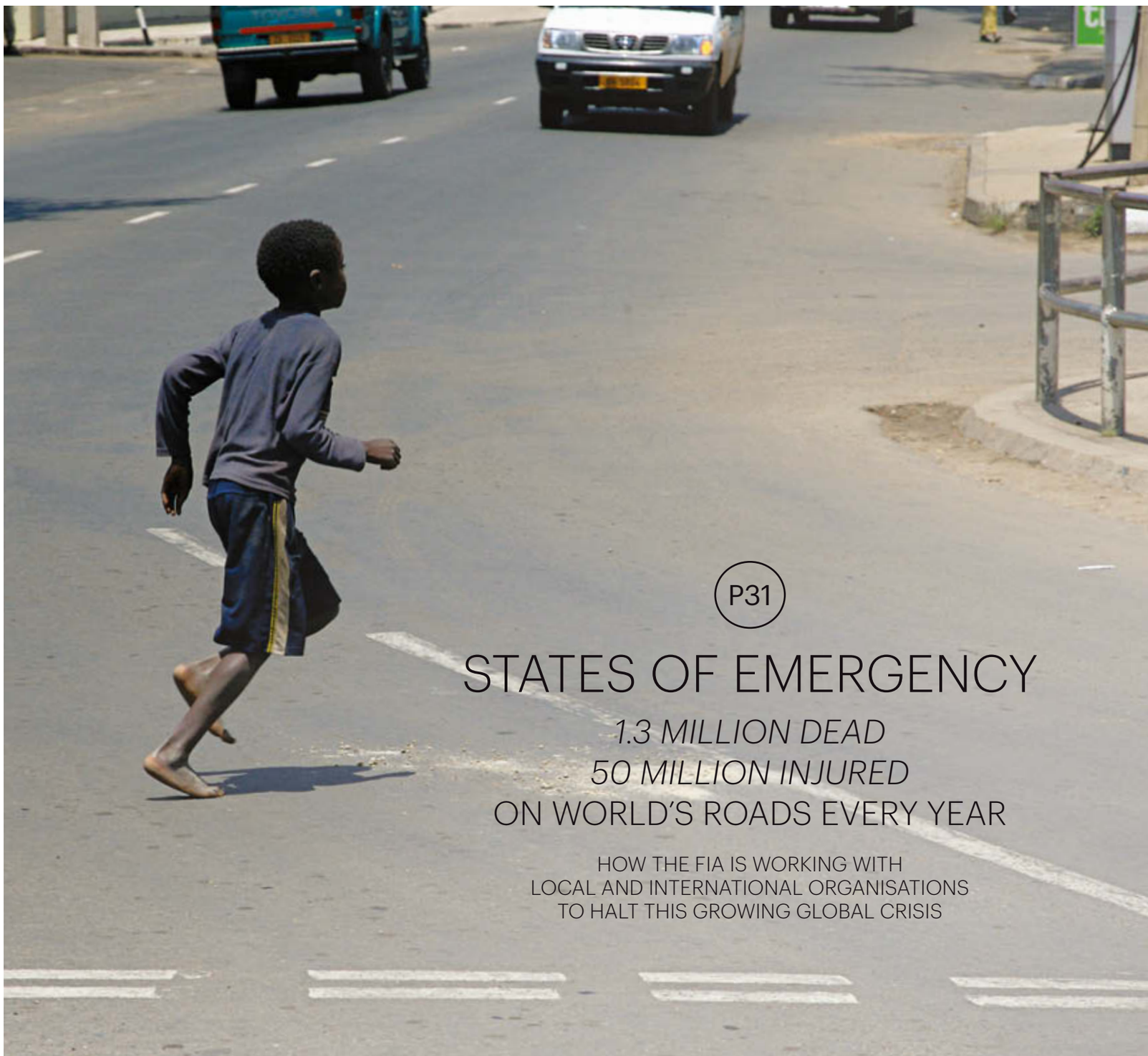
INTERNATIONAL JOURNAL
OF THE FIA: ISSUE #8

AUTO



P31

STATES OF EMERGENCY

1.3 MILLION DEAD
50 MILLION INJURED
ON WORLD'S ROADS EVERY YEAR

HOW THE FIA IS WORKING WITH
LOCAL AND INTERNATIONAL ORGANISATIONS
TO HALT THIS GROWING GLOBAL CRISIS

ISSUE #8

AUTO

INTERNATIONAL JOURNAL OF THE FIA

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We would like to thank the following for their help with this issue of AUTO: KAORU AKIMOTO, STEVE COOPER, DIANA FAUNER, KEVIN JONES, ADAM MCDAID, ALASTAIR MOFFITT, LINDSAY MORLE, SOPHIE OGG, AUDE RAYNAUT, TOM ROBBERECHTS, MARC SHOTTEN, ROBERTA VALLAROSI
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POWER IS NOTHING WITHOUT CONTROL

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

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

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

ON THE FRONTLINES

The battle for road safety is being fought on many fronts. From global-stage politics to local campaigns that improve road behaviour, all angles of action are essential in tackling the rising epidemic of death and injury on the world's roads.

The FIA is active across all of these levels, harnessing the power and resources of international bodies to influence global policy, working with governments to implement legislation and mobilising its 236 clubs in 141 countries to run campaigns on the ground. In this edition of AUTO, we present a wide-ranging special report on road safety, examining how the battle to save lives is being won from the corridors of power to the streets on which we drive.

We also focus on a future of a different kind in this issue - that of racing, where next-generation racers are honing their skills in the digital world. The FIA is taking a lead in bringing motor sport to gamers through its partnership with the Gran Turismo series.

Another entry point is through the many racing academies that exist in motor sport. With almost half of the current Formula One grid having participated in a junior team programme, AUTO looks at whether they are now an essential step on the path to the top.

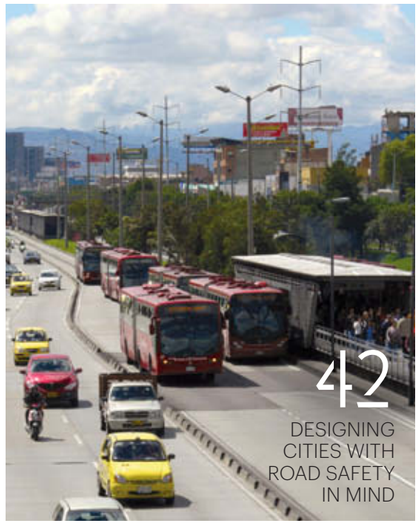
One man who knows what it's like to get to the top, and how to stay there, is rally legend Carlos Sainz. In this edition we catch up with 'The King' to discuss his stellar career, his preparation for his eighth Dakar rally in 2015 and why, at the age of 52, he's still driven to compete.

Contents

From F1 technology transfer to a special report on the global drive for road safety, this is AUTO

24

THE FIA AND GRAN TURISMO HAVE JOINED FORCES TO TURN MORE GAMERS INTO RACERS



42

DESIGNING CITIES WITH ROAD SAFETY IN MIND

20

FORMULA ONE TECHNOLOGY BEING PUT TO EVERYDAY USE

32

THE DIPLOMATIC DRIVE TO MOVE ROAD SAFETY TO THE TOP OF THE GLOBAL AGENDA

58

HOW RAMONA KARLSSON EARNED A TOP SEAT IN WORLD RALLYCROSS

64

RED BULL'S HELMUT MARKO ON ITS JUNIOR TEAM SUCCESS

AUTO / ISSUE #8

A THING OF BEAUTY

GT and endurance drivers will get the chance to further their careers at the wheel of the new Renaultsport R.S. 01. The car will compete in the new one-make Renaultsport Trophy next year as part of the World Series by Renault line-up.

New Renault GT racer

CONCEPT TO REALITY

With a design inspired by the world of concept cars, the Renaultsport R.S. 01 has a Dallara-built carbon monocoque chassis weighing less than 1100kg. The Nismo V6 engine can develop over 500bhp, while Michelin has produced special 18-inch tyres for the car, which was first revealed at the Moscow Motor Show in August.

Renault's latest GT race car has also been built to current LMP1 rules. It will compete in a new one-make Renaultsport Trophy for 2015 under the World Series by Renault umbrella.

Two champions in the Pro and Am categories will be given the chance to further their careers by the French manufacturer. The winner of the Pro class will undergo a driver development programme prior to undertaking a rookie test with the official Nismo team, which races in Super GT in Japan. For the AM champion there is a chance to compete in the 2016 Le Mans 24 Hours driving an LMP2 prototype.

Patrice Ratti, CEO of Renault Sport Technologies, said: "Renaultsport R.S. 01 is a racing car of extraordinary design, symbolising Renault's passion for motor sports. The spectacular design lines reflect in themselves the ambitions of this exceptional car, thanks to the efforts and enthusiasm of Laurens van den Acker and his team. Under the bodywork, it is packed with cutting-edge systems from Renault Sport Technologies.

"The aim is to achieve an advanced level of performance, delivering thrills for both the driver and the public. If we had to sum up Renaultsport R.S. 01 in a few words, we could describe it as a marriage between the beauty of Renault DeZir and the performance of Formula Renault 3.5."

AUTO / ISSUE #8

FIA Formula E

BEIJING FEELS THE POWER

A new chapter in motor sport history began in Beijing, China on September 13th when, after more than two years in the planning, the FIA's new all-electric Formula E championship got off to a thrilling start, with Audi Sport ABT's Lucas di Grassi finally emerging victorious after Nicolas Prost and Nick Heidfeld crashed out in a last-corner battle for the lead.

The new series, first concepted by the FIA in 2011, got off to a flying start on race day morning when, in qualifying, Prost ran quickest around the streets around the city's Olympic Park to claim the first pole position of the new championship. The e-dams-Renault team racer finished a tenth of a second ahead of di Grassi.

Prost's race was far less straightforward, however. The Frenchman held the lead throughout but in the closing stages he was put under pressure by Venturi's Nick Heidfeld who had risen to second when the drivers made the mid-race change to fully-charged second cars.

In the final corner Heidfeld attempted to pass, Prost reacted and the pair collided. The historic victory went to a delighted di Grassi.

"To win the race is like a dream come true," he said. "I was lucky to be in the right place at the right time. We made a few mistakes but overall I'm extremely happy to be the first ever winner of a Formula E race."

With the first race being watched by an estimated crowd of 75,000 and around the world on TV and online, the inaugural event was branded a success by series promoter Alejandro Agag. "This is a new era for racing," he said. "The big conclusion is that this is real racing. These guys are pushing really hard and we saw that on the last corner of the last lap."

The Formula E e-Prix will take place in Putrajaya, Malaysia on 22 November.

ELECTRIC AVENUE

Audi Sport ABT's Lucas di Grassi (left and inset) on his way to victory at the first Formula E race, held in Beijing, China. Di Grassi was followed to the flag by Andretti Autosport's Franck Motagny and Audi Sport ABT's Daniel Abt, though Abt was later penalised for exceeding battery consumption limits. Third place then went to Virgin Racing's Sam Bird.

PHOTOGRAPH: GETTY

AUTO NEWS

In this issue, VW leads the drive to cut CO_2 emissions in line with new EU regulations by 2020; Toyota joins an innovative electric car-sharing scheme in France; the Hyundai ix35 Fuel Cell sets a new distance record for a hydrogen-powered vehicle, and South African Kelvin van der Linde wins the FIA Institute Young Driver Excellence Academy

VW is aiming to achieve CO_2 emission levels in line with new EU laws for its new Golf, out in 2019.

CAR MAKERS FACE NEW CO_2 TARGETS

Some of the most economical mainstream cars ever seen will be built over the next decade as manufacturers strive to cut CO_2 emissions and increase fuel efficiency.

A raft of cutting-edge technologies will aim to achieve CO_2 figures of under 90g/km and fuel efficiency levels of more than 300mpg according to motoring title *Autocar*, which has revealed what it believes are the top five new technologies set to transform road cars.

The average family car achieved 132g/km of CO_2 in 2012, and this is will be cut to just 95g/km by 2020. Under new European Union rules that require car makers to meet these strict CO_2 emissions standards, mid-market saloons and hatchbacks are set to be shaped by the development of fuel-saving technologies including flywheels, Variable Compression Ratio engines, coasting (when a car travels at a set speed), electric turbos and enclosed wheel wells.

Volkswagen has already started work on an aerodynamic package for the next-generation Golf, the Mk8, which is due out in 2019.

VW engineers and designers are investigating ways of cutting the average CO_2 output of new Golf models to "well below" 90g/km, with technology being applied from the company's radical XK1, which has made extensive use of aerodynamic innovation to achieve 313mpg.

TOYOTA JOINS PIONEERING ELECTRIC CAR SHARE TEST

Toyota has teamed up with the French city of Grenoble and energy supplier and official FIA Technical Partner, EDF, to run a pioneering electric car-sharing scheme in the French Alpine city, starting in October.

The Japanese car maker will supply 70 i-ROAD and COMS ultra-compact electric vehicles for the scheme, called Citélib by Ha:mo, which will allow users to pick up one of the small EVs at one location and drop it off at another.

EDF subsidiary Sodetrel will develop and manage around 30 charging stations for the vehicles in a three-year test in conjunction with the City and Metropolitan Area of Grenoble and Toyota.

"The Grenoble-Alpes Métropole community has always been open to innovation," said Christophe Ferrari, president of the Grenoble-Alpes Métropole. "In terms of scale, it's perfectly suited to this kind of test, and in Grenoble we have a tradition of daring to do things.

"The partnership between us, Toyota, EDF and Citélib – a local car-sharing operator – is an innovation in France. It's a great opportunity for our community to test, for three years and exclusively in Europe, a new mode of mobility that's not only innovative but also economic and ecological. It's an experiment that is bound to be followed by others."

Seventy Toyota i-ROAD and COMS electric cars will feature in a car-sharing scheme starting in Grenoble.

UK TO OPEN ROADS FOR MOTOR SPORT

British Prime Minister David Cameron has given his backing to a new government bill to allow local authorities to stage motor sport events on closed public roads in the country.

The new rules will enable local authorities in the UK to suspend the Road Traffic Act, which currently requires an Act of Parliament. It is estimated that the move could help generate up to £40 million for local communities, which would be allowed to stage motor sport events including stage rallies, hillclimbs and speed trials.

Announcing the move Mr Cameron said: "We have a great tradition of motor sport and today we are bringing British motor racing back to British roads, to benefit local communities. As part of our long-term economic plan, we are backing our world-leading motor sport industry to support jobs, enhance skills and help us to build a more resilient economy."

The motor sport industry has estimated that there could be sufficient demand to hold up to 20 significant events on British roads each year. The UK currently hosts around 9,000 motor sport events annually, organised by Motor Sport Association and Auto Cycle Union member clubs, with the vast majority taking place at purpose-built venues or in rural off-road locations.

The legislation will feature in the Deregulation Bill, due to go to the Commons this autumn.

NEW UN GROUP TO TACKLE TRANSPORT

United Nations Secretary-General Ban Ki-moon has revealed details of an Advisory Group on Sustainable Transport that will work to provide recommendations on the subject at global, national and local level.

The group, established for three years, will work with governments, transport providers, businesses, financial institutions and other parties to promote sustainable transport systems and their integration into development strategies and policies.

Olof Persson, chief executive officer of the Volvo Group, and Carolina Tohá, Mayor of Santiago, Chile, will co-chair the group. Among the 10 other members are Viktor Kiryanov (left), Deputy Minister of Interior of the Russian Federation and Colonel General of Police, who is responsible for transport safety in that country. General Kiryanov is also president of the Russian Automobile Federation.

In a letter to group members Ban Ki-moon said: "I look forward to working with you to help fight poverty and climate change and contribute to future goals by advancing sustainable transport across the world."

The group will hold its first meeting this autumn and is expected to submit a progress report to the Secretary-General in the second half of 2015.

HYUNDAI FUEL CELL CAR SETS DISTANCE RECORD

Hyundai Motor's ix35 Fuel Cell vehicle has set a new distance record for a hydrogen-powered production car running on a single tank, covering 700 kilometres (435 miles) across three countries.

The ix35 Fuel Cell, the world's first mass-production fuel cell electric vehicle (FCEV), was driven between Oslo in Norway and Malmö in Sweden, via Gothenburg and Copenhagen in Denmark. The journey, conducted by independent Norwegian non-profit eco-pioneers Marius Bornstein and Arnt G Hartvig, took 10 hours to complete at an average speed of 76km/h (47mph).

