downside is that it has always been a very labour-intensive material to work with. In low-unit-volume motor sport that's acceptable, but for mainstream car production it's a deal-breaker. McLaren has made great strides in automating the process: the McLaren F1 road car chassis took approximately 1000 man-hours to build; the SLR drove that down to 300 man-hours; and the carbonfibre tub of the MP4-12C takes around 100 hours. It will soon overtake the SLR as the highest-volume carbonfibre road car ever produced.

"We're continuing to push in the direction of lower costs and greater efficiency in the use carbonfibre," says Glover. "That will allow us to make more of the car out of carbonfibre – or introduce cars made of carbonfibre at a lower price-point. It's largely a matter of automation. Ideally, we'd like an 12C tub to take a lot less than 100 hours. There's a fantastic opportunity here to continue improving the composite manufacturing process."

"It's a very real transfer of technology from F1, but it's not just taking carbonfibre technology from McLaren Racing's autoclave. Rather, it's using that as a seed to generate a whole new stream of development," Glover continues. "There are a number of tools we use that are common to F1. For instance, our tubs undergo a load and acoustic inspection to ensure they have been manufactured completely defect-free. It's exactly the same inspection process that's used by the F1 team."

"It's also nice in areas such as finite element analysis and CFD [computational fluid dynamics] to use the same tools, share the same people, use the same computers and make sure we go up the learning curve together. Very often F1 is leading us because they need to go much more deeply into things like that, but actually in areas like crash analysis I'd say we're probably leading these days because we've got more crash tests to pass."

That final point is significant: in the field of safety there is never one final answer, only a better one. And given the level of R&D maturity to be found in both industries, it can be supposed that technology transfer is a door that swings both ways. Today the auto industry takes inspiration from motor sport – but it's not unreasonable to assume that the process will go the other way in future. □

'THE WORLD IS LOOKING FOR THE BEST WAY TO MAKE COMPOSITE CARS IN HIGH VOLUME'

DICK GLOVER

PHOTOGRAPHY: GETTY IMAGES; LAT; PICKETT RACING

Audi looking backwards

...as the racing team looks to the future with its digital rear-view camera



In May, at the Spa round of the FIA World Endurance Championship, Audi introduced a new digital rear-view camera, greatly enhancing the driver's rearward field of vision. Audi has not been shy about describing the technology as the "forerunner" of a system for production cars.

Wing mirrors in motor sport have a bad reputation. Frequently minuscule, in the interests of drag reduction, the vibrations common to stiff racing chassis tend to shake the mirrors into near uselessness. Add the effects of headlight glare at night and drivers claim they're even worse than that. So Audi rethought the whole concept.

A tiny rear-facing camera mounted in the roof of the R18 transmits its signals to a dashboard-mounted screen. Instead of the typical LCD display with LED backlighting, Audi uses one of the newer active matrix OLED displays (AMOLED). The organic materials in this design are

self-luminous, ensuring that AMOLEDs are much thinner and lighter than conventional displays. They also feature extremely high contrast, very good colour definition and switching times of just a few milliseconds, irrespective of temperatures. In all, they give Audi a fluid image-flow in real time – even at 330km/h down Spa's Kemmel Straight.

"Our drivers came to value the digital rear-view mirror highly at its Spa debut," says Dr Ullrich. "With respect to the screen and the programming we greatly benefited from the work of our colleagues [at Audi's road car Technical Development department]."

"I'm sure we'll be able to return valuable findings to them, from packaging the system into a very small space and the aerodynamic effects of the camera, through to energy consumption. The intensity of the demands in motor sport, such as at Le Mans, will cause a system like this to mature at an accelerated pace."



Audi has improved the safety and driver environment of its 330km/h R18 Le Mans Prototype racer (above) with this tiny high-tech rear-view OLED camera

The power grid

ACCELERATING CHANGE

Motor sport is changing fast. A few years ago, environmental concerns were scarcely on the radar, never mind the track. Now they're a major consideration in every area of the sport, from car construction and circuit design to fan engagement and championship promotion





McLaren's ecologically advanced car assembly plant (left) and F1 HQ are always striving to lower their carbon footprint

Motor sport's green agenda is being driven by forward-thinking organisations and individuals

The Team

Formula One will take a big step towards a more environmentally aware era when the next-generation engine is introduced in 2014. Meanwhile, many teams are already raising their green profiles. Lotus, for instance, recently unveiled a new solar-powered simulator building, and Sauber has constructed one of the largest solar car ports at its home HQ in Switzerland. In short, the environmental issue is now taken seriously right across the sport.

One especially focused team is McLaren. Every area of their business, both racing and automotive, has been optimised for improved sustainability and efficiency. Such a committed approach helped the team become the first in F1 to achieve the Carbon Trust Standard, an accomplishment built on the back of three years detailed work evaluating every aspect of their business, from heating and lighting in buildings to the number of people sent to each race. So why are F1 teams making such concerted efforts?

"We firmly believe that fans, customers and partners want to see evidence, not claims," says McLaren's managing director, Jonathan Neale. "We want to demonstrate real substance."

It helps, of course, that such developments are also good for business. As Neale says: "Developing carbon-efficient technologies and processes helps us show leadership as well as the inventiveness of our engineers. Our brand is built on being at the cutting edge."

This point underlines the reason for changing attitudes to sustainability in motor sport. Car manufacturers and other partners used to be attracted simply to the glamour of F1 and its high-performance message, but, says Neale, "if the sport doesn't become

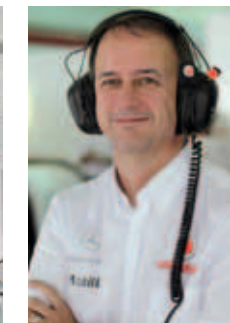
more environmentally sustainable, many of its sources of investment will disappear because the priorities of the manufacturers and associated partners are evolving in response to consumer demand."

That's why Neale firmly believes improvements in environmental sustainability will also improve the commercial sustainability of the sport: "Motor sport has to engage car manufacturers and associated partners to ensure its long-term growth. By being at the cutting edge of efficient technologies it makes itself relevant and compelling for the car industry, because the efficient technologies we pioneer trickle down to road cars that people buy. The shift towards more carbon-efficient transport is inevitable, and motor sport must lead that shift."



Neale also points to McLaren's 17-year partnership with oil company ExxonMobil and the synergy they enjoy with the auto industry as an example of how F1 can have a positive influence. "For ExxonMobil our cars act as high-speed laboratories, challenging them to produce more volumetrically efficient fuels, as well as lubricants offering superior protection for minimal frictional losses. The techniques their scientists have developed while working with us have had a direct effect on the fuel and lubricants you can buy at your local filling station: better performance, better economy, better reliability, lower emissions and longer intervals between services."