The car used was in production-standard specification and exceeded its stated range of 594 kilometres, with the trip computer indicating nearly 10k of range still available at the journey's end.

Frank Meijer, head of FCEV at Hyundai Motor Europe, said: "The distance travelled by the ix35 Fuel Cell shows the viability and real-world benefits of hydrogen fuel cell technology – it's an electric vehicle with long-distance range. Hyundai is the first car maker to mass-produce fuel cell vehicles, and we continue to promote the growth of Europe's hydrogen refuelling network."

NEW BAHAMAS TRACK

The Bahamas government has unveiled plans for a $10 million 'world-class' motor sport venue to be developed in conjunction with the FIA in a bid to boost the country's sports tourism economy.

Minister of Youth, Sports and Culture Dr Daniel Johnson said the aim was to create a state-of-the-art venue that could be used all year round. The location of the new facility has yet to be finalised, although the aim is to host a 'major event' in 2016.

"We are committed to building a world-class track," said Dr Johnson. "It will be used for motorcycles, drag racing, big concerts, all sorts of things. A motor sports complex for the Bahamas."

Welcoming the news, FIA President Jean Todt said the Federation had "great ambitions for the country".

ACADEMY DRIVER OF 2014

South African Kelvin van der Linde has won the Driver of the Year award for the 2014 FIA Institute Young Driver Excellence Academy.

The 18-year-old, who races in the ADAC GT Masters championship, was presented with his trophy at the conclusion of the final Academy workshop held at Paul Ricard in France in July.

Van der Linde said: "The Academy will always have nothing but special memories in my heart. To everyone involved, from the coaches to my fellow drivers, I want to say thank you."

He impressed Academy members not only with his track speed but his enthusiasm to engage with the programme. He also showed a strong appreciation and understanding of key safety aspects.

As part of his prize, Academy performance managers Alex Wurz and Robert Reid (right) will assist Van der Linde in his career progression, ensuring he develops opportunities in the sport.

3D SIMULATION TO AID HONDA DESIGN

Honda is pioneering the use of 3D technology to help in crash simulation tests and car design.

The Japanese car maker has joined forces with American firm 3DXCITE to develop new 3D technology based on its DELTAGEN system. It takes the output from a commonly-used advanced simulation software package, known as LS DYNA CAE, and renders it in a three-dimensional presentation.

The technology, which was first designed for use in the animation and film industry, allows Honda engineers to more easily study the results of a crash simulation, test different design approaches and implement design changes with greater speed and efficiency.

Engineers can manipulate the rendering, rotate the view in any direction and strip away parts of the vehicle to isolate a section or component for more thorough analysis. The crash barrier can also be rendered transparent in a virtual environment so that the immediate effects of a crash can be viewed from any angle, including the driver's seat.

The new software (below) was co-developed by Honda R&D Americas Inc, the North American research and development arm of Honda, in conjunction with 3DXCITE.

"With this technology, we have gained the potential to improve the quality of decision-making and reduce the time required for finalising a vehicle design by greatly increasing the ease of communicating and understanding the results of a crash test simulation," said Eric DeHoff, technical leader for CAE in the Crash Safety Group of Honda R&D Americas, Inc. "This tool will promote a more complete understanding of vehicle safety design among all engineers involved in our vehicle development process."

A

B

PHOTOGRAPHY: DPPI

ACADEMY STARS EXCEL

FIA Institute Young Driver Excellence Academy graduates are making their presence felt in the world of international racing.

Former Academy member Gabby Chaves took second place in the final Indy Lights race at Sonoma, California, in August to win the 2014 title. "This is a dream come true, we've worked so hard for this," he said.

In the GP3 Series, Alex Lynn (above) took his third win of the year at Spa in Belgium in August to maintain his championship lead. The Red Bull Junior Team driver is in his first season of GP3 with the Carlin team.

One step up the ladder towards Formula One, Stoffel Vandoorne converted pole to a second-place finish in the first of two GP2 Series races at Spa. As AUTO went to press, the ART Grand Prix driver and Academy graduate was third in the standings.

And in the World Rally Championship, Andreas Mikkelsen scored his third podium of the year on Rallye Deutschland in August. The Volkswagen Motorsport II driver was third in the points behind works VW drivers Sébastien Ogier and Jari-Matti Latvala.

'GREEN' NISSAN PRAISE

Nissan has gained a place in an annual list of the world's greenest brands, moving up to fourth this year.

The Japanese car maker improved in Interbrand's Best Global Green Brands report, which cited its leadership in electric vehicles, ambitious EV infrastructure plan and support for government sustainability goals as key factors.

The report ranks companies based on their environmental practices and customers' perceptions of their eco-friendliness and social impact. Last year Nissan moved up 16 positions to crack the top 10 for the first time.

"More people want to buy products from brands they believe in," said Roel De Vries, Nissan corporate vice-president responsible for Global Marketing, Brand and Communications.

The Nissan Leaf (below) is the world's best-selling electric vehicle with more than 120,000 units sold since launch. Nissan unveiled its second all-electric vehicle, the e-NV200 commercial van, in June.

USAID SUPPORTS HELMET PROJECT IN CAMBODIA

The US Agency for International Development (USAID) is supporting an important new two-year project to increase motorcycle helmet use in Cambodia.

The non-profit organisation Asia Injury Prevention (AIP) Foundation has been awarded a grant by the Development Innovation Ventures (DIV) programme at USAID. The grant, which supports social impact and improved outcomes for sustainability and scale, will fund AIP Foundation's two-year project, 'Head Safe, Helmet On'. Additional financial and in-kind support is being contributed by the FIA Foundation, the UPS Foundation, the US Centers for Disease Control and Prevention, and the AIP Foundation.

The FIA Foundation's Road Safety Fund played an important advisory role in helping to secure the USAID funding.

AUTO ASKS

AS CAR MAKERS EXPLORE NEW TECHNOLOGIES, IS MOTOR SPORT STILL RELEVANT TO MOTORING?

Manufacturers are exploring an array of new technologies in the drive to produce ever-more environmentally-friendly vehicles. So does motor sport still have a strong influence on development?

The manufacturer

YOSHIAKI KINOSHITA

PRESIDENT, TOYOTA MOTORSPORT

I firmly believe that motor sport is relevant to motoring and I think we are proving that in the FIA World Endurance Championship (WEC) with our TS040 Hybrid car. The WEC rules encourage innovation, particularly relating to powertrain technology. It is probably the most open top-level racing series in the world in terms of the different technologies in use and this is very relevant to manufacturers.

Motor sport is a short-lead-time environment, which means new technology can be trialled in a competitive arena where its performance and endurance are tested to the limit without compromise. Unlike road car development loops, which take several years to move from concept to production, motor sport moves very quickly and we see the results of our developments within a few weeks or months of the first concept. This, combined with technical regulations which support innovation, is a valuable opportunity.

Our Toyota Racing entry in the WEC is not only a sporting challenge, it is a rolling test bench for research into advanced hybrid technologies. The engineers who develop the hybrid powertrain on the TS040 are not working in isolation: they are some of the same engineers, working in the same technical centre, who also contribute to hybrid road car development. The work we do on the track has a direct relevance to future Toyota road cars and we feed our experiences back into the Toyota R&D system on a daily basis.

Looking beyond the car itself, the advanced technology and processes we have at Toyota Motorsport GmbH in Cologne, which were built up because of our Formula One participation, are now active in developing and testing road car technologies for our parent company. These kinds of knowledge and technology transfer are very useful and a good example of why motor sport remains relevant to motoring.

The race team

BRUNO FAMIN

PEUGEOT SPORT DIRECTOR

Motoring development needs motor sport more than ever if it is to evolve in this fast-moving, ever-changing world. Yet while we welcome change, we also need continuity to benefit from the experience and skills of those we invest in.

Peugeot Sport was created by Jean Todt in 1980 to provide the business with success through continuity, and we've had successful participation since in many forms of motor sport, no doubt inspired by a Peugeot winning the first-ever recorded vehicle competition – the Paris-Rouen rally – 120 years ago. Our involvement allows us to develop brand-building project cars like the 208 T16 Pikes Peak and 2008 DKR vehicles, and the RCZ R and 208 GTi 30th – two products linked to motor sport developments for the public to enjoy.

The resources at our disposal are considerable, but inevitably require balancing with degrees of (cost) reality. But by exploring the technical possibilities great things are possible, with future production car efficiency in mind. A perfect illustration of this is the 208 FE (F for fun, E for efficiency) – a five-seater hatchback capable of accelerating to 100kph/62mph in eight seconds, yet which also achieves an amazing measured CO_2 output of just 46g/km.

Only a competitive environment produces the drive to succeed, so motor sport is imperative for product development. But we must be led in the right direction. History shows that many cul-de-sacs have been taken and the Internal Combustion Engine has so far won the race to keep ahead of alternative propulsion systems. The world is changing, threatened by multiple challenges (future fuel supply limitations, electric range and its safety, large hydrogen production costs, etc) and we have far-reaching activities in development, enhanced by what we've learned through success in competition.

The technical partner

ANDREAS SIGL

GLOBAL DIRECTOR, INFINITI FORMULA ONE

Is motor sport still relevant to motoring? More than ever if you look at Formula One. Downsizing to 1.6-litre engines, hybridisation and turbos are all relevant as these things have happened to road cars.

We hear drivers complaining about driveability and figuring out software or battery management issues, but these are issues that we have figured out with hundreds of thousands of road cars. So the relevance is there, but people are perhaps missing it.

We have always looked at our relationship with Red Bull as a two-way street. Some people criticised us, arguing there are too few similarities and that F1 is rocket science compared to road cars. But if you look at it more conceptually by asking where the exchange of information happens, then it is a two-way street. It happens on the people side, on processes and technology.

We have announced Sebastian Vettel as our Director of Performance. People say, 'That's just a marketing title, it's not doing anything', but we have spent almost a year with him, teaching him, showing him our facilities, our design centres, our technical centres... He has been driving our product, even our competitor's product, which means he is not making the comparison to an F1 car but to an Infiniti car or to another competitor's car. He is credible because he is very good at feeling the product and after a lap he knows what is wrong or what is good with the car.

Process-wise, we have given a lot of people tours to see the facilities of an F1 factory. You go to a team like Red Bull Racing with 400 engineers and say that's great, but we have the power of 90,000 engineers behind us in the Nissan Motors group. There are simulation tools, heat chambers and other impressive machines that we don't necessarily share, but we could and this is all on the process side.

On the technology side there is hybrid, battery storage and new materials we can work together on. Paddle-shift technology came from F1 to road cars, but we have developed them using lightweight magnesium, which F1 is not doing. So yes, we believe motor sport is relevant to motoring, but you need to look at it more holistically. ■

* Since this interview, Infiniti has appointed Tommaso Volpe as its new F1 Global Director. Andreas Sigl will move on to a new assignment within the Nissan Corporation

F1 technology transfer

INSIDE THE BOOMING TRANSFER MARKET

In the ever-changing world of Formula One, perhaps the biggest shift is in the growing transfer of team technology and expertise to other businesses, with varied and surprising results

TEXT: MATT YOUSON

If you were to imagine two less related activities, then the process of mapping a safe and timely path of an Airbus A380 carrying 500-plus passengers from touchdown to stand and turning on the TV on a tiny Scottish island would fit the bill. Both, though, have one thing in common – they rely on technology developed in Formula One.

Technology transfer and the world's top single-seater race series have been bedfellows since F1 began. But whereas the headline crossover has always focused on technologies carried across from race to road cars, F1 has in recent years expanded its horizons, applying its engineering prowess to a range of wider world solutions that are not only bringing much-needed finance to teams faced with a changing business model, but driving innovation in fields ranging from aviation to electricity generation. Talk to almost any F1 team and it will provide examples of its expertise or intellectual property delivering results far outside the expected sphere of operation.

"We've significantly increased our third-party business in the last few years – for us, it's an important pillar of the company," says Sauber team principal Monisha Kaltenborn. "We commercialise the know-how we create through Formula One and apply it in other areas. It has become a very important source of income."

Pressed for examples, Kaltenborn is coy, stating that Sauber's customers appreciate discretion. Other F1 teams are less reticent.

Williams has been involved in technology transfer for several decades but F1's move to hybrid technology was a catalyst for the company to formalise its non-F1 business. When Kinetic Energy Recover Systems (KERS) were introduced in 2009, the majority planned a system around battery storage. The rules, however, were deliberately left open to encourage alternative technologies and Williams developed a magnetically-loaded composite flywheel. Ultimately it never ran in a grand prix, but Williams' technology proved its worth for Porsche and Audi, with the latter's all-conquering R18 e-tron Quattro winning the last three Le Mans 24 Hours.

The intention with the flywheel, however, was always to create a commercial proposition and as such a new company, Williams Hybrid Power (WHP), was created. Based at the team's headquarters in Grove, Oxfordshire, WHP worked with various partners to develop flywheel technology for use in passenger cars and commercial vehicles. Earlier this year the technology reached a point where it was ready to be taken into production, and Williams sold the business to global engineering firm GKN for a cash payment plus future royalties.

This is only one strand of the business, though. Williams also researched possibilities for scaling up the flywheel for fixed applications. Now under the aegis of a new division, Williams Advanced Engineering, this continues to leverage the team's experience and facilities by developing flywheel technology for use with power grids. One project sees the composite flywheels – now weighing close to a tonne – built into the power network on the Scottish islands of Eigg and Fair Isle.

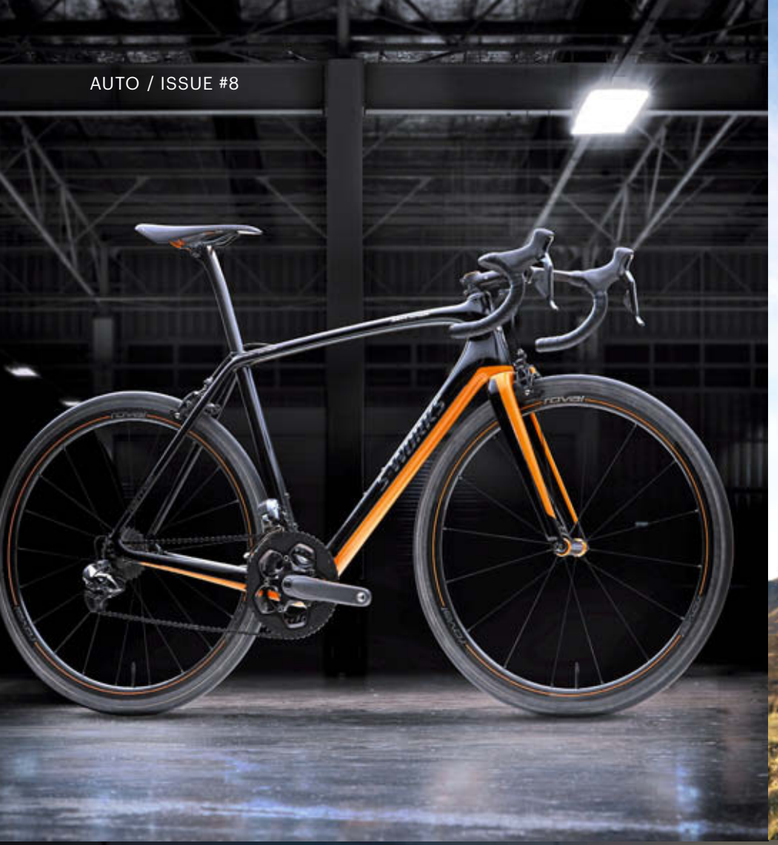
Early in the development of the flywheel, Williams identified that the technology had great potential as a network 'buffer' for alternative energy sources. Using solar energy in the hours of darkness is one such example, but of greater use, around the coasts of northern Europe, is the ability to smooth an uneven power supply – such as that provided by wind turbines in a blustery location – and supply the grid with regulated electricity of the type suitable for domestic consumption. Batteries can and do fulfil this role, but the physical properties of batteries make them unsuited to the variability, which greatly reduces their working life and efficiency. The electrically-charged, magnetically-loaded composite flywheel, however, thrives in such conditions.

The Isle of Eigg power network utilises various renewable sources including solar, hydro and wind power. It uses conventional lead-acid batteries to regulate power flow and store excess energy generated from the renewable systems, reducing the grid's reliance on diesel generators. Williams' flywheel system will now take on this role so the batteries can be used for their main job of long-term bulk energy storage.

Paul Newsome, chief technical officer at Williams Advanced Engineering, says: "Energy-efficient technologies are at the heart of Williams' diversification strategy and this project is a tangible example of how technology developed for F1 can have a direct relevance to people's lives. Finding ways to make renewable energy more efficient and reliable is increasingly important, particularly in remote locations."

Williams' and Sauber's third-party business represent much more than F1 teams looking to make a fast buck. Their projects are indicative of a new reality for the sport in which revenue from sponsorship has ceased to be the only game in town. The ban on cigarette advertising is frequently referenced as the catalyst for this change, but the stark reality is one of general malaise in sponsorship activity across the board. TV revenues have plugged some of the holes, but a flexible business model is equally important. ▶

From the world of F1 composites material experts have helped develop Hypetex – coloured carbon fibre – which has been eagerly embraced by designers.



Clockwise from top left: McLaren Applied Technologies used its expertise to help create the super-lightweight S-Works+ McLaren Venge racing bike; Williams' flywheel technology is being used to help smooth out the power supply on two small Scottish islands; McLaren is also working with NATS at Heathrow to develop a system to better control air traffic in the skies and on the ground.

McLaren was perhaps the first to recognise the potential of its assets. The road car division – McLaren Automotive – has been successfully utilising the team's F1 engineering skills since the late 1980s, but the group also contains the decade-old McLaren Applied Technologies (MAT) business, which takes the skills acquired in half a century of racing and applies them to non-automotive projects, using facilities at the McLaren Technology Centre and the skills of McLaren's staff.

"It's worth looking at what our ambition really is," says Geoff McGrath, McLaren Applied Technologies vice-president. "It's captured in our mission statement, which is: 'we exist to deliver breakthroughs in performance through the application of McLaren technology and design expertise.' That's deliberately stated because we don't simply sell intellectual property from racing. We sell full solutions that deliver high performance and we seek to work with customers to take them to new levels of achievement."

Arguably the most visible project completed by MAT is the creation of the S-Works+ McLaren Venge racing bike for American manufacturer Specialized. Enjoyed by amateurs and ridden professionally by world champion Mark Cavendish, McLaren's task was to take the (already lightweight) Venge racing bike and reduce the weight of the carbon frame and forks. It pulled together a list of design skills naturally associated with F1 chassis construction – namely expertise in lightweight, super-stiff, super-strong materials technology, aerodynamic design and carbon fibre fabrication – to build a frame 20 per cent lighter than the standard model.

It's a good example of F1 transferring knowledge and skills, but the link between a lightweight racing car and a lightweight racing bike is, perhaps, an obvious one. Better examples of the potential that exists for F1 teams to transfer their skills and technology come from some of the less tangible examples of McLaren's work.

A collaboration with the UK's NATS (National Air Traffic Services) organisation shows the more eclectic range of work taken on by F1 teams. NATS maintains air traffic control in the UK. It is also in charge of ground traffic control at London's Heathrow Airport – the busiest in Europe and the third busiest in the world. In an excellent example of lateral thinking, NATS and McLaren Applied Technologies have developed a system for managing traffic on the airport's runways, taxiways and aprons, based around McLaren software that visualises live race-tracking information and simplifies the decision-making process governing pit-stop strategy.

While perhaps not intuitively similar, the procedures do share parallels, with the aim for aircraft controllers being to find gaps in taxiway traffic in order to get planes onto and away from their stands. Sheer weight of traffic at Heathrow can make this difficult: with close to 1300 daily aircraft movements, managing that flow often proves difficult and sees aircraft stacked in the skies, waiting to land. NATS estimates the stacking procedure introduces an extra 600 tonnes of carbon into the atmosphere above London every day.

McLaren has mapped the ground routes at Heathrow and married that data to a graphically simple representation to allow ground traffic controllers to better visualise their airport in the same way strategists and engineers on the pitwall can assess traffic on a track.

"At peak times a plane lands every 40 seconds, so NATS spends a lot of time training its ground control staff to direct those planes to gates," explains McGrath. "They have a complex set of traffic lanes, and it's not obvious when a plane lands which gate it should be directed to in order to minimise traffic, queuing, or even allow the ground staff to get there in time to greet it.

"In a race when the safety car comes out we've anticipated the scenario, and in the same way we can anticipate a plane blocking a taxi lane, or what happens when flights arrive at the same time. Today it causes chaos, because everyone goes into reaction mode. The ground crew has to react to the situation it's presented with but we can give the crews tools that will help anticipate the scenarios they are going to face. It's an elegant solution.

> "WE DON'T SIMPLY SELL INTELLECTUAL PROPERTY FROM RACING, WE SELL FULL SOLUTIONS"
>
> GEOFF McGRATH, McLAREN

"The idea was to develop a tool that would help ground controllers not only to react when a plane lands, but anticipate the loads – in other words to look into the future and understand what should happen if a particular plane lands five minutes from now, or an hour from now. It's similar to racing where we're trying to simulate what could occur in the future based on what has happened in the past and what's happening in the present."

The spread of F1-derived know-how stretches beyond the purely practical, encompassing design-led products such as Hypetex, developed by UK company GPF One utilising the skills of a group of ex-F1 composites material experts. The idea is straightforward enough – coloured carbon fibre – but the material has until now stubbornly resisted the addition of workable, marketable colour. Seven years of research using F1 skills has solved the problem.

"The technology to make Hypetex stems from the world of F1 but its potential application is huge," says GPF One CEO Marc Cohen. "The aesthetic quality of Hypetex and the strength and lightness of the material makes it perfect for use in design."

The product has already been embraced by designers. The company is collaborating with leading furniture designer Michael Sodeau to create an exclusive lounge chair set for exhibition at London's designjunction fair this autumn.

There is a neatly virtuous circle to the operation of a technology transfer business attached to an F1 team. Reputation plus visibility on a global stage and an unusual set of engineering skills make the team an attractive partner; revenue from third-party work contributes to the team's funding, allowing it to enhance that reputation further – but there are other reasons why technology transfer has become an active rather than incidental aspect of F1 business.

Despite impressions to the contrary, F1 is becoming a leaner, more cost-conscious sport. Testing has been reduced, spare cars have been banned, windtunnel and CFD usage has been curtailed. While such measures reduce running costs, they also create problems of under-utilised facilities and staff. Expanding a tech transfer business allows teams to maximise their use of existing facilities while investing for the future. It also allows them to retain the skills and experience of a staff too large to be justified by racing alone.

Maximising the return from these facilities and people is a sound business plan because, while F1 looks like big business and has some of the best engineering facilities in the world, it is ultimately an industry of small-to-medium sized enterprises making tough choices on investment. The nature of F1 may be changing, but extracting the maximum from every available asset is a philosophy that resonates back to the foundation of the sport. ■

AUTO / ISSUE #8

Virtual reality racers

RACING OUT OF THE DIGITAL DOMAIN

Far from being a pastime for idle youth, computer gaming is now seen as an entry point into the real world of racing. The FIA is taking a lead in bringing racing to gamers through a partnership with the hugely successful Gran Turismo series

TEXT: JUSTIN HYNES

Spa-Francorchamps has been given the Gran Turismo treatment and is close to gaining FIA virtual homologation status.

Mid-July at Hockenheim and as is always the case during a grand prix weekend, it's the Formula One event dominating the headlines. As race day dawns, all the talk is of the fate of championship contenders Nico Rosberg and Mercedes team-mate Lewis Hamilton, with the German on pole and the Briton starting from 20th following a crash in qualifying.

But as anticipation for the main event builds, on track a small but very significant piece of racing history is being made. At just after 9.50am, in the weekend's second GP3 race, 22-year-old Jann Mardenborough crosses the line to take his first victory in the F1 feeder series.

On the surface the only thing notable about the statistic is the (these days) relatively advanced age of the winner. However, when you consider that until three years ago Mardenborough had never sat in a real racing car and had done all his racing at home on a games console, the scale of his achievement – he is the first gamer-turned-racer to win an international championship event – becomes clear.

Mardenborough, a graduate of Nissan's GT Academy programme, in which gamers battle it out for a career in real motor sport, is proof positive that technology has reached the point of crossover where racing skills can be honed in the virtual world and transferred to real-world competition.

In advance of Mardenborough's victory, the FIA, realising that a digital rubicon was being crossed, entered into a multi-year partnership with Polyphony Digital, the Japanese company behind the wildly successful Gran Turismo racing game.

The partnership has a two-fold aim, firstly to promote motor sport safety to competitors, even in the virtual world, and secondly to encourage young people to get involved in motor sport.

Thus, late last year motor sport's governing body began the process of homologating circuits within Gran Turismo, bringing the game's tracks into line with the FIA's safety guidelines. Silverstone, Suzuka, Brands Hatch and Australia's Bathurst (home of the 1000km V8 Supercars race) were the first to meet the FIA's standards.

"The aim was to look at the circuits they have digitised as if they are real circuits," explains Jacques Berger, head of the FIA's Safety Department. "When we went to Japan we went through all the circuits they have built and checked all the details – track width, the size of the run-off areas, the kind of debris fencing used, the kerbs etc.

"We found a number of tracks that corresponded very closely to the real circuits, right down to the position of the spectators, the TECPRO barriers and the tyre walls. There were six circuits that corresponded to the criteria we wanted to see and four were homologated. Spa-Francorchamps and Le Mans, which in the game is called Le Sarthe, will be next but they still need a small amount of work."

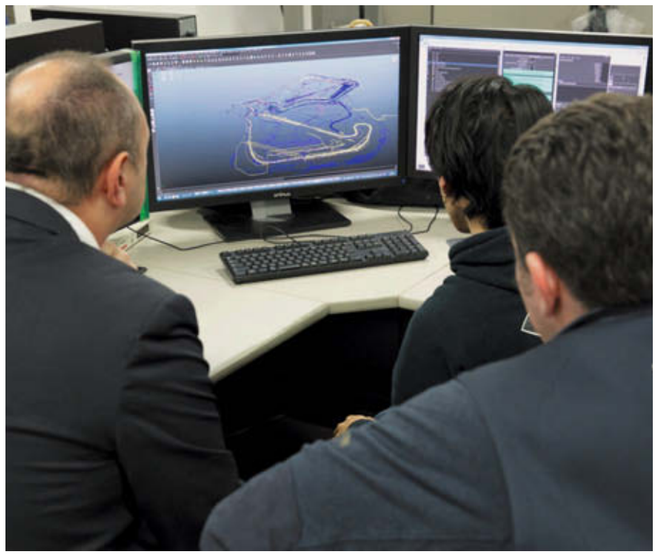
The process of homologation involved initial correlation work by Polyphony on data provided by the FIA, as the game's creator Kazunori Yamauchi explains.

"The FIA had model data that acted as a reference and it was compared with the Gran Turismo tracks to see whether they were accurately represented, as well as checking the design of the run-off areas, the shape of the kerbs and position of the tyre barriers to make sure the FIA's general safety standards were fulfilled."

The last step was for members of the FIA Safety Department to travel to Japan to perform final checks. For Berger, the lengths gone to by the Japanese company to correctly model the facilities were impressive.

"They are using very impressive, very complex methods to digitize the circuits," he says. "They use photos from

Suzuka is one of Gran Turismo's FIA-approved circuits. Below: Polyphony and FIA staff study data on Silverstone; the gaming partnership was announced at the FIA Sports Conference Week at Munich in June, attended by Emerson Fittipaldi, FIA President Jean Todt and Gran Turismo creator Kazunori Yamauchi.



"NOW WE CAN BUILD NEW IMAGINARY CIRCUITS THAT WILL FULFILL THE FIA'S SAFETY STANDARDS"

KAZUNORI YAMAUCHI, GRAN TURISMO CREATOR

helicopters, GPS, Differential GPS and laser scans to build a 3D circuit. It is the kind of technology F1 teams usually use with their simulators."

For Yamauchi, a racer himself, the process provided an insight into why circuits are designed as they are.

"In recreating a real circuit we take an immense amount of photographs and survey data to produce a precise representation of the tracks. But we didn't know the reason for the shape of the run-off areas, or things like why the kerbs are shaped a certain way and the regulations behind it," he says. "Through this communication with the FIA we were able to understand everything about the safety standards behind these elements, and I think now if we design new imaginary permanent circuits we can build tracks that will fulfill the FIA's safety standards."

For Berger, that is the next logical step. "That would be very interesting," he says. "Take that one step further and it could be possible for new Formula One circuits to be created in the game and then we could virtually drive those circuits and decide, for example, that the run-off areas needed to be larger or plan modifications.

"Currently, when we receive plans for any circuit, we develop simulations to cope with that," he adds. "We have our own software which simulates accidents, losing control of the car, etc. With this we calculate the size of the run-off areas, the number of tyres in a tyre wall, etc. We then say to the designer to build what we recommend. However, the next step would be to put a virtual car on that circuit and run that."

For the moment the FIA will promote circuit safety by in-game grading of tracks, with warnings being displayed as to a vehicle's suitability or otherwise for particular circuits.

"We will look at circuits and for example say, 'Okay, this circuit is not suitable for Formula One because the run-off areas are not suitable, the barriers are not right'," says Berger. "We will put a small asterisk saying 'the FIA does not recommend you to play on this circuit with the following types of car'. There will be grades of circuits in ▶

the game. Of course, in the virtual world, they will not be forbidden from using these cars on the circuit, but the message will be clear."

And just as with real-life tracks, homologation will cover a three-year period. "We will include the homologation date," says Berger. "So if we homologated the Fuji circuit in 2013, the next homologation is set for 2016, so there will be a photo of the circuit in 2013. If there is a big change we could modify the drawing but normally the homologation is for three years."

The safety message is just one facet of the FIA's collaboration with Polyphony, however. In recognising the need to reach new generations of potential motor sport competitors, the FIA and the game company are planning the launch of an online FIA Gran Turismo championship aimed at attracting more young people to motor sport.

Launching the concept, FIA President Jean Todt said that the online championship is an example of the federation's commitment "to find new ways to continue to make motor sport more accessible to millions of fans that share a passion for racing".

Yamauchi confirms that the championship is not designed to be a driver discovery programme, but rather a means of making motor sport accessible to as many people as possible, through accurate simulations.

"My expectations for this are simple, and that is to have as many users as possible learn about motor sport, the fun of driving cars and about safe driving," he says. "It is not a driver discovery programme, but I think it will open people's eyes to motor sport, and perhaps out of these people there will be users who will start aiming for major championships."

This was the case for Mardenborough. The Briton's interest in motor sport began with trips to his local kart circuit as a child, but when that facility shut its doors so too did the door close on Mardenborough's racing ambitions – until he took on the challenge of Nissan's GT Academy, which invites gamers to pit their skills against each other in pursuit of the chance to become a real-world racer, mentored by the car manufacturer.

Mardenborough is a firm believer that gaming has now reached a level of realism that makes it an entry point for youngsters.

"It's a jump [to move from gaming to real racing], but it's not as big a jump as I thought getting into a car at Pembury [circuit in Wales] for my first-ever race. I was thinking, 'What's this going to be like?' And then I did it and it felt quite normal.

"There is a link between gaming and the way the cars react, how they pitch and yaw, how the throttle feels, the steering and brake input. In terms of those things and the balance of the cars, it's all quite accurately presented in the game. So when I was on a circuit in a real car for the first time it was quite eye-opening for me because it felt very natural."

Mardenborough does admit, however, that deficiencies remain in console racing.

"One thing that was different is the fact you have to use your eyes a lot more in the real thing," he says. "I had a 30-inch television screen so my eyes were constantly fixed on the screen and I never really looked to the side at all, but at Silverstone entering Brooklands corner I was looking at the kerb in front of me and the instructors noticed that straight away. That took a while to tune out of your head.

"Also, the physicality of the cars is something completely different," he adds. "It is violent. All these forces were new to me. I expected it, having watched racing on television and seen how violent it was, but it was still a shock. But the physicality – the noise and smells and the raw sensation of it – is just amazing."