But sustainability is also important to companies not directly associated with the automotive world. Neale adds: "They want to be associated with a sport that their customers and shareholders view as cutting edge, technologically advanced and relevant to the modern world. That also requires us to address environmental issues and continually strive to be more sustainable."



McLaren's Jonathan Neale and supercar assembly plant; Formula E's Agag (below) with driver Lucas di Grassi

The Championship

McLaren technology will form the backbone of a new championship with sustainability at its heart. The McLaren Electronic Systems division will supply electric engines, transmissions and electronics to the FIA's new Formula E Championship, set to hit the starting grid in 2014 and aiming to revolutionise sustainable racing.

Alejandro Agag, CEO of Formula E as well as a team owner in GP2 and GP3, believes that his championship will also improve the image of sustainable transport and motivate consumers to demand it.

"There's an increasing problem in the cities with air pollution and city mobility," says Agag. "Cities need a solution and that is electric cars. But the interest in electric cars by the public is limited still and you can see it in the low numbers being sold. The expectations of the big manufacturers have not been realised, but a championship like ours can help to speed up the adoption of electric cars by making people believe in them. We'll be making them look exciting, fast and competitive, and attracting people to watch them."

The championship will use battery-powered single-seaters that will be good for 20-25 minutes of intense racing. Then, rather than waiting for a recharge after their first stint, the drivers will sprint over to a second car.

In a further nod to improving the environmental impact of cars in cities, races will only be run on street circuits. Agag says: "That's the basic philosophy of our championship. The electric car is for the city and it is the solution to problems of city mobility. That is why we intend to race in the city."

Of course, an obvious difficulty with street circuits is that such narrow tracks and tight turns don't encourage overtaking. But Agag has a few novel ideas to deal with that.

"Cars will have a push-to-pass button to provide 40 additional horsepower for 20 seconds. We will allow fans to contribute by Twitter, so they can give their favourite driver an additional push-to-pass. Drivers can also talk to fans during the race and fans can listen to the radio communications between the people and the driver."

Tyres will be designed to last for an entire race, which not only makes them more sustainable but potentially much more exciting because such wear-resistant tyres tend to become slippery on the normal asphalt of a street circuit. Agag is confident that the fans he's aiming for will embrace the concept, but admits this audience won't be your average hardcore motor sport fan.

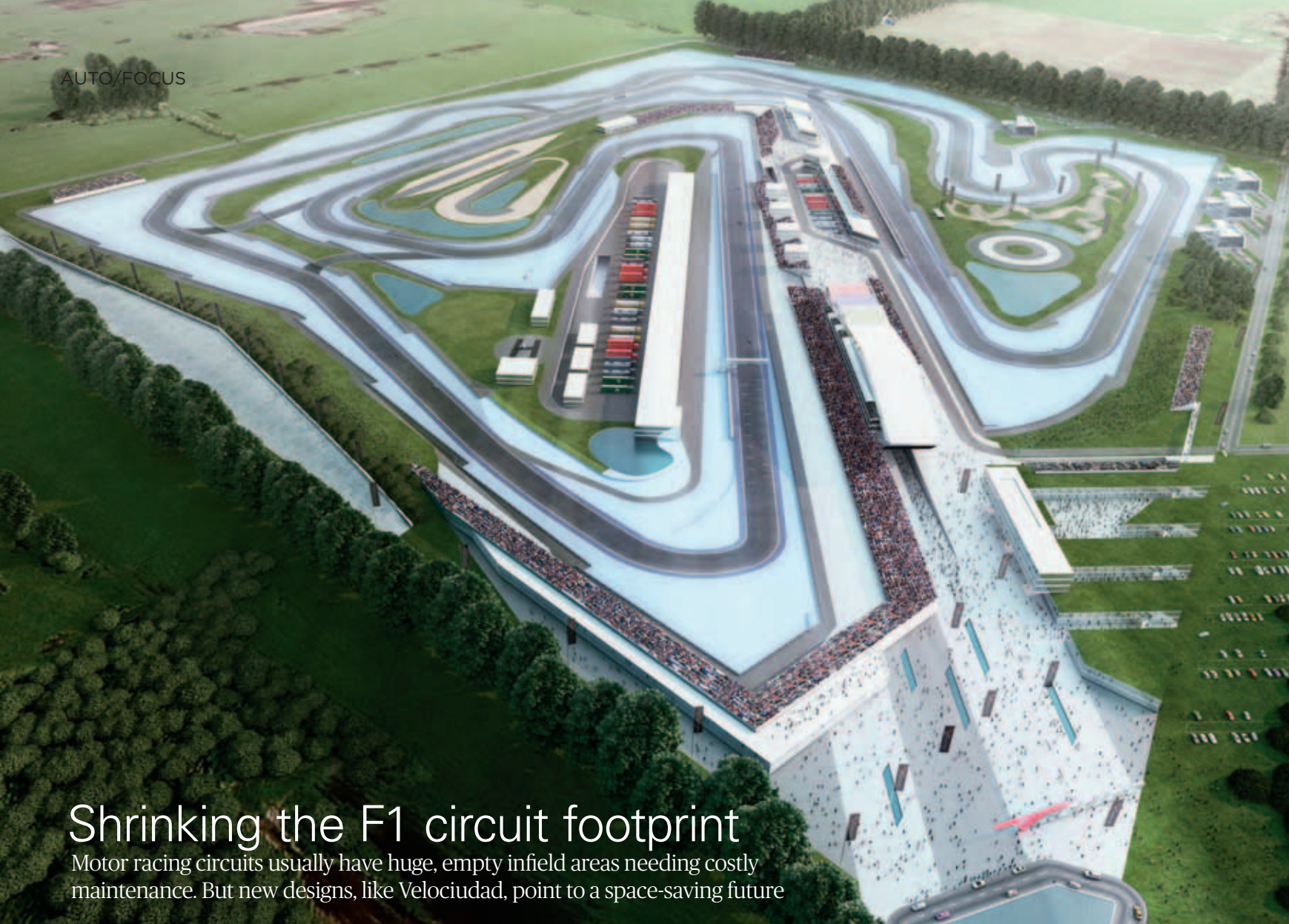
"We're targeting other, much younger demographics," he says. "We're targeting people who like to participate in an event and not just watch it. As they'll be staged in the city centres, most of our races will be run next to a stadium or arena, and after the race there will be a big concert with DJs. So we'll target that new group of fans who like different things and new things, so we're convinced we'll catch their attention."

The city centre setting is also environmentally important. After all, the biggest carbon footprint in motor racing isn't produced by the cars on track but by the cars being driven in their tens of thousands by spectators to the circuit. He says: "Staging races in cities is key to reducing the sport's carbon footprint because people can take public transport or even walk to a race."

They will also have a set of fences and walls that stay in each city to further minimise the transportation footprint, as well as using renewable elements for the construction of the facilities.

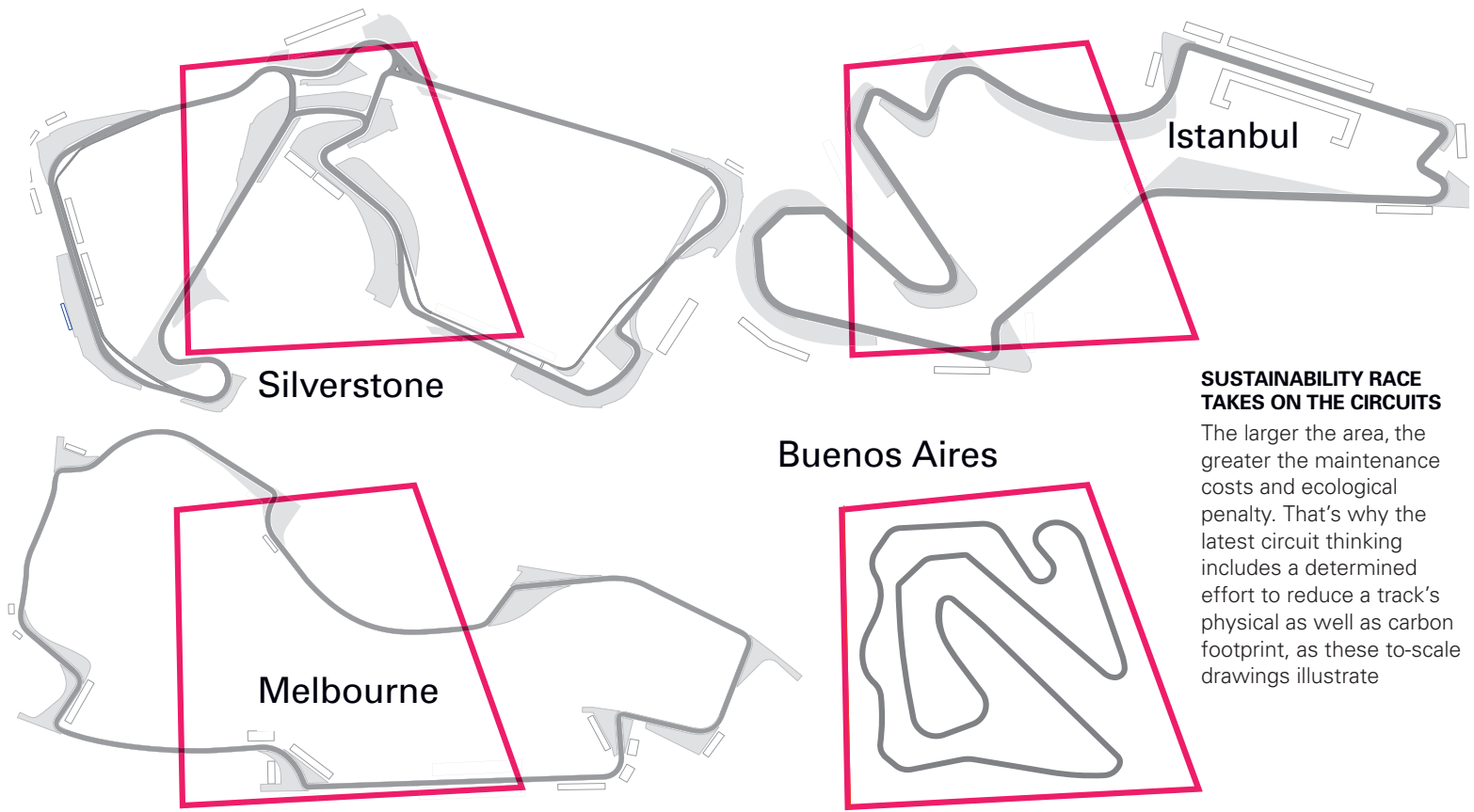
Ultimately, the aim is to have a truly positive effect on environmental progress. Agag says: "We would like to see the championship really make a contribution to the numbers of electric cars in cities. We believe we can have a major impact on pollution if we achieve this goal of increasing the number. As an example, if we increase the number of electric cars in cities by 2,000 worldwide we would offset the carbon footprint of our championship for one year. If we achieve 100,000 electric cars, the impact will be very important, and with one million additional electric cars the positive impact would be huge. That is our aim." >





Shrinking the F1 circuit footprint

Motor racing circuits usually have huge, empty infield areas needing costly maintenance. But new designs, like Velocidad, point to a space-saving future



SUSTAINABILITY RACE TAKES ON THE CIRCUITS

The larger the area, the greater the maintenance costs and ecological penalty. That's why the latest circuit thinking includes a determined effort to reduce a track's physical as well as carbon footprint, as these to-scale drawings illustrate

PHOTOGRAPHY: RICHIE HOPSON/FIA

Circuit design

Whether you're designing a temporary street circuit in a city centre or a grand facility in the desert, the principles for sustainability are the same. And in recent years this has become a key consideration for any new circuit project.

There are many examples of sustainable features being added to existing facilities, such as Hermann Tilke's photovoltaic-powered Sun Tower at Abu Dhabi's Yas Marina circuit. But new circuit developments are now adopting an even more comprehensive approach as sustainability becomes a vital consideration every step of the way.

John Rhodes, associate principal at sports architecture firm Populous – which was responsible for the recent redevelopment of Silverstone and the design of London's main 2012 Olympic stadium – says that sustainability concerns have become a top priority in design decision-making.

"Many of the big wins in sustainable design are not all that glamorous," he says, "or even evident to the casual user – such as the designing of an integrated travel plan for event spectators. But they are effective and essential to any new development."

Rhodes is keen to develop more ways for motor sport circuits to improve their environmental credentials. He points to the harnessing by new technologies of otherwise wasted energy, such as the huge footfall of spectators at major events – for example, building walkways with tiles that are designed to collect kinetic energy every time they're stepped on. Such installations could create the power to run lighting, signs, digital adverts and even entire wi-fi zones.