Darren Cox, global head of brand, marketing and sales at Nissan's racing arm, Nismo, says the success of Mardenborough and the programme's other finds such as Le Mans and Blancpain Endurance Series driver Mark Shulzhitskiy, is proof that the gulf between simulated and real racing has been bridged.

"I knew we'd find good racing drivers," he says. "There's this theory about athletes needing 10,000 hours of perfect practice to reach elite status; that if you put in those hours you can become very good at a chosen discipline. In traditional motor sport drivers have done that through karting and the lower formulae, but that is hugely expensive and not available to everyone. The guys we are finding have still done 10,000 hours, but they've done it in the digital world and all they then need to do is hone those skills in a slightly different environment. This is the beauty of it; their skills are transferable.

"We thought that the great differentiator would be fitness, physical as well as mental strength and focus," he adds. "However, the guys that have become good all genuinely wanted to be professional sportsmen. They don't want to be a gamer who tries real driving, they want to make this into a career and they will do everything they can towards [achieving] that goal."

For Cox, the future shape of real-world motor racing is certain – grids featuring a number of drivers who got their racing start in gaming. "The more people we have enter the programme, the more countries we open up to, the better the drivers we find will be. In 15 years time, if you haven't got four or five drivers in F1 that started in gaming, I'll be very surprised."

Berger agrees, saying the potential for the FIA online championship to cultivate new generations of racing drivers and fans is "very exciting".

"The FIA's online championship is an exciting possibility," he says. "We know that it will be difficult to build due to the computing power necessary. But the possibility is there. Yes, everything is possible." ■

Top left: the Bathurst track in Gran Turismo, complete with tyre tracks. Above right: Jann Mardenborough is a race-winning graduate of the Nissan GT Academy. Above: Kazunori Kamauchi hopes the new FIA Gran Turismo Championship will make motor sport "accessible to millions".

SPECIAL REPORT

ROUTES TO ROAD SAFETY

AUTO examines how the rising number of road fatalities and injuries is being tackled around the world, from the highest level of politics to the grassroots and with help from motor sport's biggest stars

GLOBAL DRIVE FOR SAFETY

The launch of the UN Decade of Action for Road Safety was the result of a global advocacy effort involving the FIA and FIA Foundation, alongside other leading groups such as the WHO and the World Bank. Now they are working together to ensure the goals are met worldwide

TEXT: MARC CUTLER

Global problems require global solutions. This is why the world's leading health and development organisations came together to tackle the pandemic that causes 1.3 million deaths on the roads every year.
The FIA, World Bank and World Health Organisation were major players in a movement that led to UN Secretary-General Ban Ki-moon and world leaders pledging to take action on this global public health issue with a Decade of Action for Road Safety.

Launched in 2011, the Decade was a pivotal moment in the battle to push road safety to the top of the agenda of states and organisations that had until then not given the issue due regard.

However, this success wasn't sudden. It was a significant milestone in a process that began in earnest more than half a decade earlier, in 2004, when the World Bank partnered with the World Health Organisation (WHO) to launch the World Report on Road Traffic Injury Prevention, which demonstrated how great the problem had become, especially in developing countries.

Etienne Krug, Director of WHO's Department of Violence and Injury Prevention, admits that prior to then road safety "didn't get the political attention such a large amount of death and injury would usually receive. We are not yet where we want to be, but action is being taken".

It was perceived by many in the international development community to be only a national problem, not appropriate for wider coordinated support. In addition, the absence of transport-related targets from the Millennium Development Goals (MDGs), which were established following the Millennium Summit of the UN in 2000, meant road traffic injuries were eclipsed by other equally pressing threats such as tuberculosis, malaria and HIV/AIDS. ▶

The first-ever Global Ministerial Conference in Moscow in 2009 was key to bringing about the UN Decade of Action for Road Safety.

The World Report, and the WHO's World Health Day dedicated to road safety in 2004, both supported by the FIA Foundation, kick-started a growing recognition that not only was road safety a significant global problem, but that its toll in developing countries was spiralling.

"That started some deep international political thinking around road safety, which for decades had been thought of as a national issue," says Krug.

At the same time, the FIA and FIA Foundation were campaigning for road safety to be put on the UN agenda, a major goal of the Foundation's Make Roads Safe initiative. The activism led to an agreement by the UN General Assembly to hold the first-ever global ministerial conference on road safety in Moscow.

Once the ministerial was confirmed, senior figures across a strong coalition of organisations were determined that the event would be both meaningful and lead to tangible change. Together with the WHO and the World Bank, the Russian Federation and other governments – including the US, Sweden, Brazil and Oman – a working group was formed. After a series of meetings, it wrote a draft resolution for Moscow, endorsing the proposal – first made by the FIA Foundation-coordinated Commission for Global Road Safety – for a Decade of Action.

Central to the proposal would be the target, in the run up to 2020, of first stabilising and then reducing the forecast increase in road deaths by 50 per cent.

The idea for a Decade of Action was based on models of other successful Decade campaigns. In particular, the working group looked at the Decade to Roll Back Malaria of 2001-2010, which had also been approved by the UN and had been successful in motivating political leaders and in securing financial resources.

The Global Ministerial Conference in Moscow in 2009 was key to bringing about the UN Decade of Action.

"We managed to get representatives from over 120 countries to attend and we had over 1500 people there," says Krug. "That really was an event that had never happened before in this field, so it put the issue on a much higher political level. We also had Ministers for Transport attending along with Ministers for Health, so it covered a number of different areas. It showed that this was an issue that needed to be tackled."

Following the Ministerial Conference, and in the context of continued campaigning, the Russian government led the diplomatic effort to get the resolution through the UN General Assembly, where the Decade of Action was finally proclaimed in March 2010.

ACTION STATIONS

The process since the Decade launched has been about concerted action to advance the cause. The World Bank and WHO have played a leading role, supported by campaigns spearheaded by the FIA Foundation, the FIA and its member clubs, and many non-governmental organisations.

FIA Foundation Director General Saul Billingsley says: "Securing the Decade of Action was a significant advance. But now the challenge is to take this UN resolution and translate it into tangible and sustained action that saves lives. This requires a higher level of commitment and attention from governments than just signing on to a UN pledge, and not all are yet willing to deliver. Yet with the Decade we have a powerful platform to encourage, persuade and demonstrate the many successes that are being achieved."

The World Bank is also focused on supporting governments and in particular helping to develop their road safety capacity by advising on lead agencies and casualty reduction strategies.

"This has meant creating scalable projects that bring together relevant sectors such as transport, health, enforcement, education and non-governmental organisations," says Pierre Guislain, the World Bank's Senior Director for Transport and Information & Communications Technology (ICT) Global Practice. An example is the bank's engagement with Argentina to strengthen its national crash data collection system, which led to the creation of a larger road safety observatory for the Latin America region.

The World Bank works closely with the FIA to raise country-level awareness at regional events of national auto clubs, which attract senior government officials. "All these efforts are important contributions towards improving road safety around the world, and show that collaboration between the private and public sectors are critical to achieving greater impact," says Guislain.

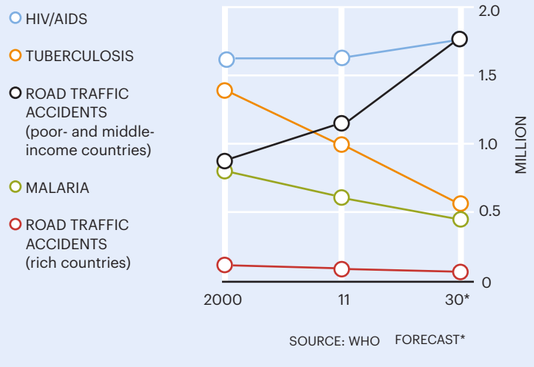
Since 2008, the World Bank's transport business strategy has been to provide "Safe, Clean and Affordable Transport for Development".

"Developing countries should not suffer the same 30-year wait it took developed countries to effectively manage road safety," says Guislain. "They can and should leapfrog that process, saving lives and resources."

In India, which is the leading contributor of road deaths in the world, the World Bank's lending projects have focused on a multi-sectorial approach that targets improving road safety performance. Support is not limited to infrastructure but also focuses on other aspects of the safety agenda that are as relevant and meet specific demands from the Government of India. ▶

A CLEAR PROBLEM

Global deaths by selected cause



Schoolchildren take part in a Decade of Action for Road Safety campaign – one of many run worldwide since the UN backed the scheme in 2010.

"DEVELOPING COUNTRIES SHOULDN'T SUFFER THE SAME 30-YEAR WAIT IT TOOK DEVELOPED COUNTRIES TO EFFECTIVELY MANAGE ROAD SAFETY"

PIERRE GUISLAIN, WORLD BANK

The recently-approved National Highway project seeks to improve 1100km of highways, which will add safety engineering measures and build capacity at state and central levels in road safety management. Moreover, in Kerala, Tamil Nadu, Karnataka and Gujarat, a special effort is being made to engage the traffic police, state transport departments and emergency response counterparts through the design and implementation of result-based interventions on specific high-risk corridors. This serves to link infrastructure impacts with awareness-raising, and enforcement measures with post-crash response. The International Road Assessment Programme (iRAP), an infrastructure safety initiative originally designed by FIA clubs and supported by the Foundation, is an integral part of this strategy.

In conjunction, the FIA has been working closely with the Inter-American Development Bank since 2010, hosting high-level forums on road safety involving national government leaders.

IDB has invested in infrastructure projects in countries such as Jamaica, Argentina, Paraguay and Guyana with positive results. In Guyana, for instance, it helped to improve infrastructure and modernise transport regulations through the creation of a National Road Safety Council, which called on the participation of the government and civil society representatives.

"All of the countries that have successfully reduced road accident-related deaths have done so by adopting comprehensive road safety plans," says IDB President Luis Alberto Moreno. "Many countries are following these same footsteps and will see similar results over the next few years."

CAUSE AND EFFECT

So how effective has this strategy been so far? The WHO's 2013 Global Status report showed many high-income countries and regions, particularly in the EU, had managed to reduce the number of deaths on their roads. However, 90 per cent of road deaths still happen in low- and middle-income countries, and here progress is uneven or non-existent. Moreover, many road fatalities are not reported in developing countries, which severely undermines the reliability of global road death estimates. This is why the World Bank is partnering with organisations like the International Road Traffic Accident Database (IRTAD) to bring a standardised reporting method to countries. To help further, the World Bank continues to lobby politically to provoke action.

"Our advocacy for road safety plays out at global level through the World Bank-led Global Road Safety Facility (GRSF) and our support to and engagement in the Decade of Action, as well as our collaboration with other partners, and at country level through our analytical work and lending operations," says Guislain. "Proactive measures on road safety are a non-negotiable part of our support to low- and middle-income countries. Our teams work closely with ministries of transport, health, finance, road agencies and other local partners to raise road safety as a priority on their own agendas."

The World Bank currently has active road safety projects in 54 countries, and between 2008 and 2013 its road safety lending increased by 352 per cent (US$43 million in 2008 to US$194m in 2013).

"The real challenge is ensuring the discussion about road safety at country level is translated into action," says Guislain. "Many developing countries are just starting to see a major rise in motorisation, which will mean greater numbers of deaths and injuries unless action is taken. For example, we support the Global New Car Assessment Program to initiate a rating system for the safety of vehicles produced and imported by developing countries."

Through its Global Road Safety Facility, which receives money from key donors including the FIA Foundation, Bloomberg Philanthropies and governments, the World Bank is committed to continuing and intensifying its support to developing countries facing a rapid increase in vehicle use and urban density, in the design and implementation of policies and programmes that protect vulnerable road users while promoting much-needed growth.

Another core partner in the global battle is the United Nations Economic Commission for Europe (UNECE), which hosts the only permanent intergovernmental body dedicated to road safety in the world. The World Forum for Harmonization of Vehicle Regulations defines all safety standards for cars worldwide, from brakes and ABS, to child seats and crash tests. The FIA and the International Organization of Motor Vehicle Manufacturers have for decades provided fundamental contributions to the work of the World Forum. More recently, the International Telecommunication Union joined the World Forum to discuss new technologies such as autonomous vehicles.

"Coordination with all partners is key if we want to succeed in bringing down significantly the number of dead an injured on the roads," says Christian Friis Bach, Executive Secretary of the UNECE.

The World Forum meets four times a year in Geneva bringing together the world's main players in the motor industry. Together, these countries develop globally accepted norms that allow cars to be sold worldwide, under certain conditions, and result in billions of dollars of savings. These norms permanently increase the safety of cars, trucks, coaches and motorbikes and reduce their environmental impact via ever more stringent limits for the emission of pollutants.

The FIA Foundation and the Global New Car Assessment Programme participate in the work of the World Forum, helping to encourage the introduction of safer vehicles on the market by influencing consumer demand.

UN Secretary-General Ban Ki-moon with Michael Bloomberg of Bloomberg Philanthropies, a major supporter of the road safety drive with a $125m investment.

MONEY MATTERS

Private sector donors also have a major role to play. The FIA Foundation's Road Safety Fund, which is managed in conjunction with WHO, encourages companies to invest in road safety in developing countries. A number of major global companies, including Allianz, Bosch Johnson & Johnson and UPS, have responded to the call.

But real change will require major philanthropies and other donors to get involved. Bloomberg Philanthropies, the foundation of former New York City Mayor Michael Bloomberg, is the first significant public health philanthropy to invest serious money – more than $125 million over five years – in supporting road safety programmes. The focus is firmly on encouraging actions proven to save lives, like enforcement of seat belts, motorcycle helmets and speed limits, safer car design, a focus on safe road infrastructure and support for non-motorised and safe public transport.

"With the funding at our disposal," says Billingsley, "the FIA Foundation can play a catalytic role in testing, developing and supporting innovative solutions, like iRAP and Global NCAP, and the Safe Schools work we are initiating, and then encourage larger donors to help governments to take them to scale. Through an annual €1.5m grant to the FIA we are also helping to build road safety capacity in automobile clubs across the world."

As the next step, the global road safety community is pushing for road safety to be recognised as part of the UN's post-2015 Sustainable Development Goals, an agreement of the UN Conference on Sustainable Development held in Rio in June 2012 to develop a set of future international development goals. The previous Millenium Development Goals demonstrated the importance of being on the UN agenda, particularly in helping to mobilise attention and resources.

"Important progress on the post-2015 agenda has been made," says Billingsley. "Together with our partners we have formed a strong coalition advocating for a target in the new Goals to halve road traffic deaths and injuries. The WHO has endorsed the target, the World Bank is also supportive, and Jean Todt and the FIA have played an integral role in building support at national and international levels. The next few months of negotiations at the UN are critical and we must keep up the pressure."

Working hand in hand, these organisations are leading the global battle to improve road safety. Between them, they offer the strongest platform yet for this battle to succeed.

As FIA President Jean Todt puts it: "We can work on it independently but our message is so much stronger if we work together." ■

BANKING ON PROGRESS

The FIA has put road safety on the global agenda, says Luis Alberto Moreno, President of the Inter-American Development Bank

How did the Inter-American Development Bank start working with the FIA?
It was mainly due to the great leadership of President Jean Todt along with Michelle Yeoh. We started collaborating on road safety about four or five years ago and we believe that by working under the umbrella of the FIA's leadership we can combine both the automotive industry with society and the private sector. We can therefore bring everybody together with a great purpose, which is basically to reduce the numbers of injuries and deaths that are caused by a lack of road safety.
Every year in Latin America more than 100,000 people die and over 5 million are injured because of poor road safety. That is a very big number, similar to 200 Boeing 747's crashing each year. It is a huge issue but it is something that, thanks to the work of the FIA, has really been put on the map.