Rhodes also wants to see designs that utilise all areas of a modern circuit: "As a sporting event, motor sport is pretty much unique in terms of the scale of the field of play. The unused infield areas of circuits offer great opportunities for renewable energy harvesting schemes such as wind turbines and solar converters."

However, the scale of the average circuit also creates a sustainability challenge, in particular the amount of land that needs constant attention. But one way circuit designers are dealing with this is by using computer simulation software during the design process to reduce the amount of land a facility needs.

"The average area for a purpose-built F1 circuit is around 315 acres, which equates to 15 football pitches," says Rhodes. "But we've been able to reduce that significantly with recent designs. The development of computational design tools and simulation methods has given us the ability to fully test and further enhance the design of a racing environment before commissioning implementation."

Argentina's planned Velocidad circuit, Buenos Aires, designed by Populous, is a case in point. It is an FIA Category 1 circuit with a 4.7km track suitable for F1, yet it folds itself into just 62 acres. It's another example of how technology and sustainability can work hand in hand. And how motor sport can lead the way.

'THE AVERAGE AREA FOR A PURPOSE-BUILT F1 CIRCUIT IS AROUND 315 ACRES, BUT WE'VE BEEN ABLE TO REDUCE THAT SIGNIFICANTLY'

JOHN RHODES



FIA Institute adviser Even Wiger leads the Institute's sustainability programme: "We believe that motor sport can become a leader in this field, just as it has in so many others"

Governance

Bringing all of these initiatives and plans together is the FIA Institute's newly launched sustainability programme, which will help motor sport stakeholders to measure, improve and be recognised for their environmental performance.

Underpinning the programme is an environmental accreditation scheme, the first to have been developed specifically for motor sport. It will enable National Sporting Authorities (ASNs), teams, circuits, manufacturers and promoters in motor sport to achieve the highest environmental standards. Organisations that sign up will be rated on three levels of performance, so measuring their environmental achievement and providing a benchmark against which to improve.

The framework has been developed in partnership with leading environmental provider DNV, as well as the Institute's Sustainability Advisory Panel, composed of experts from across motor sport, including representatives from circuits, ASNs and manufacturers.

FIA Institute sustainability adviser Even Wiger is leading the project and has huge experience in the area, having implemented ISO 14001 environmental certification programmes across the steel industry sector. He brought his skills to motor sport as the managing director of WRC Rally Norway, where he helped to achieve the highest-ever environmental standards for the event, introducing schemes that turned it into a completely carbon-neutral rally.

Wiger says: "The sustainability programme should go much further than merely mitigating motor sport emissions. It will help all motor sport stakeholders to engage with environmental issues and improve their performance in this area. We believe that motor sport can become a leader in this field, just as it has in so many others."

The programme includes a carbon offset initiative, a module helping stakeholders to achieve carbon neutrality as part of a wider set of environmental actions. Carbon offsetting has been a feature of motor sport for years but only on an ad hoc basis – without any centralised policy or authority for calculating methodology or offset projects. The new FIA Institute programme will address this issue by providing a structured framework and pathway to carbon neutrality.

Through the new programme, ASNs, teams, circuits and events can seek carbon neutrality by initially calculating their emissions with an Institute-approved auditor, then offsetting the emissions through approved sequestration projects and credits.

FIA Institute president, Gérard Saillant, adds: "We're very happy to be launching this important programme in motor sport. Not only will it help to highlight motor sport's commitment to controlling its environmental impact, it will also help to develop environmental solutions that are relevant to the wider automotive industry." □



Kevin
Magnussen
at the 2012
F1 Young
Driver Test,
Yas Marina
circuit,
Abu Dhabi

HOW DO YOU GET THE BEST OUT OF YOUNG RACING DRIVERS?

Simple – let them to learn from the best

*The US Road Racing Drivers Club asked
some of the world's top drivers and racing experts
to give online instruction to young competitors
from around the world >*

PHOTOGRAPHY: LAT

The Road Racing Drivers Club's SAFEisFast initiative, supported by the FIA Institute, has been a major success story for the Motor Sport Safety Development Fund. What started as a symposium for 200 young drivers has become a huge online educational platform that has attracted more than 36,000 unique visitors from 130 countries in its first year alone.

SAFE is an acronym for Skilled, Assured, Fit and Empowered, qualities that form the backbone of the online tutorials on the SAFEisFast.com website. The site offers training across 12 categories critical to every driver's success – from safety and fitness, to race car systems and dynamics, to mental preparation, marketing and how to find sponsorship.

Another key part of the programme is the Online Instructor initiative. Every fortnight a racing expert is made available to answer young drivers' questions and help them with their careers.

What follows on these pages are some of the top tips offered by those racing stars over the past year.



Fernandez: "I'd take the driver with the best, most sellable personality"

Adrian Fernandez

FIA WEC driver and former IndyCar and ALMS champ and team owner

Q As a team owner, if you test two drivers who are equal on performance, what other areas are key in making your decision to select one driver over the other? – Oli W

A If the drivers are pretty much equal on track, I'd take the driver that has the best, most sellable personality. At the end of the day, that's what a team needs to keep their sponsors happy. It doesn't matter if you have a quick driver if he's a jerk. If he doesn't have the personality, the 'selling point', you're not going to go anywhere regardless of how quick he is. Times have changed and you need the complete package in a driver.



Hildebrand: "You have to find the car's limit so your team can get to work"

J R Hildebrand

IndyCar driver with Panther Racing and 2011 IndyCar rookie of the year

Q At a to a new track how long does it take to memorise the layout and know what speed you can carry into each turn? – Rob

A Memorising a track becomes fairly natural over time, but getting it right in the car is a constantly evolving process. The more tracks you race on, the easier it becomes to look at a new circuit and relate the look of

new corners to ones you've seen before, and have a general idea for what to expect.

A lot of us practise a bit of visualisation to get ourselves in the right mindset going into practice, qualifying, or whatever the situation might be. Really nailing it when you're in the car is a tougher prospect because conditions are always changing and there are various aspects of a corner to consider and eventually get right or wrong. That invariably takes some trial and error, so you have to take some risks at first to get yourself in the ballpark, then re-evaluate where you're at.

Can you take another big swing at it, or are you pretty close and just need to chip away? The answer to that question can definitely get you into trouble if you're wrong, but as a driver in that position, your primary objective is to reach the car's limit as quickly as possible so that your team can get to work. So it's a necessary time to be calculated, focused – and rather aggressive.