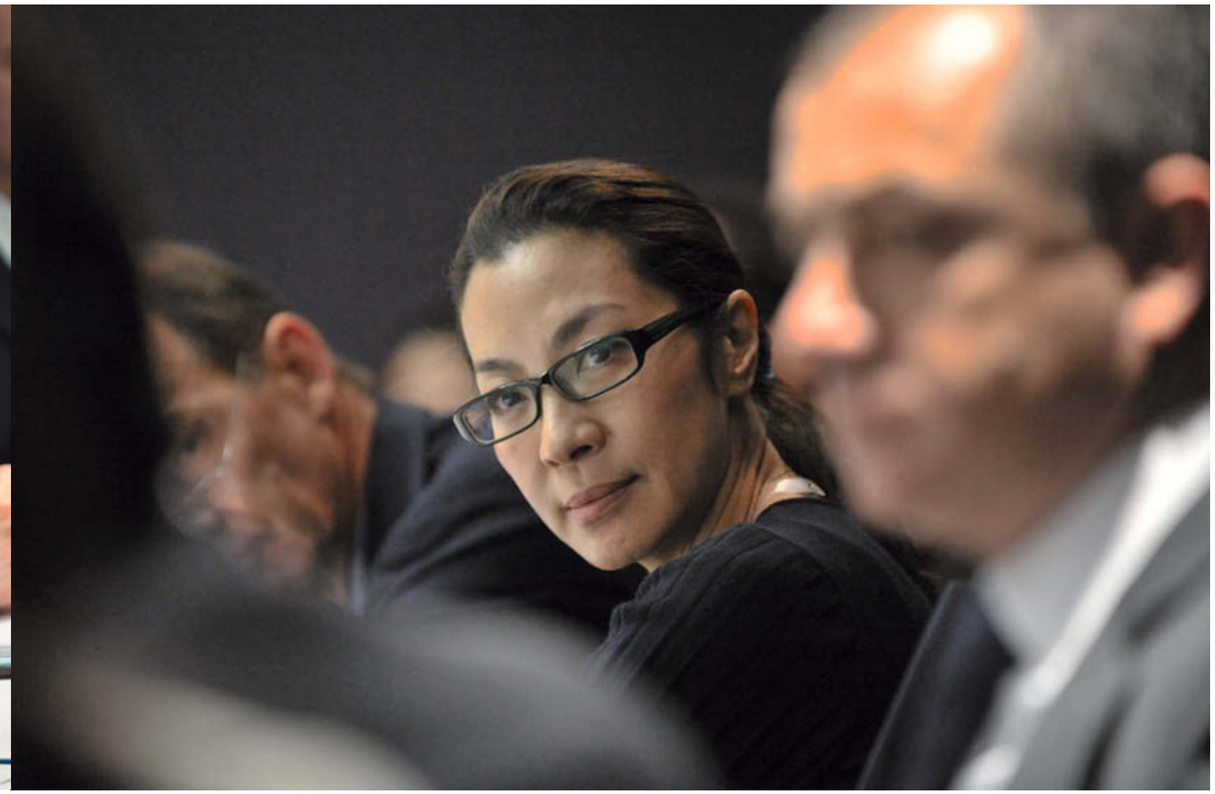
Before the FIA took on this issue, was there less attention given to road safety?
I think there wasn't a coherent or holistic approach to road safety before. Global NCAP standards have had a huge impact in standardising car designs and helping root out older, unsafe designs. There is no question that the FIA and FIA Foundation have helped move the issue forward.

What are the main issues facing the road safety community in your region?
I think the most important thing is to raise awareness. We want to really encourage governments, auto manufacturers and stakeholders to take action. We run an annual forum on road safety in conjunction with the FIA. The first one was held in Brazil, the second in Argentina and we held the last one in the Dominican Republic in August. These regional forums are very important in talking to those three sets of stakeholders and having them propose concrete solutions on road safety.

How is the Inter-American Development Bank involved with that work?
As the financier that we are, we do a lot of lending to the 26 governments in Latin America that we serve. In those countries, our main activity involves construction and being involved with the discussion around road building and road safety. Equally, we support Latin NCAP and the improvement of safety features in cars sold in Latin America. We make public those results and this helps to hold the industry accountable.

We are almost halfway through the UN's Decade of Action, what developments do you expect to see in the second half?
It is critical to continue working on the five pillars that form the Decade of Action. Of course we are continuing our work in other areas but the more projects that we can finance that focus on improving road safety, the better.

Do you think the UN will include road safety in its Sustainable Development Goals?
I sincerely hope they do because it would be a great opportunity. But if it doesn't happen, the job that the FIA has done will be even more important and we will certainly continue to work together.



A SHARED DUTY TO SAFETY

FIA President Jean Todt and his partner, Michelle Yeoh, have been at the forefront of the global campaign to improve road safety. However, while victories have been won, both agree there are many battles still to be fought

TEXT: EDWARD ADAMS

Every year almost 1.3 million lives are lost on the world's roads and 50 million more are injured. The FIA and sister organisation the FIA Foundation have been campaigning to raise the profile of road safety on the international political agenda as a leading health and development challenge and to mobilise action on the ground to tackle the growing crisis. AUTO speaks with the federation's President, Jean Todt, and his partner, actress Michelle Yeoh, who have been to the forefront of activism.

Q: Welcome Jean and Michelle. So where did this joint fight for road safety begin?
Jean Todt: As you know, my life has been devoted to motor sport. It's my passion. But it's one which has not always been easy. When I first got involved in the sport the risks were far greater. We didn't have the same safety standards we have today. I lost many friends. In this way, I was always exposed to the battle to save lives and the need to make driving safer.

My career has given me a lot and I felt it was time to give something back. This was one of the reasons I was involved in the setting up of ICM in Paris (L'Institut du Cerveau et de la Moelle Épinière), which I am proud to say is today one of the top institutes devoted to medical research for brain and spinal cord disorders. For the same reason I've been interested in getting more involved in road safety. When I discovered the scale of the challenge and the tragic impact it has on so many lives every day I was shocked. When I was still at Ferrari I convinced my friend Michael Schumacher and my partner to help in campaigning. Once I was elected as President of the FIA I made it a top priority for the federation.

FIA President Jean Todt and Michelle Yeoh, a Global Road Safety Ambassador, have both spoken at the highest political level in their efforts to reduce the growing number of road fatalities worldwide.

You know, it's a cause that is often ignored but the numbers killed in road accidents in poor and middle-income countries now outstrips deaths caused by tuberculosis and malaria, and will soon outstrip HIV. And in many parts of the world the problem is getting worse.

Q: What about you Michelle? How did you get involved?
Michelle Yeoh: As Jean said, it was at his suggestion that I first got involved in the work being carried out by the FIA Foundation as Global Road Safety Ambassador for the Make Roads Safe campaign. The more I learned about the crisis – and it is a crisis – the more I was appalled by the numbers. Every six seconds someone dies on the world's roads. Since we started this interview that's already five fatalities at least. Each day it's 3,400 lost – that's like 10 planes crashes per day. You need to make the figures real so that people to understand what's going on.

Each and every accident is a terrible tragedy for every family and loved one involved. And yet, as Jean said, most people are still not aware of the scale of the problem we face. We also shouldn't forget that it's not only a personal tragedy and that road accidents also have a major economic and developmental impact. Can you imagine that road safety costs developing countries as much as all the development aid they receive every year? That's about $100bn a year in total.

Q: How would you characterise the severity of problem?
MY: At the very highest level. 1.3 million people die every year as a result of road accidents and this number is expected to rise to 2.4 million by 2030 if nothing changes. The international community needs to take responsibility and devote the resources necessary to tackle road safety effectively before the crisis gets any worse.
JT: As more and more cars arrive on the world's roads, the challenge only gets bigger. Today we have 1 billion vehicles in use. In the next 10-15 years we will have 2 billion. We know that emerging and developing countries are the worst affected. With only half the world's cars they account for 90 per cent of global fatalities. We cannot let this continue. We have a responsibility to take action now.

Q: What can you tell me about what you've seen personally in those countries around the world where the roads are particularly unsafe?
MY: Jean and I have been fortunate to be able to travel worldwide and standards vary hugely. In many developing countries there is a real lack of effective legislation concerning the major risk factors of speed, drink-driving, helmet use, seat-belt use, and child restraints. And when they do have legislation in place it's often not enforced. This can be down to a lack of resources or corruption. ▶

Q: Why do you think is road safety not treated with the same urgency as epidemics such as AIDS, tuberculosis or malaria?
JT: For me, there are a number of reasons for this. It can be that governments are simply unaware of the scale of the problem and the impact it has, both in human and economic terms. Others may feel reforms will be too difficult to introduce and then there is sometimes also a political fear that introducing measures will be very unpopular. But that view is wrong. In those countries that have taken a lead on road safety, political leadership has proven to be not only popular, it's also been very effective. Europe is an excellent example, where fatality rates have dropped by 50 per cent over the last decade. In Argentina the numbers have dropped 20 per cent in recent years.

Q: Do we know what it takes to succeed in this struggle?
MY: Unlike epidemics where we are waiting for a vaccine, we know what needs to be done to improve road safety. We have made great progress in developed countries over the last decades. How was it achieved? Better road safety institutions, adopting good laws and enforcing them, training and education drivers, improving car safety standards, building safer infrastructure, and improving post-crash care after an accident occurs. This knowledge has been used as the basis of the 'safe system' approach promoted through the Decade of Action.
JT: It is an approach that has already delivered tangible results. Argentina is a prime example of how a government working in partnership with external agencies such as the WHO and the World Bank can achieve something remarkable. In 2008 Argentina created a National Road Safety Agency to work alongside a regional observatory that monitors policies, campaigns and results. Over the past few years it has reduced fatalities by more than 20 per cent. It is a fantastic example of what can be achieved.

Q: So would you say that governments are now taking the problem more seriously?
JT: There are two sides to the story. In the developed world it has been taken very seriously. Look at France: 30 years ago, 18,000 died on its roads. Today the fatality rate is around 3,250. So the challenge now is focused more on developing and emerging countries. And here there is a big difference in performance within this group. As we've said, a country like Argentina has made rapid progress., but far too many others are still ignoring the challenge.

Q: Who have been the champions, and who is not doing enough?
MY: The launch of the UN Decade of Action for Road Safety in 2011 was a great achievement, which everyone in the road safety community worked for. For the first time road safety received the attention it deserves. But as we approach 2015 and the mid-point of the Decade we need to renew our efforts and make sure governments meet their commitments. There will be a Ministerial Summit in Brazil next year to see what has been achieved and what needs still to be done.

Also, next year, governments will agree new goals to replace the UN Millennium Development Goals of 2010. Five years ago, road safety wasn't included. Making sure it is included in the new Sustainable Development Goals for the post-2015 period is really important.

Q: What is behind the FIA's Action for Road Safety campaign? Can you explain more about that?
JT: The campaign was set up in 2011 to support the Decade of Action and is centred on three pillars. The first is advocacy at the highest level. The second is action by our 236 clubs in 141 countries on the ground – representing over 80 million members in total – and the third is building new institutional and private partnerships aimed at improving road safety. Using the full reach of our worldwide network we are doing all we can to make a real difference.

In many cases governments are simply not aware of the impact of the problem, but once they understand the need, things can happen quickly. In Gabon a few years ago a passionate discussion with the President on the country's pedestrian safety problem led to a very ambitious project to build 100 footbridges in areas where pedestrians are most at risk. I have visited all of the 145 countries in which our clubs are present and have always promoted the Decade of Action in meetings with Heads of State, Ministers, and transport representatives.

Q: How are the FIA automobile clubs involved?
JT: It's important to understand that our motoring clubs have traditionally been leading voices for road safety in their respective countries. But they're not only a voice. They are also vital protagonists on the ground. Our clubs carry out training, awareness raising, consumer testing, and other actions around the world every day. In many cases it is our clubs who are the driving force convincing authorities to act. They have a real impact. Through the FIA's grant programme, supported by the FIA Foundation, over 90 projects in over 50 countries have been carried out in the past three years.

Q: Isn't road safety just a national problem?
MY: It's true that many saw it that way before. People thought it was just a problem concerning drivers and that the response was up to national governments alone. That view has been changing. Increasingly, road safety is recognised as the global health and development crisis that it is – thanks largely to the work of the UN, the World Bank, and other international organisations along with the FIA and FIA Foundation. Giving road safety the place and priority it deserves on the global political agenda means much greater mobilisation of action and much greater resources for the cause.

Q: Is it difficult to raise funds for the cause?
JT: We know funding is falling short for the second half of the Decade. More has to be done to engage bilateral donors, philanthropies and the private sector. We need to find innovative ways to raise financing. One idea being discussed in the road safety community is the creation of a fund based on a marginal contribution on sales related to the automotive industry. That could mean one dollar of every car sold going towards the fund. The contribution would be almost invisible to the consumer. It could also be extended to other car-related products such as accessories or insurance. With 75 million cars sold every year we could raise hundreds of millions of dollars for the cause.

Q: Is the private sector interested in getting involved?
JT: Private companies are getting more involved, both out of economic interest and a social responsibility to take action on one of the worst crises of our times. In recent years we have built strong partnerships with leading companies to increase our efforts and to make sure our message is heard globally. With Michelin, for example, we launched a global campaign to promote 10 simple rules for safer driving around the world, asking drivers to slow down, wear a seatbelt, and respect others on the road.

Yeoh with UN Secretary-General Ban Ki-moon. Right: F1 stars join Todt and Yeoh to promote the FIA's Action for Road Safety; the couple are focused on future action to cut road deaths.

Q: You were talking about car safety, how can we encourage car manufacturers to improve standards?
JT: The provision of vehicles meeting the highest safety standards is crucial to saving lives. Just look at Europe where Euro NCAP has proved to be a very effective way of improving vehicle safety.

The challenge is in low and middle-income nations, where car use is growing exponentially. It's important that similar pressure exists in those regions and that consumers have access to safe vehicles. Assessment programmes are being set up around the world and highlighting poor models. A New Car Assessment Programme for Southeast Asia (ASEAN NCAP) has completed two phases of testing 25 popular models in the region's market and there is more to come.

Q: The FIA is the governing body of motor sport. Do you see any contradiction between campaigning for road safety and promoting motor racing?
JT: I spent a life in motor racing. Every day at the track you are made aware of the risks on the road. And you do all you can to minimise the risks. We have had very important advances in motor sport safety over the past three decades. We haven't had a driver fatality in Formula One in 20 years now and we are working continuously to improve on that performance.

Even if the numbers have fallen dramatically, too many still die in accidents related to motor sport each year. The motor sport community has a vital role to play to use its voice and experience to pass on the message to fans and the public that safety can never be considered a luxury.

Racing is for the track, never the road. Whether it is promoting new life saving technologies, or safer driving on the road, the motor sport community can be an important and very visible voice for safety.

Q: Finally, how is it to be a high-profile partnership fighting for this cause?
JT: As we have become more involved, campaigning for road safety has become a kind of moral duty for Michelle and I. We have a shared commitment to do whatever we can – no matter how small – to help save lives.

This is why we have made the choice to use the visibility our careers have given to us to reach out to people who can make a difference, at the service of this cause.
MY: It is a privilege to be able to share such an important engagement with the person you love. It gives you even more strength, faith and courage.

The only way to keep the issue at the top of the world's agenda is to make it clear that the world wants action. Unless all of us act, unless we all raise our voices and demand action then this crisis will keep growing. From the world stage to the streets on which we walk, ride and drive every day, we all need to do all we can to make sure the road safety struggle gets the priority it deserves. ■

THE ROAD TO VISION ZERO

How do you design a city to be safe for pedestrians and road users? You aim for perfection

TEXT: DAVID THORPE

Claes Tingvall had a vision. In 1997, sitting at his desk in an office in Stockholm and looking at traffic fatality statistics, he suddenly thought: "What if nobody ever had to die in an auto accident?"

A crazy idea? Yet sometimes it takes one person to question what everybody else accepts – that it's not okay for 1.2 million people around the world to die every year on the roads (twice as many as die of malaria).

Tingvall went on to found Vision Zero, an initiative that aims to achieve a highway system with low to no fatalities or serious injuries. He has been able to put his ideas into practice as the director of Traffic Road Safety at the Swedish National Road Administration in Stockholm. And in April, New York City became the first American city to adopt his Vision Zero policy.

Now Tingvall is looking to bring his vision to other cities across the world. Despite the high number of deaths and injuries on roads globally, only seven per cent of the world's population in 28 countries had comprehensive laws in place in 2013 on the five key risk factors: reducing speed, drink-driving, seat belts, motorcycle helmet use and child restraint use.

So why does Tingvall think this 'slow massacre' doesn't attract more outrage? He puts it down to "a culture of blaming the victim because they did something wrong and of not taking responsibility". His response? To use economic arguments to show that it is worth investing more in traffic safety and to appeal to ethics. "In other man-machine systems we arrange it that even the most vulnerable are protected," he says. "So why not traffic systems?"