Button: "In karting the engines are so small you have to keep the revs high"

Jenson Button

Formula One driver for McLaren and former F1 world champion

Q You have been known as a very smooth race driver. Can you describe why you do it and what are the advantages to being smooth? – Michael Martin

A It's something I started learning when I was a kid: in karting, you race with such small engines and you have to keep the revs high to maintain your minimum speed through the corners. That's the quickest way to go racing. Also, I was very influenced by watching Alain Prost on TV in the 1980s. >



PHOTOGRAPHY: DREW GIBSON/ASTON MARTIN RACING; VODAFONE MCLAREN MERCEDES; LAT; CIK/FIA

'REALLY NAILING IT IN THE CAR IS TOUGH, AND TAKES TRIAL AND ERROR'

J R HILDEBRAND



Gil de Ferran

Former Indianapolis 500 victor and winning team owner

Q I'm currently racing karts in Europe but my ultimate goal is to race in the Indianapolis 500. Should I switch to cars in Europe or move over and start racing as soon as I can in the US? – Randall Marcu

A Whether you want to race in IndyCar or Formula One, three things come to mind: 1 Competition, 2 Wins, 3 Miles.

Let me explain. The only way you will develop your talents is to face very tough competition at each level of your career. Facing difficult opponents forces you to think, develop and find new limits. It takes you out of your comfort zone; it will test you and your resolve. When you look back, you won't believe how far you've come.

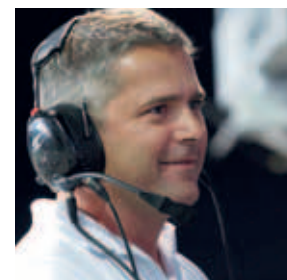
The winning part is easy to explain. If you win at every level, many good things will happen – the best teams will be after you, the best people will want to work with you, and it's likely that you will also end up with the best engines and equipment in general.

It becomes an unstoppable virtuous cycle. Everything becomes easier and opportunities tend to come your way. Conversely, if you don't win or, shall we say, conquer each level of your career, why should you think you're good enough to move up?

It is fine to make long-term plans and have big life goals, but if you don't execute your immediate challenge well, it's likely that nothing further will matter. All those beautiful career plans you have will come to nothing if you don't do well in your next race, and the next one and the next one...

There are no guarantees in life, but it's amazing how opportunities seem to come to those who are doing well in the first place. In short, it helps if you make your own luck.

Lastly, I would choose a series that gives you plenty of miles – not necessarily only racing miles, but also testing miles. Only in testing can you experiment and truly develop many of the skills you will need to become a top professional.



De Ferran: "Facing difficult opponents forces you to find new limits"



Dallaire: "You should simply but ruthlessly focus on hitting your marks"

Dr Jacques Dallaire

Council of Motorsport Sciences member; mental preparation expert

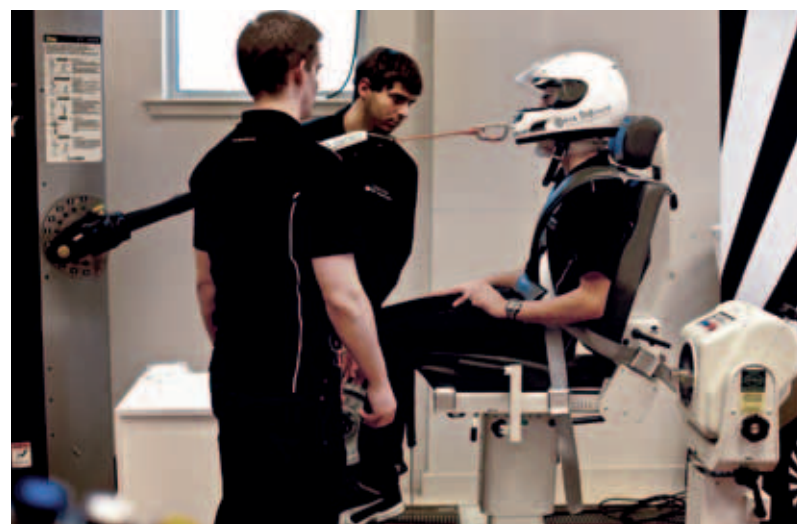
Q In March this year I had a crash at Sebring and still expect to race there again very soon. How can I be sure to race at the limit when I take on the corner where I crashed, without getting scared, psyched out or choke through that corner? – Matthew

A This kind of situation happens much more frequently than you might think, Matthew. First off, you can't *not* think about whatever is on your mind. So how do you avoid thinking (really, worrying) about the crash you had at Sebring?

It is certainly *not* by trying not to think about it because what you picture in your mind is exactly that, and your unconscious mind will attempt to deliver what your conscious mind tells it. Instead, during your mental rehearsal of the Sebring circuit you should simply but ruthlessly focus on hitting your marks with precision in every turn, and 17 should be no exception... take a perfect approach, followed by a perfect turn in, followed by a perfect apex, followed by a perfect exit.



Neck strengthening exercises are crucial to coping with cornering g-forces. Here young FIA Academy drivers find their limit at the FIA Institute training centre in Edinburgh



Dario Franchitti

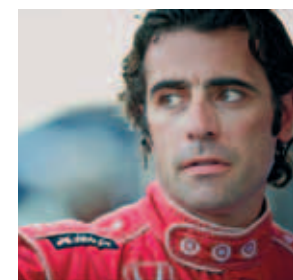
Four-time IndyCar champion and twice an Indy 500 winner

Q If you're driving subconsciously, almost as if you're on autopilot, what do you think about to make sure you stay in the zone mentally? – Mike Milners

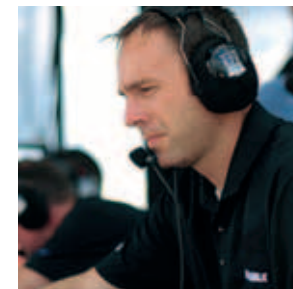
A When you're in that subconscious state, that's the best feeling of all. You're just in the rhythm, in the zone. You don't need to work at anything, you've got yourself in that ideal state and, look out, that's when you'll be doing your best work. Instead, it's those days when you're not in the zone that you've got to work to get into it.

It's what Jackie Stewart once called mind management. You've got to learn how your mind works and you've got to figure out what works for you to get you into that zone. For me, when I'm in that mental state, strange things pop into my head – the strangest things. I remember in Japan once it was a comedy sketch I'd heard the night before. It was Billy Connolly, and it came into my head every time at the same point in the lap, 200 laps in a row!