In the beginning, people laughed at him, "or indeed were very upset and frightened. Many people said it was impossible, but they were only looking at the figure zero. You probably can't get to zero deaths but you might get to within a 90 per cent reduction."

Nowadays there is an ISO standard for road safety, a UN Decade of Action for Road Safety 2011-2020, and 43 of the European states have a 'towards-zero' ambition. Clearly there is momentum in this campaign.

Many of the gains in Sweden were made by creating "a more forgiving way of designing roads and intersections", as Tingvall puts it, and with good management of speed cameras and traffic calming, together with divided narrow roads. As a result deaths dropped by over 70 per cent in five years.

FROM NEW YORK TO THE DEVELOPING WORLD

Sweden is one thing; New York is something else. Still, under its new mayor Bill de Blasio, New York City has declared that it "must no longer regard traffic crashes as mere 'accidents', but rather as preventable incidents that can be systematically addressed. No level of fatality on city streets is inevitable or acceptable".

Its Vision Zero Action Plan has the aim of "ending traffic deaths and injuries on our streets". The city has asked for feedback from citizens on problems at particular intersections. Since launching an online map in April where people were asked to note things like whether there was sufficient time to cross a road, poor visibility, speeding, or a failure to yield to pedestrians, there have been more than 7500 comments about dangerous streets.

While it should be relatively easy for America to move towards Vision Zero, 90 per cent of traffic fatalities occur in low- and middle-income countries, and of those, 70 per cent involve vulnerable users of the road – pedestrians, cyclists and motorcyclists.

Peruvian Claudia Adriazola-Steil shares Tingvall's vision. When working for the government of Peru she designed the country's first road safety policy. Now she is responsible for rolling out similar policies across the world as the Health and Road Safety Program director for EMBARQ, the Center for Sustainable Transport and Urban Development at the World Resources Institute in New York City.

EMBARQ's Health and Road Safety team assists cities, particularly emerging megacities, in their urban planning by recommending street designs that calm traffic, reducing block sizes, and finding ways to encourage walking and cycling. Adriazola-Steil says: "Focusing on traffic safety leads to multiple wins: cities can improve air quality, increase the opportunities for physical activity, reduce stress and alleviate inequalities. Shifting the method of transport to high-quality, sustainable options is a significant part of the puzzle in making roads safer, but other tactics are necessary too." ▶

Like Mexico, Colombia has a Bus Rapid Transit (BRT) system in Bogota. The TransMilenio BRT, with its dedicated lane, is a transit reorganisation scheme for a city in the developing world. In addition to improvements in emissions and travel times, the first TransMilenio corridor has helped to halve traffic fatalities on Avenida Caracas, avoiding an estimated 200 deaths during its first nine years of operation.

Chief among these modes is cycling, which is gaining in popularity almost everywhere. "For cyclists we need to provide infrastructure, cycle lanes, segregated in certain circumstances," she says. "Cycling brings a lot of benefits because cyclists are happier, will make fewer hospital visits and take fewer days off work."

She adds that as well as shifting to sustainable transport, encouraging high-density development is instrumental in reducing the number of traffic injuries. Together with mixed land use it means that people need to take fewer trips, effectively reducing risk. Using World Bank data, she points to a direct correlation between traffic fatalities and vehicle miles travelled. The message is clear: in order to continue to reduce the number of traffic fatalities, we need to reduce the number of vehicle miles travelled.

Some may believe that there are countries with a culture of aggressive driving, which might make them harder to tackle. Adriazola-Steil sees it differently: "If you have a city like Lima you can be stuck in traffic for two or three hours, which makes you reluctant to stop at a traffic light or a stop sign because you are in despair. Maybe the city is not functioning any more. To solve this you must think how people live in the city and find ways to move facilities such as hospitals closer to where people need them to cut down the need for long journeys. You have to look at the entire system."

Claes Tingvall founded Vision Zero in a bid to eliminate road traffic fatalities and injuries.

Having led Peru's first road safety policy, Claudia Adriazola-Steil works on similar schemes globally.

She believes the same approach is valid for tackling dangerous motorcycling. "It's very sad that in countries like Brazil and India you get a lot of young motorcyclists who die in traffic accidents or suffer severe injuries that leave them disabled for life," she says. "Again, we need to look at what is happening behind all this. If distances are too big to cycle or walk then they must take their motorbike. A lot of countries are making a mistake in providing subsidies for motorbikes. They are too cheap. The disadvantages of motorbikes are huge and these are not factored into these decisions."

FEWER RULES?

Speed is a big factor in traffic safety. "If you allow cars to go as fast as they can and if you have cyclists and pedestrians in the same area you will have more accidents," Adriazola-Steil states. "If you cut down the speed people are allowed to travel at they become more aware of other road users. Unfortunately, some cities – when they develop roads – do not think clearly about how pedestrians are going to use an area."

To tackle this, in some places – counter-intuitively – they even take away all the road signs, having slowed down the traffic. By doing this you force people to negotiate between themselves how they are going to navigate the shared space. "Humans actually function better in a social environment than in a regulated environment," says Tingvall. "When we understand that we need to negotiate we can become more clever and more aware of what is going on, and we become more dynamic. It has been tried in Sweden and we do it really well. Some older people get really upset and they want rules, but the point is rules are unnecessary. The only rule should be that you don't want to crash with anyone else."

Adriazola-Steil is a passionate advocate of Bus Rapid Transit services (BRT), which aims to combine the capacity and speed of light rail or metro systems with the flexibility, lower cost and simplicity of a bus system. "Mexico City has four BRT lanes and they are building a fifth," she explains. "BRT is expanding to other cities in Mexico and around the world, with many representatives coming to Mexico City to see what is happening there." Rio de Janeiro, Istanbul and Bangalore are among the 160 cities that have already implemented BRT systems.

Another persuasive factor of BRT is that besides saving lives, with sustainable transport "you can also move more people. For example, in a lane that can carry 1000 people you can carry many more thousands using buses for the same amount of road. This will cut congestion and increase mobility as well as traffic safety".

AFFORDABLE INVESTMENT

Many cities can't afford the investment in infrastructure needed to implement sustainable transport policies. What is the solution? "It's not always about spending a lot of money but about changing attitudes and priorities," says Tingvall. "The question really for any city is whether it can survive without going in that direction. In parts of South America and Asia they are more radical than in America or Europe. The World Bank as a lender in the past has been a disaster but nowadays it's not going to finance building a major road through a city without thinking really seriously about it. Instead they think more about sustainability and liveability."

He agrees that bulldozing roads is happening a lot still in African cities, but puts this down to old-fashioned consultants and planners who need to change their old ideas and be retrained or replaced.

As cities and countries incrementally approach Vision Zero, putting a stop to the few remaining injuries and fatalities requires lateral thinking. In Sweden, the focus has shifted to making road and pavement surfaces softer.

"Human beings weren't designed to walk on stones and concrete, so sometimes a fall from standing can do a great deal of damage and even cause death," says Tingvall. "This is insane. We are researching new, softer types of surface that can help to minimise injury."

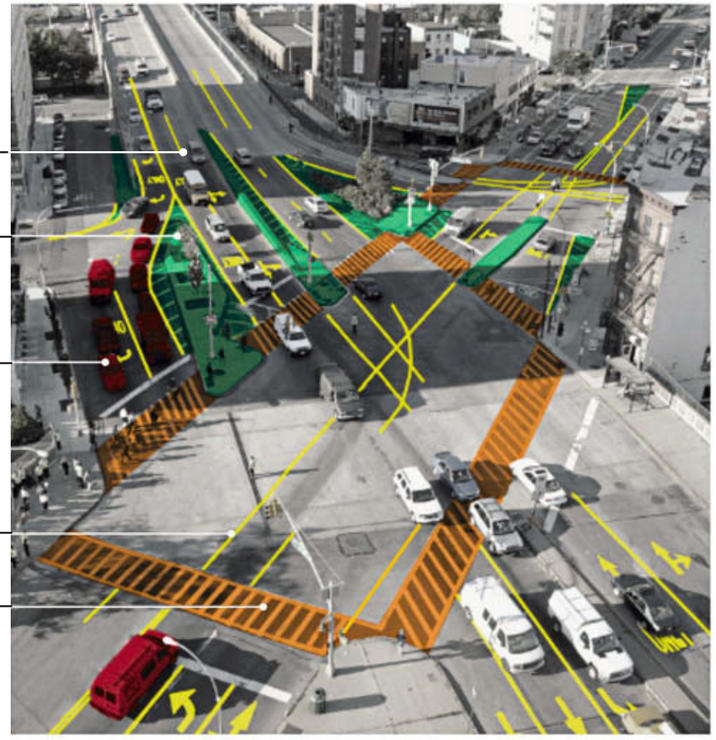
Adriazola-Steil adds: "Mobility is very important but not at the cost of health, your life and quality of life." In the future, perhaps people will consider our time as a period of barbarism akin to the age of slavery, for believing that the death of 1.3 million people per year is a reasonable price to pay for allowing the remaining population to drive from A to B. ■

TRAFFIC CALMING

A mix of new high-visibility crosswalks, reduced crossing distances, turn restrictions, leading pedestrian intervals, extended medians and clearer lane designations has eliminated 63 per cent of all injury crashes at one New York City intersection.

BEFORE

AFTER



ELIMINATE MOVEMENTS
Reduce number of movements entering a complicated intersection.

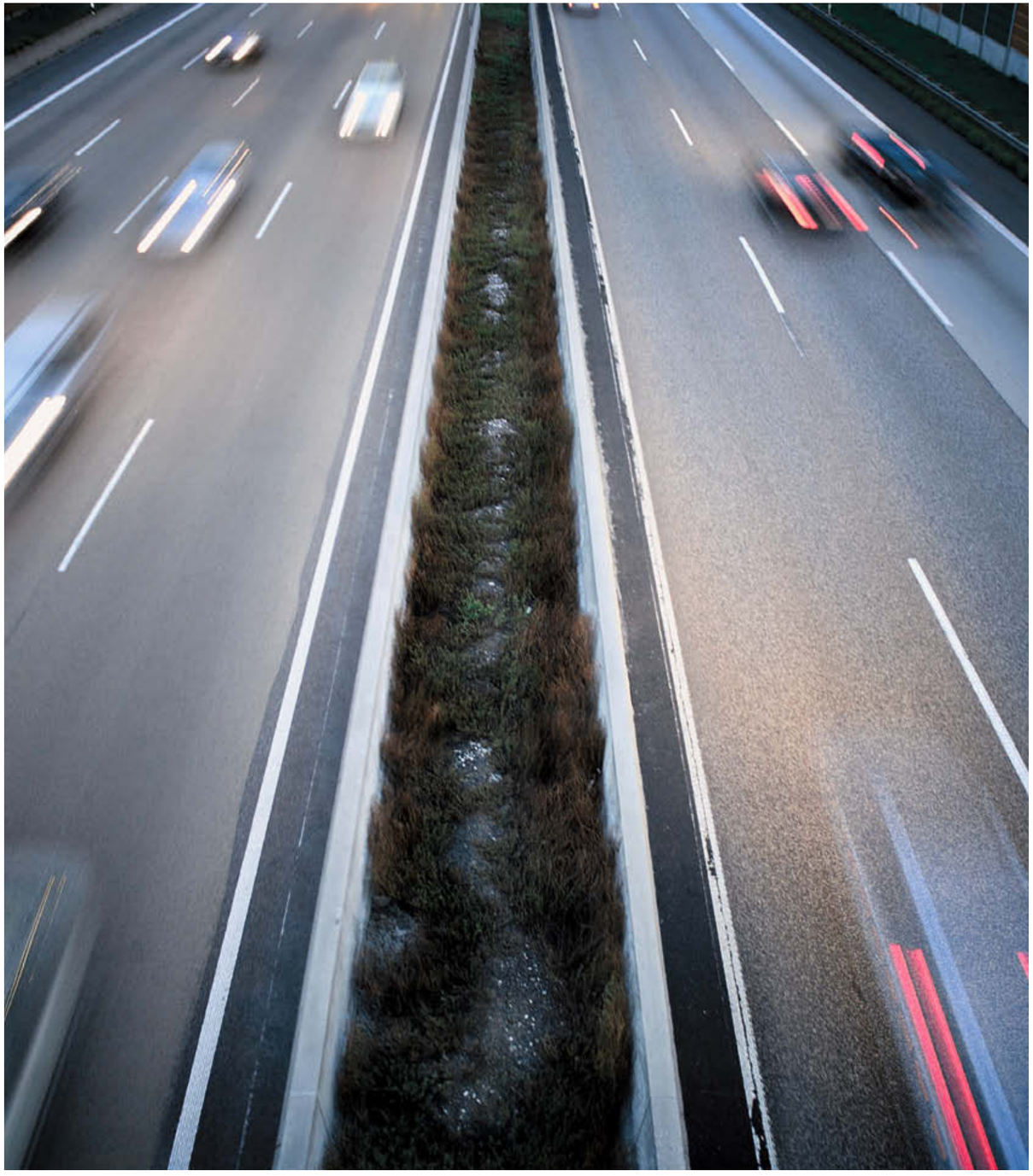
EXTEND MEDIANS
Lengthen/widen existing medians to tighten up intersection.

DELAYED TURNING
Allow through vehicles to move while holding turning vehicles, giving pedestrians a head start or a conflict-free crossing.

LANE DESIGNATION
Clarify who belongs where.

CROSSWALKS
New signals allow pedestrians to cross. Add crosswalks where pedestrians want to cross.

PHOTOGRAPHY: ISTOCK



PILLARS OF SAFETY WISDOM

The UN Decade of Action on Road Safety calls for a safe system approach to reducing road deaths, focusing on five key areas. AUTO looks at how this is being put into practice globally

TEXT: GEMMA BRIGGS

When the UN Decade of Action for Road Safety launched in May 2011, agencies and governments from all continents became united in their efforts to reduce the appallingly high level of road traffic deaths – over 3,000 a day around the world.

The aim is bold: to stabilise and reduce the forecasted level of global road fatalities. Action is required at all levels to tackle the crisis, but how are these road safety activities structured? From the World Health Organisation to the United Nations Road Safety Collaboration (a global collective of governments, NGOs international agenicies and concerned organisations, including the FIA), a wide range of stakeholders created a Plan of Action, the framework of which came from the 'safe system' approach.

The system acknowledges that human error does happen, that the human body is vulnerable and that traffic accidents cannot be completely avoided. Road users, vehicles and the road network are addressed in an integrated manner, with greater attention paid to speed management and vehicle and road design over more traditional road safety approaches.

The concept shifts the focus of responsibility away from road users to those who design the road transport system itself with the goal of ensuring that accidents do not result in serious injury. The Decade of Action sets out the importance of ownership at national and local level, with countries encouraged to carry out activities based on five pillars: road safety management, safer roads and mobility, safer vehicles, safer road users and post-crash response. One third of the way through the decade, huge strides have been made, with key projects around the world delivering solid reductions in traffic fatalities. So how are agencies and governments successfully implementing the five pillars? ▶

The Safe System Approach

To support the goals of the UN Decade of Action for Road Safety, the United Nations Road Safety Collaboration has developed a Global Plan identifying key capacity building and injury prevention measures in each of five categories or 'pillars'. These are:

1. Road Safety Management: strengthening institutional and operational capacity to achieve national road safety objectives; supporting stronger governance and policing.

2. Safer Roads and Mobility: improving the planning, design, construction and operation of road networks to ensure safety for all users; encouraging investment in sustainable modes of transport.

3. Safer Vehicles: promoting crashworthiness and providing consumers with good safety information; accelerating the introduction and use of proven safety technologies.

4. Safe Road Users: putting vulnerable road users first; tackling drink driving; promoting seat belt and helmet use; enforcing speed limits, improving driver training.

5. Post-Crash Response: improving emergency response and trauma care; supporting the care and rehabilitation of road injury victims; providing advice, support and legal redress for crash victims and their families.

Road fatalities have been recduced by 20 per cent in Argentina since it established a National Road Safety Agency. Left: Michelle Yeoh with OISEVI president Felipe Rodriguez.

PILLAR ONE – ROAD SAFETY MANAGEMENT

Ensuring that a country puts in a place a safe transport network is a starting point for reducing fatalities, and provides the basis for creating regional safety measures.

According to proposals laid out under the safe system, the first step in developing a safer network is to assess the problem and the existing capacity for road traffic injury prevention in a country. This would be followed by the preparation of a national road safety strategy. Once a strategy has been approved, the next step would be to put in place financial and human resources to address the issue and to implement actions to prevent road crashes and to evaluate the impact of these actions.

The effective development of this kind of safety management requires many different agencies to work together including government, domestic and international agencies, multi-lateral banks, NGOs, as well as the private sector. Co-ordinating the input of each is no easy task and the system recommends the formation of a lead agency to spearhead the programmes.

In Argentina, this has been managed to such an outstanding effect. There, the creation of effective safety management systems has been achieved through the creation of the National Road Safety Agency, the ANSV. When it was formed, in 2008, around 5,700 people died annually on the country's roads, with a further 95,000 injured. The World Bank – which has strongly supported the ANSV's work – estimated that by 2020, if no action was taken, Argentina's fatality rate would soar to 10 times that of European countries with best road safety practice.

"In 2008, by special request of the President, a National Road Safety Strategic Plan was developed," explains Felipe Rodriguez, president of the Ibero-American Road Safety Observatory (OISEVI). "This plan encouraged the Minister of Interior and Transportation, Florencio Randazzo, to send a project to the National Congress addressing road safety as a state policy. This lead to the creation of the National Road Safety Agency."

Rodriguez says that the alliance with organisations such as World Bank, Inter-American Development Bank (IDB) and the Corporación Andina de Fomento (CAF) has led to a successful twinning agreement with Spain's DGT (Dirección General de Tráfico). "This twinning agreement helped the ANSV obtain a wide range of experiences that were replicated locally," he says. "Furthermore, organisations like International Road Traffic and Accident Database (IRTAD) and the FIA, among others, have supported the agency."

Since the ANSV's creation, a broad range of policies have been put in place, which over the space of two years helped to save 490 lives. "We have created the National Road Safety Observatory," says Rodriguez. "Our National Enforcement Plan focuses on speeding, drink-driving, helmet usage, seat belt usage and distractive factors, and there is also a National Road Safety Education Plan."

Work by the observatory shows that there has been a 50 per cent decrease in drink-driving rates, a 43 per cent increase in seat belt use,a 19.5 per cent increase in the use of helmets and a 50 per cent decrease in traffic fatalities in selected corridors. Despite these impressive statistics, Rodriguez says the hard work will continue.

"Road safety in Argentina will be focused on the integration of road safety at all levels, with the target on vulnerable users," he says. "It is mandatory that we start working on road safety for motorcycles, as figures provided by the National Road Safety Observatory indicate that deaths related to motorcycles have been increasing for the last two years." There can be no doubt that the ANSV will tackle this challenge with as much determination and success as it has already shown.

PILLAR TWO – SAFER ROADS AND MOBILITY

Raising the safety of road networks is a huge challenge, not least in developing nations where a rapid growth in mobility can leave old infrastructure lagging behind. The UN Decade of Action aims to improve the protective quality of road networks by promoting safety-conscious planning, design, construction and operation of roads.

Rob McInerney is chief executive of iRap, the International Road Assessment Programme, which receives funding from the FIA Foundation and works in partnership with governments and non-governmental organisations to inspect high-risk roads and to develop star ratings and safer road investment plans. He says that in many cases the likelihood of death and injury is built into our road designs and that head-on accidents, run-off road accidents, intersection accidents and pedestrian and cyclist accidents can all be avoided via safer road design. Analysis of iRAP results (2013) in seven countries covering approximately 60,000km of road showed the percentages of fatalities saved as: 92 per cent of pedestrian, 49 per cent of pedestrian crossing, 52 per cent of bicycle, 61 per cent of run-off, 46 per cent of head-on and 21 per cent of intersection.

China is one country to have successfully introduced its own RAP, with the team winning iRAP's Star Performer Award for 2014. The initiative began with the signing of a partnership agreement between iRAP and the Chinese Ministry of Transport (Research Institute of Highways) in 2008.

The local team, headed by Tiejun Zhang and supported by Greg Smith from iRAP, has been building the ChinaRAP programme with the support of the Chinese government, World Bank Global Road Safety Facility, Bloomberg Philanthropies, FIA Foundation and the Road Safety Fund.

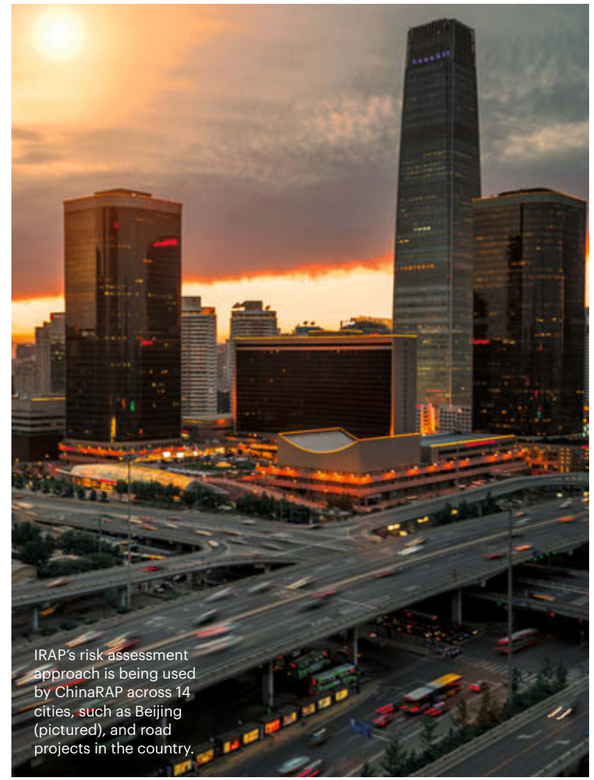
"Building on the success of iRAP globally the local programme has included investment in research, models, survey equipment and software to provide a holistic national approach that captures Chinese practice and experience," says Zhang.

With Ministerial support, the risk assessment approach is now being used across 14 city and highway projects in China, helping to shape development bank projects worth more than CNY 9 billion (US$1.5 billion). Some examples include the World Bank-financed Yunnan Honghe Prefecture Urban Transport Project, where the team assessed city roads and made recommendations for safety improvements such as footpaths, speed limit reclassification and bicycle lanes. In Shaanxi, the team is working closely with designers to lift safety star ratings on almost 1000km of roads as part of the Asian Development Bank-financed Shaanxi Mountains Road Safety Demonstration Project.

"It's a huge country, the scale is unbelievable," says McInerney. "For China, there is certainly lots of development and lots of investment in road infrastructure with the rapid urbanisation of its cities. ChinaRAP is having some really good results. We are sharing our technology and approach – the best of research worldwide is helping good road investment decisions in China – but it is their programme." ▶

"THE SCALE IS UNBELIEVABLE, BUT CHINA IS GETTING SOME GOOD RESULTS."

ROB McINERNEY, IRAP



IRAP's risk assessment approach is being used by ChinaRAP across 14 cities, such as Beijing (pictured), and road projects in the country.

PILLAR THREE – SAFER VEHICLES

Two of the major challenges of the Decade of Action are to bring vehicle safety technologies to developing markets and to harmonise vehicle regulations worldwide.

This process has most notably achieved results in Europe, where Euro NCAP, set up in 1997, has achieved huge success in improving the safety of cars through an increasingly stringent system of tests and star-ratings applied to new vehicles. In 2011 the decision was taken to broaden the initiative and Global NCAP was born.

One such new NCAP is that of the Association of South East Asian Nations, created in December 2011. It has crash tested 31 models across all vehicle categories, with 17 of the 20 most popular car makers in the ASEAN region covered, along with 50 per cent of total car volumes. From a regional lists of top 30 cars in 2012, their work has covered 70 per cent of vehicles.

Khairil Anwar Abu Kassim, ASEAN NCAP secretary-general, says this has banished the myth that safe cars are expensive, and that safety has become the trendsetter for automotive industry in the region. "The safety culture has been injected into manufacturing philosophy," he says. "Although some ASEAN countries don't have crash regulations, ASEAN NCAP has been their baseline in making safer cars. For instance, although it is not written, Japanese makers won't tolerate vehicle safety level lower than four stars. Finally, safety wins over accessories."

Moving forward, the ASEAN scheme is looking towards reducing fatalities among motorcyclists. "Crash avoidance technology is the next thing," says Abu Kassim, "but we are currently focusing on technology that would lessen motorcyclist fatality. We are appreciating higher-end technology such as Autonomous Emergency Braking (AEB) as long as it is able to detect motorcyclists. We also encourage manufacturers to start with systems such as the Blind Spot Indicator or Lane Watch from Honda." Abu Kassim adds that through its creation of a technical and communication platform for each NCAP to benefit from, Global NCAP "has been vital in creating the paradigm shift of vehicle safety in developing countries".

Even comparatively safe Western European countries still need to work on enforcement issues to improve road safety. "Road safety continues to be in a state of crisis – statistics show there was no overall progress between 2007 and 2010," says Eva Molnar, director of the United Nations Economic Commission for Europe (UNECE) Transport Division. The body provides the UN conventions on road safety to ensure that rules are in place to protect road users and there are some 58 transport-related international legal instruments.

"These instruments cover many aspects of road safety including traffic rules, road signs and signals, the transportation of dangerous goods, the construction and technical inspection of vehicles, and driving times and rest periods for professional drivers," adds Molnar. "The more countries adhere to these legal instruments, the safer roads will become. Our goal is to achieve full global adherence to all UN road safety legal instruments so that the legal and regulatory framework essential for fighting the road safety crisis is in place all over the world."

The Tata Nano received zero stars for adult occupant protection and child protection in the first-ever Indian NCAP tests

Left: The AIP Foundation is working to promote helmet usage, with school-based education taking place in Cambodia.

PHOTOGRAPHY: ISTOCK

PILLAR FOUR – SAFER ROAD USERS

While much of the focus of the safe system approach is aimed at those involved in the design of road transport networks, improving road user behaviour remains a key goal. The Road Safety Collaboration's Plan of Action recommends that this is achieved through a focus on pedestrian and cyclist safety, making drink driving and the use of excessive speed socially unacceptable, improving driver training and promoting the use of seat belts and crash helmets.

The last of these is the focus of the Gobal Helmet Vaccine initiative (GHVI), led by the Asia Injury Prevention Foundation (AIP). Motorcycles are the vehicle of choice in many developing countries and in an accident helmets are proven to reduce the risk of death by 42 per cent and serious injury by 69 per cent. Now operating in Vietnam, Cambodia, Thailand, Uganda and Tanzania, the GHVI combines public awareness, global and legislative advocacy, research and helmet production.

In Vietnam, where the project originated, motorcycles make up 95 per cent of registered vehicles and in many cases are the sole family vehicle in a household. Measures have included the creation of tropical helmets, which saw the AIP Foundation work alongside the Ministry of Science and Technology to revise the Vietnamese helmet standard and then facilitate the opening of the Protec factory to produce them. Another key development was the establishment of the Vietnam Helmet Wearing Coalition (VHWC) to support public education.

A further major element was a credible commitment to enforce the law in order to alter people's behaviour. Public awareness campaigns were run alongside this in order to persuade people to alter their behaviour.

"The result has been an outstanding success," says Mirjam Sidik, CEO of the AIP Foundation. "The AIP Foundation and its partners are committed to ensuring this change is lasting, by continuing to support school-based education for children, many of whom unfortunately are still not yet wearing helmets."

PILLAR FIVE – POST-CRASH RESPONSE

At the heart of the safe system lies the acknowledgment that road traffic accidents cannot be eradicated, and so post-crash response is as important to road safety as any preventative measures. The time between an accident occurring and the injured reaching emergency medical care – the so-called 'golden hour' – is critical. Quick evacuation from the accident site to hospital can save lives, and once the golden hour has passed victims should have access to staff trained in trauma nursing and emergency care.

One FIA-affiliated organisation leading the way in post-crash care is Germany's Allgemeiner Deutscher Automobil-Club e.V (ADAC), which operates an Air Rescue Service using 51 'yellow angel' emergency response helicopters. "ADAC is the pioneer of air rescue in Germany," says Dr Anja Ewert, head of International Cooperation and Public Policy at ADAC. "By putting the first civil rescue helicopter into continuous operation in Münich-Harlaching on 1 November 1970, ADAC initiated the expansion of public air rescue services in Germany."

From 36 ADAC Air Rescue Stations, these helicopters take part in 50,000 missions each year. "Thousands of people owe their lives to this fast airborne medical assistance," adds Ewert.

The ADAC rescue helicopters are usually based at hospitals. On call from 7am until sunset, they take under 20 minutes to cover their maximum range, carrying an emergency physician and the helicopter crew members direct to the patient.

"Whether or not a patient will survive a cardiac arrest or severe injuries is a matter of minutes," says Ewert. "Having provided primary medical care, our crew flies the patient to hospital or even a specialist clinic. Air transport means shorter travel times and, in view of low noise and vibration levels, a lower transport-related risk."

Some 17 of ADAC's Air Rescue Stations take part in the ADAC Accident Research project, looking at severe accidents and those outside urban areas. The project records accident cause and documents the injury causes and severity. Its successes have included the mandatory implementation of anti-lock braking systems (ABS) for motorcycles and trans-European establishment of Emergency Brake Assist test measures (Euro NCAP). ■

ADAC air rescue helicopters take part in 50,000 missions across Germany each year, helping 45,000 patients.

The FIA grants programme has helped improve safety in Tanzania's 'boda boda' taxi system.

HOME SECURITY

In tackling the road safety crisis at ground level, the FIA and its partners are busy mobilising the federation's greatest asset - its 236 member clubs spread across 141 countries

TEXT: JUSTIN HYNES

Until recently, for thousands of citizens of Tanzania's largest city, Dar Es Salaam, the only way of negotiating the bustling streets of the metropolis was to climb aboard one of the motorcycle taxis known locally as '*boda-boda*' and then clatter through the heavy traffic, hoping not to become another figure in the growing statistic of those killed or injured in crashes involving the often unlicensed two- and three-wheel vehicles piloted by untrained riders.

But since 2012, that situation has changed dramatically, thanks to a co-ordinated training and licensing programme in part funded by the FIA and the FIA Foundation.

In 2011, the sister organisations joined forces to launch a Road Safety Grant Programme to fund safety initiatives developed by FIA member clubs worldwide. The Tanzanian Automobile Association's '*boda-boda*' project was one the first to get funding, and during a seven-month trial period in 2012 more than 700 unlicensed and new riders of motorcycle taxis were given safe riding and defensive driving training. A campaign also promoted the use of reflective stickers to increase visibility at night.

In alliance with the National Road Safety Council of Tanzania, local motorcycle importers and dealers, the city council of Tanzania, government ministries and the police, the project also worked to strengthen the canopies of three-wheel motorcycles and enforce the use of seat belts.

The project is just one of 90 to have received grant aid from the FIA and FIA Foundation over the past three years, and with the application process for the fourth round of funding having just been completed, the FIA's Director of Operations & Strategy, Ortrud Birk, is confident in branding the programme a success.

"The FIA grants programme has a huge impact because it can reach all our clubs and their 80 million members. It's capable of direct and tangible action," she says. "The FIA is a unique ambassador for road safety in that it acts almost as an aggregator of the concerns of its member clubs and it can help them tackle these issues. If these projects were attempted in isolation they would not be as successful, but for our clubs to be able to access funding and tap into the resources and expertise of their colleagues means they can make a big difference."

She cites the Tanzanian project as one that has benefited greatly from grant aid from the federation.

"As part of the grant process we have established clear criteria as to how clubs can access follow-up financing, via a clear delta of improvement, and Tanzania's was one where that delta was very evident," she explains. "In the first year, the programme was rolled out in Dar Es Salaam alone. In the second year they expanded to two more provinces, and now, as we head into the fourth year, they have covered the entire country. So far almost 3,000 riders have received training."

With the World Health Organisation's (WHO) 2013 Global Road Safety report revealing that 92 per cent of fatalities and injuries occur in low and middle-income countries, funding for projects such as that in Tanzania meets the road safety crisis where the need is most acute, But the grant programme does not ignore regions where road safety standards are well developed, especially where the initiatives are innovative, as with the on-board rescue sheets developed by Germany's Allgemeiner Deutscher Automobil-Club e V (ADAC).