Crazy stuff like that. But don't confuse such thoughts with a lack of concentration – being in the zone doesn't mean losing focus.



Franchitti: "You've got to figure out how your mind works"



Fry: "Better for a driver to report that he's unsure than to make things up"

Brandon Fry

Muscle Milk Pickett Racing team manager and chief race engineer

Q What is the most common mistake you see made by drivers when they give you feedback on the car? – Jack Mitchell J

A I've been fortunate to work with very experienced drivers, some of whom are very sensitive to what the car is doing and others who are still very quick but have much less feel for what the car is doing beyond a general understeer/oversteer comment. In a few cases, particularly if I have just started working with a driver, they may feel it is important to provide feedback beyond what they would normally feel comfortable giving.

While it's important for a driver to pay attention to the car's behaviour, it is acceptable to report that he isn't sure what the car is doing at a certain corner or part of the track or even under certain conditions (braking, turn in, etc). It is far better for a driver to report that he is unsure about what the car is doing than to make things up.

Other tools exist (data acquisition, visual, and so on) to help fill in gaps. Providing unsure or potentially inaccurate feedback only wastes time.

Young drivers should have a goal for each track session. For example, in practice it might be to see what downforce level would be right for the race. If so, it would be beneficial to run in a bit of traffic, but if the goal is to run a qualifying sim, running on an open track is probably preferable.

Andy Lally

Three-time Grand-Am champ who leads the GT class all-time win list

Q I see many pros really working the steering wheel quickly back and forth during cornering and weight-transfer. Is that to help the car rotate and be ready for a quick correction? – Rick Goyeb

A I tell most people the same thing: in like a ballerina and out like a cowboy. The point being, you need to be smooth and on your toes to have the 'platform' – the car – as stable as possible on your way to the apex of a corner. Then, once you get your foot to the floor under full acceleration, you do whatever you need to get to the exit kerbing without lifting.

Uninterrupted acceleration is key, and balancing corner-entry speed with exit speed is mega important – not only for your lap time but your race pace and overtaking.

Lally: "The car must be as stable as possible on your way to the apex"



'I TELL MOST PEOPLE THE SAME THING: IN LIKE A BALLERINA AND OUT LIKE A COWBOY'

ANDY LALLY



Wurz: "You need to understand what is happening to a car on its limit"

Alex Wurz

WEC driver, two-time Le Mans winner and former F1 driver

Q What did you do to set yourself apart from other drivers when you were starting out, other than showing your talent on the track? – Mike Anderson

A When I was starting out I found I could gain an edge with two things: my ability to communicate technical information, and my fitness.

First is the ability to understand what is happening with a car when you're driving it at its limit, the understanding of vehicle dynamics and how, as a driver, you can influence it or, equally, understand when the set-up or construction is wrong. This was a big help for all the good contracts I've had over the years.

One has to be very open to ensure you can separate driver-made set-up balance issues from real technical-related balance issues. If you know what your driving input is doing to cause certain reactions in the car, you can filter out your driving inputs and analyse much better and more efficiently what the car's set-up and balance issues are. Then you're able to give better feedback which helps the team develop the car better than other drivers do.

When I speak about fitness, I've always been very fit and I've always trained a lot. At my first ever Formula One test, I had two days of testing in Estoril, one of the most physically challenging race tracks of all. I did 80 laps each day and had no issues with my neck or my concentration. This test was important, too – a shoot-out with my rivals for a seat, and they could only manage a handful of laps at a time. So it was much harder for them to learn because they didn't have the physical stamina to do as many laps as I could manage and, of course, one learns a lot on every lap in an F1 car. So I was the fastest and got the contract.

In this case it was a very clear example of my training giving me an advantage. And you know what? Training doesn't cost any money – just effort! □

Ashley Fowler
Specialist engine technician
Performs thorough checks of all aspects of the engine to ensure there are no visible signs of wear and tear.

Norman Smith
Car controller, Jari-Matti Latvala
Veteran of the team, Smith manages personnel working on Jari-Matti's car during service. Ensures all jobs are completed within the allotted time, and it's his role to ensure the car leaves service on time.

Miguel Cunha
Mechanic
From Portugal, Cunha is a highly experienced mechanic who works on the front of the car throughout the service.

Lee Hanley
Mechanic
A front-end mechanic, Hanley works in harmony with those at each front corner to carry out a strict programme of routine checks and maintenance.

It's an all-too brief respite: a half-hour or so in which a small crew of mechanical magicians conjure up new parts, deliver miracle running repairs and work strategic alchemy in order to turn what can often look like a no-win situation into a fighting chance for victory.

Service stops in the World Rally Championship are strictly limited. They usually last a mere 10, 30 or 45 minutes depending on the day's stage plan. In that time just four technicians are allowed to work on the car, while around them engineers rapidly download the driver's feedback and plot strategy for the next special stage.

It's a frantic environment in which the crew can rip out a gearbox and install a new unit in 10 minutes, and where 'mechanical' solutions often come at the end of a hammer or in the blue flash of a blow-torch.

It may not be the prettiest work and in some cases it's remarkably low tech, but it is always delivered with exceptional skill and speed of thought as the Ford WRC team demonstrate in this stop during the recent Rally Italia Sardegna. The team may have been competing in the penultimate event of its current spell in the WRC but there was no let-up in the quest to push Jari-Matti Latvala as high up the standings as they fight to secure an eventual third-place championship finish for the Finn.



PHOTOGRAPHY: MCKLEIN PHOTOGRAPHY



The Ford WRC team goes about its prep for the next Sardinian Rally stage as driver Latvala compares notes with his engineer

Chris Morris
Transmission engineer
Responsible on the event for all aspects of the Fiesta RS WRC's transmission system. Ensures that when changes are needed, the team's mechanics have the necessary parts on hand and that they'll be fitted within the strict time limits imposed during service.

Jari-Matti Latvala
Driver
Latvala joined the official Ford team in 2008 and became the youngest driver to win a world rally round when he triumphed in Sweden that season. Apart from consulting with engineers and management in service, he also handles media interviews with the vast number of journalists attending WRC events.

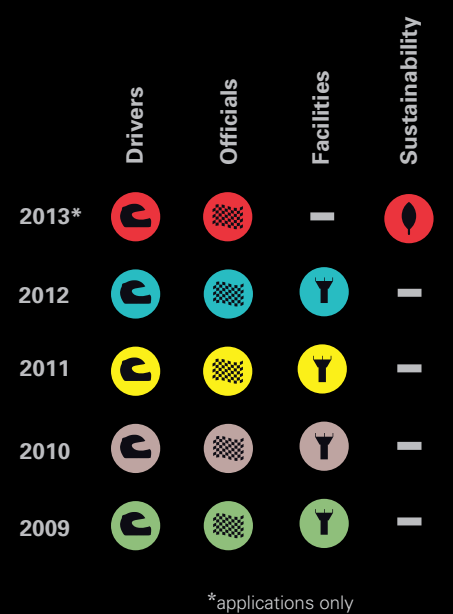
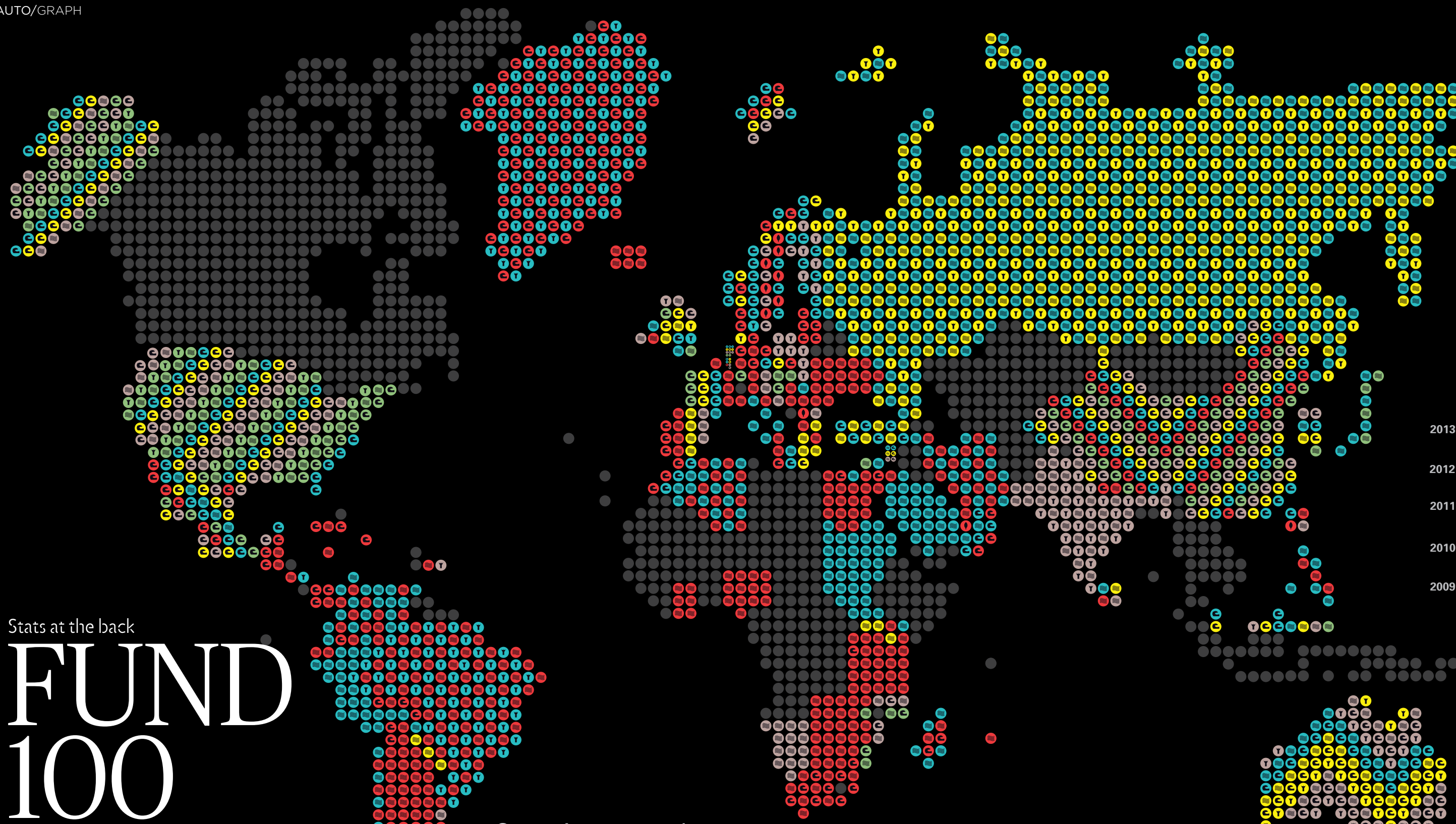
Tim Jackson
Engineer, Jari-Matti Latvala
Jackson works closely with driver Latvala to finalise the car set-up in service. Crucial adjustments such as ride height and damper settings, which play a vital role in how the car performs on stages, are discussed by the pair to ensure maximum performance is delivered by the Fiesta RS WRC, relative to the conditions and roads to be tackled.

Dave Ferguson
Mechanic
One of the four corner men on the Fiesta RS WRC. At each service Ferguson carries out a thorough inspection of suspension and damper parts, replacing components where necessary, in accord with the team's plans.

Freeze frame

SERVICE STATIONS

In the first of a new series, Auto presses pause on a crucial moment in motoring or motor sport. Here we zoom in on a WRC service stop as Jari-Matti Latvala prepares for the next stage



Stats at the back

FUND 100

National Sporting Authorities in 100 countries have now engaged with the Motor Sport Safety Development Fund since it began. Over €22m in grants have been awarded for projects such as Officials Safety Training, Young Driver Safety and Facility improvement. In 2013, grants will also be awarded for sustainability projects. This map shows every region where a project has taken place, from 2009-2012, as well as the projects applied for in 2013.

Countries engaged

Albania	China	Estonia	Israel	Mexico	Pakistan	Singapore	Trinidad and Tobago
Algeria	Colombia	Finland	Italy	Morocco	Panama	Slovakia	Turkey
Argentina	Costa Rica	France	Jamaica	Mozambique	Paraguay	Slovenia	Uganda
Australia	Côte d'Ivoire	Georgia	Japan	Nepal	Peru	South Africa	UK
Austria	Croatia	Germany	Jordan	Netherlands	Philippines	South Korea	Ukraine
Barbados	Cuba	Greece	Kenya	New Zealand	Poland	Spain	United Arab Emirates
Belgium	Czech Republic	Guatemala	Kuwait	Namibia	Portugal	Sri Lanka	Uruguay
Bolivia	Denmark	Hong Kong	Lebanon	Nicaragua	Puerto Rico	Sudan	Zimbabwe
Botswana	Dominican Republic	Hungary	Lithuania	Nigeria	Romania	Sweden	
Brazil	Ecuador	Iceland	Madagascar	Norway	Russia	Syria	
Bulgaria	Egypt	India	Malaysia	Oman	Rwanda	Taiwan	
Burundi	El Salvador	Iran	Malta	Palestinian Territory	Saudi Arabia	Tanzania	
Chile		Ireland	Mauritius		Serbia	Tunisia	

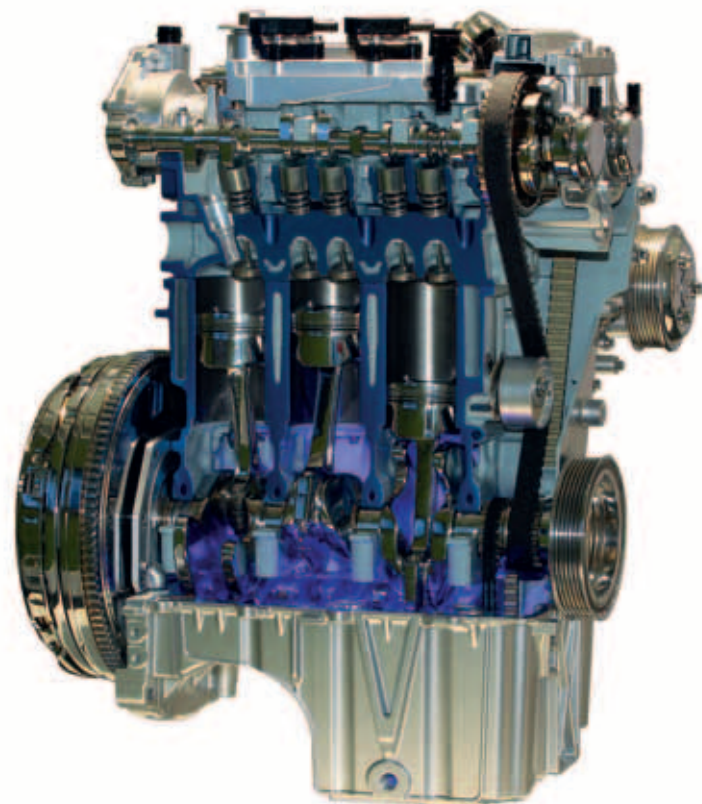
ILLUSTRATION BY: STUDIO TONNE
REPRESENTED BY: AGENCY RUSH

Countries that have engaged with the Fund through grants and applications since its inception

Back to the future

ENGINE OF CHANGE

While alternative energy powerplants may be the future of motoring, there's still plenty of mileage in traditional petrol-fuelled engines, says Ford's head of gasoline powertrain development, Andrew Fraser



Launched last year, Ford's three-cylinder, 1.0-litre EcoBoost engine has become a major success story. A multiple award-winner, this tiny powerplant has set 16 FIA-approved speed records* as well as being voted International Engine of the Year. So even as most major car makers explore alternative fuels, such as downsized turbocharged petrol units will still provide the power that drives car sales globally over the next two decades. Here, Andrew Fraser, from the internal combustion cutting edge at Ford, engages in a little futurology for *Auto*.

Q Where does the petrol engine fit into the future powertrain market share?

A It depends heavily on the segment. From a European perspective, in large vehicles such as MPVs and SUVs we expect diesel to continue being the preferred choice for consumers. In smaller B- and C-segment cars, where purchase price is critical, the petrol engine will continue to be viable, especially for drivers not covering big annual mileages.

Ford's view is that diesel share will actually reduce slightly in these segments, as the cost will be progressively forced up by more complex after-treatment systems required to meet future emissions standards. The payback in terms of fuel economy will therefore take longer, so more customers will opt for a high-tech petrol engine instead.

Q Is downsizing the future? Is it likely that small engines will be the mainstream technology over the next 20 years and that electric cars will remain peripheral?

A We think downsized engines will dominate for at least the next 10 years, probably longer. Turbocharging (or other boosting

systems) will be widespread. In Britain every Focus now has a turbocharged engine, whether petrol or diesel. Our forecasts for 'electrified' vehicles – battery, hybrid and plug-in hybrid – are that they will remain less than 10 per cent of the market in 2020. Twenty years ahead is harder to predict, but without an energy storage breakthrough it seems unlikely that electric vehicles will take a major market share.

Q Will EcoBoost engines form the core of future hybrids? Will they be used as range-extenders for electric cars?

A An EcoBoost engine has many features to give great response and high torque. If you pair one with an electric drivetrain you wouldn't need all of these features, as electric drive would provide some capability (eg, high torque at low revs). A downsized engine such as the 1.0 three-cylinder would make a great base unit for a hybrid, but you'd probably use a simpler derivative.

Q The EcoBoost 1.0 will eventually go into larger models. How do you market a 1.0-litre car to people who normally buy a 2.0-litre based on the notion that larger engine size denotes affluence and power?

A We believe customers are becoming



Fraser (right) believes that smaller conventional engines, like Ford's three-cylinder 1.0 (above) will continue to sell well for a good decade



attuned to the electronics industry, where smaller products often sell at a premium, and where many buy products based on capability and energy consumption (battery life), rather than asking exactly what processor capacity or RAM they're getting, as long as it does the tasks they need.

It is quite a reversal for the auto industry, but we believe – and Focus sales with the 1.0 (where previously the smallest engine was the 1.6) seem to support the idea – that customers will make the switch.

In larger models, I wouldn't expect a 30 per cent take up, but a reasonable slice of consumers may opt for the 1.0-litre engine even then. In the Focus segment, the 1.0 is actually the quietest engine, so refinement may be a reason to buy, alongside lively performance and great economy.

Q Is it an easier sell in some countries than others? Do you need a big education-based campaign to get the message out?

A It varies a great deal by country, partly based on consumer habits and also on the relative price of petrol compared with diesel, which is mainly driven by tax strategy. In markets where diesel is still a lot cheaper than petrol, diesel continues to make a strong economic case.

CO₂ from a petrol engine is 10 per cent lower for the same fuel consumption rate due to the lower carbon ratio of the fuel, so markets with strong CO₂-based taxation also favour high-efficiency petrol cars.

* 1.0 litre models set sub-1.0-litre class world records for recorded times covering one mile from a standing and flying start; and for highest average speeds recorded over distances from 10km to 4,104.7km. Cars also set highest average speed records over timed sessions lasting one, six, 12 and 24 hours. Highest average speed of 118.7mph set during world record run for highest average over one hour.

PHOTOGRAPHY: FORD, RICHARD BOSSSELMAN



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