This initiative revolves around helping emergency services to work rapidly and effectively at a crash site. Valuable time is often lost in extracting crash victims due, paradoxically, to the increasingly safe design of cars. Faced with high-strength steel roofs and crash cell structures, even the most powerful cutting equipment is sometimes ineffectual. Other safety components, such as gas generators for curtain airbags, can present a risk for emergency response teams.

UN MY WORLD 2015

MY World is a global survey for citizens of every country led by the United Nations and its partners. It aims to capture people's priorities and views, so that global leaders can be informed as they begin the process of defining the UN's post-2015 global development goals. The survey asks individuals which six of 16 possible issues they think would make the most difference to their lives and invites them to submit more ideas should their own not be represented. The 16 issues have been built up from the priorities expressed by people in existing research and polling exercises and they cover the existing UN Development Goals set in 2000, plus issues of sustainability, security, governance and transparency. Votes can be cast at: *http://vote.myworld2015.org*

The FIA's Grants programme has funded clubs to take action in support of such international projects as the UN's Long Short Walk (left) to raise awareness of pedestrian safety.

The simple solution is an explanatory sheet posted behind the sun visor. This standardised A4 information leaflet details the location of cabin reinforcements, the fuel tank, battery, airbags, gas generators and control units, and indicates optimum adequate cutting points.

In addition to the impact made by the projects aided, the grant programme benefits the advancement of road safety in terms of information gathering.

"While we haven't reached the stage where we can say a project had a winning model and we recommend that it will work for others, the programme has made us realise that there are certain areas that need to be addressed more frequently than others," says Birk. "for example, we have identified that child safety in cars is an area of real need in many countries."

The FIA grants programme also works in association with global-level road safety initiatives.

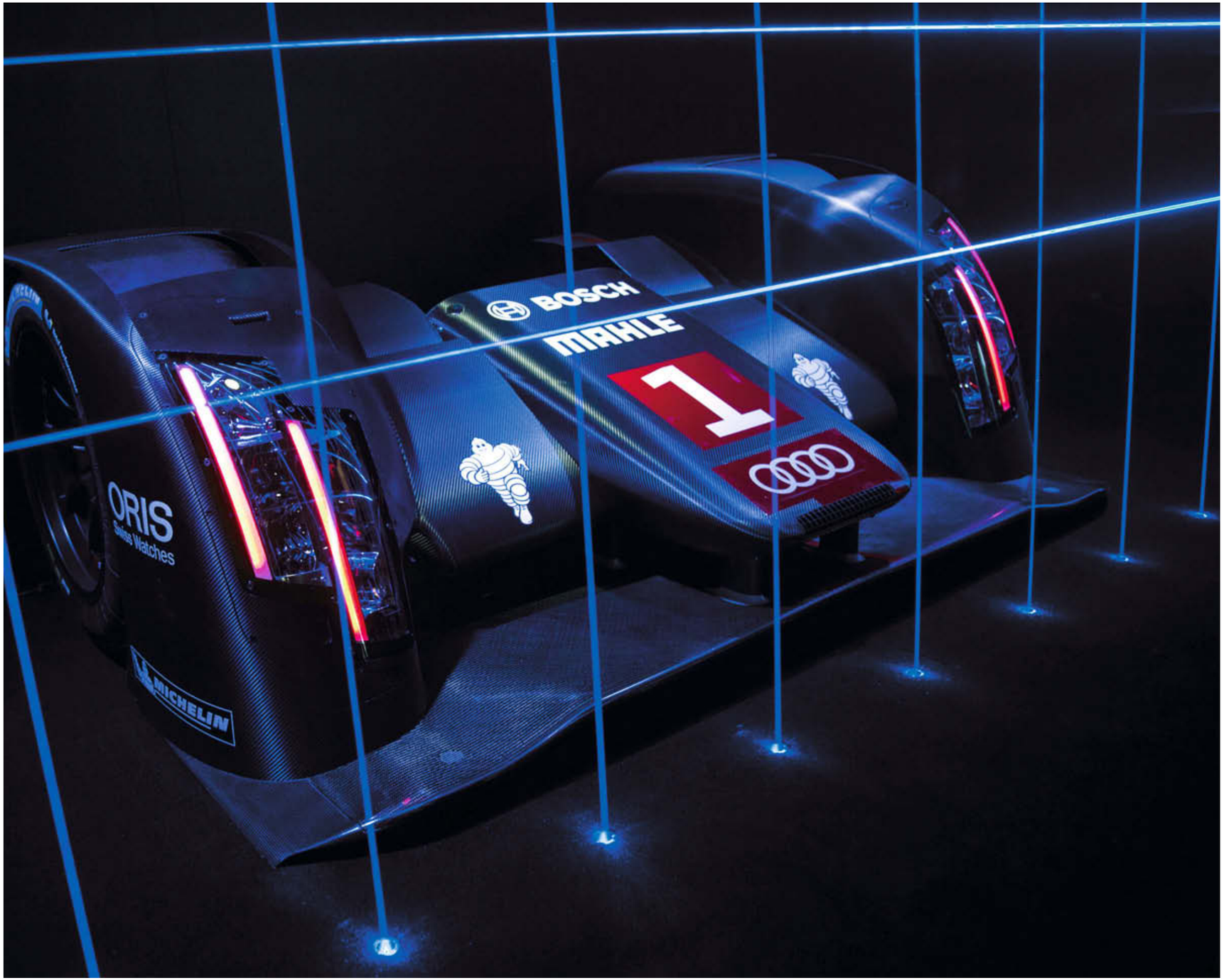
"Last year we worked with the WHO," says Birk. "During the 2013 UN Global Road Safety Week clubs were invited to develop initiatives in support of its theme of pedestrian safety. This year we have two core initiatives. One has been developed in support of the UN MY World Survey, and we are closing applications for small projects in co-operation with the International Federation of Red Cross and Red Crescent Societies, supporting a memorandum of understanding signed with the FIA to develop first aid training in the framework of road safety."

While project funding stems chiefly from financing by the FIA Foundation, the FIA grants programme also involves the federation's private sector partners.

"We have projects that might not fall into the programme funded through the FIA Foundation and this is where private sector partnerships are crucial," says Birk. "For example, we've been able to take some applications and put them to a partner such as Michelin, instigating a partnership between them. One of Michelin's key markets is the BRIC (Brazil, Russia, India and China) states and in one case we had a proposal from Sri Lanka, which dovetailed with what Michelin is trying to achieve there."

So far the grants programme has distributed more than €1 million to 90 projects globally and it is hoped the scheme will continue beyond its initial five-year period.

"We believe we should try to fund another five-year horizon," concludes Birk. "Taken individually, the projects may seem obvious and often small, but when you build all these things into a global picture of activity it becomes really important. It is making a real difference on the ground." ■



THE RACE TO SAVE LIVES

Motor sport's technology and its star drivers are playing an equally important role when it comes to strengthening the road safety message worldwide

TEXT: JUSTIN HYNES

Motor sport has always been an incubator for innovation, fast-tracking engineering development in pursuit of a competitive advantage. And while the road relevance of many of these advances may not always be apparent, the crossover has, in the past, delivered major improvements in performance, efficiency and safety in road cars.

As an example, Formula One's current pursuit of efficiency through new sophisticated hybrid engines that use up to 35 per cent less fuel than the previous V8 powerplants is an obvious and high-profile example of a targeted contribution towards road car development.

"We're often asked the question of whether there is actually any technology transfer between race and road car engineering. The answer is resoundingly 'yes'," says Mercedes F1 team technical director Paddy Lowe. "There are examples of direct transfer – for instance, the nanoslide technology used to coat cylinder bore surfaces. And then there is indirect transfer, where F1 serves as a research laboratory for developing new solutions and showing the world what is possible."

With Mercedes-Benz head of development Thomas Weber adding that the company's High Performance Powertrains facility at Brixworth in the UK will now use the expertise gained on its F1 project to assist with road car projects, tracing the link between motor sport and road car engineering is straightforward.

Plotting the connection between motor sport and road safety is, on the surface, a tougher job. With racing shrouded in the mystique of speed and risk, any link with saving lives would seem to be tenuous at best. But a deeper look reveals that while the highly specialized nature of race cars often precludes a direct transfer, motor sport has originated, and continues to develop, safety technologies that are directly applicable to driving on the road. ▶

Left: Audi has pioneered the use of laser lighting in its Le Mans cars to improve night-time vision for its drivers. Now the German make and rival BMW are transferring the technology to the road. Right: The McLaren MP4-12C was the first road car to feature an F1-style survival cell, much lighter than the equivalent metal structure.

Perhaps the most oft-repeated example of racing car technology helping to save lives on the road concerns Jaguar's development of the disc brake, specifically for the C-Type raced at the Le Mans 24 Hours in 1953. Not only was the technology more effective than the traditional drum brakes, it also eliminated the brake 'fade' found with drum brakes, where after heavy use the brakes would become less and less effective, eventually failing altogether. While the technology was not new, development by Dunlop and Jaguar inside motor sport and the obvious life-saving potential of the system meant that within a decade disc brakes were standard on the vast majority of road cars.

The pattern has continued since, with a series of developments yielding rich rewards on the road. From the Sports Car Club of America mandating the use of lap belts for competing drivers in 1954, to the development of roll cages and subsequently improved crash structures and survival cells, motor sport has, in attempting to protect competitors, officials and spectators, contributed in no small part to saving lives on the road.

But while modern race machinery might appear to have more in common with a fighter jet than family saloons, innovation in motor sport still contributes much to road safety.

In the FIA World Endurance Championship's flagship event, the Le Mans 24 Hours, Audi has pioneered the use of a laser-lighting system that dramatically increases visibility for drivers during the event's night-time stints.

The system works in tandem with the LED lighting system Audi brought from the track to road cars for the first time in 2008. As well as eight LED units on each side of the car, the new system features four laser diodes also on each side. These emit a high-intensity blue light that is then filtered through a yellow crystal phosphorous lens. The result is a deep field of white light offering twice the range of the LED headlight, enhancing visibility and safety. An intelligent camera-based sensor system detects other road users and actively adjusts the light pattern to avoid dazzle.

"We've always attached great importance to making our drivers feel safe and comfortable in the cockpit of an Audi race car," says Chris Reinke, head of LMP at Audi Sport. "Good night vision is an essential element of this. The matrix beam LED headlights already provided our drivers with a major advantage at Le Mans, and now, combined with laser light, it increases it even further. This new technology has great potential for the future."

Two-time Le Mans winner Marcel Fässler adds: "I wouldn't say it was one step forward, it's more like three. The laser light is brighter, more homogeneous and at the same time more precise."

So successful has the technology proved that it is already being introduced to road cars, with BMW beating Audi to the punch in fitting the system to its flagship electric car, the i8. Audi's response is the limited-edition R8 LMX supercar, which hosts the system. It's expected that the technology will trickle down through the German car maker's range in the coming years.

In recent years motor sport has come to rely more and more on computer-based modelling technologies in race preparation, using so-called driver-in-the-loop simulators to test set-up options and upgrades and to familiarise drivers with new circuits.

Motor sport is keen to get the road safety message across, as seen at the 2012 Le Mans 24 Hours.

That technology has now been transferred from the virtual race track to the digital road in the pursuit of road safety. As reported in AUTO last June, the Williams F1 team has adapted its circuit modelling technology to create cutting-edge road safety simulators.

The company focused its efforts on Qatar, where at the time it had a technology centre, and which has one of the world's worst road safety records. Thus, the racing team developed the Middle East's most sophisticated road safety simulator featuring a realistic interior and controls. The immersive experience featured a recreation of the streets of Doha and was used to train local taxi drivers in the city and to tour local schools teaching the importance of road safety.

The McLaren F1 team has also brought cutting-edge racing technology to the road, via its MP4-12C. Launched in 2012, the car was the first to feature an F1-style survival cell or 'tub'. Its 'MonoCell', a one-piece moulded chassis, weighed just 75kg, was 25 per cent stiffer than an equivalent all-metal structure and acted as a safety survival cell in the event of a crash, as on an F1 car.

Visionary engineering solutions aren't motor sport's only contribution to road safety, however, and in recent years racing drivers have become increasingly active in using their star status to promote a road safety agenda.

Over the past 20 years the major figure in that quest has been seven-time Formula One World Champion Michael Schumacher.

The F1 legend's association with the FIA and its road safety ambitions began in 1998 when he took part in the FIA's '10 Seconds to Save Your Life' campaign to increase seat belt use, and thereafter he became a committed safety campaigner.

In 2005 he was involved in the FIA Foundation's 'Think Before You Drive' initiative and was a key participant in its 'Make Roads Safe' campaign, launched in 2006. In the same year he was confirmed as a member of the FIA Foundation's Commission for Global Road Safety. In November '07, Schumacher became a trustee of the FIA Foundation and the former Mercedes driver was also involved in the launch of the UN Decade of Action for Road Safety in 2011.

Schumacher's commitment has given rise to a concerted effort by the FIA to present top-level motor sport competitors as role models of safe road behaviour, with drivers across the FIA's world championships supporting the FIA Action for Road Safety campaign. Many have have got involved in national campaings in their own countries, with stars such as F1's Lewis Hamilton becoming a road safety advocate on behalf of Britain's Motor Sports Association and Lotus F1 driver Pastor Maldonado supporting road safety projects in his home country of Venezuela in association with sponsor PDVSA and his own charitable foundation.

One of the largest national projects has been conducted in Mexico, where the Escuderia Telmex racing programme established by Carlos Slim Jr involves its stable of drivers in a road safety initiative entitled, *Pilotos por la Seguridad Vial* (Drivers for Road Safety).

Run in association with the FIA and Action for Road Safety, the programme, which works alongside a range of public and private bodies including the Fundacion Carlos Slim, the UN's Decade of Action on Road Safety, the FIA and the Red Cross, aims to create a road usage culture that will help to save more than 60,000 lives by 2020.

Fronted by racers such as Formula One's Sergio Pérez and Esteban Gutiérrez, the project has been a major success in reaching young drivers according to Slim Jr.

"These drivers are celebrities, personalities in the public eye," he says. "They are the only ones who drive at the limit, and also their lives depend on respecting the rules. Those attributes allow the drivers to have this moral authority to go to schools and talk to people.

"We have them visiting schools in the Drivers for Road Safety initiative and then our companies are involved in campaigns across all media," he adds. "We recently had a strong billboard, TV and radio campaign together with Fox and other channels. It's a long-term approach. Instead of us all going at it at the same time and then for six months there's nothing, we are trying to spread the message on a sustained basis."

National sporting bodies, too, have leveraged the public profile of their racers in fronting road safety campaigns. In Finland, the country's motor sports authority, AKK-Motorsport, last year launched a programme in collaboration with the national traffic safety body Liikenneturva and tyre manufacturer Michelin to raise awareness of safety issues using up-and-coming young racers such as F1 driver Valtteri Bottas, European Rally Championship driver Esapekka Lappi and FIA World Rallycross Championship competitor Toomas Heikkinen as spokespersons.

The value of such endorsements is not lost on road safety organisations such as Liikenneturva, as the organisation's education manager Antero Lammi explained at the initiative's launch. "It's wonderful to see that AKK-Motorsport bears responsibility for young people and works actively to increase safety. This is exactly the kind of activity Liikenneturva wants to encourage its members in."

The keenness of competitors globally to promote the road safety agenda – essentially saying that their skills are reserved for an environment in which they can be safely applied – and the continuing efforts of racing engineers and manufacturers involved in the sport to evolve innovation into road-going lifesavers, give the lie to the common perception of motor sport as an irresponsible, risk-laden pastime. Risk remains, of course, but the quest for the past 30 years has been safe management of that risk and ultimately the pursuit of track safety can only be good for the road. ■

For years Michael Schumacher campaigned for road safety, here helping to highlight the dangers of texting and driving.

Ramona Karlsson

LOOKING LIKE A WINNER

Success in rallying has spurred this Swede on to a campaign in the new World RX Championship, which she dovetails alongside work with the FIA to inspire other women's participation in the sport

TEXT: BEN BARRY

"I WAS WILD WHEN I WAS YOUNG. MY FATHER WAS AFRAID I'D BREAK MY LEGS DOING AUTOCROSS"

RAMONA KARLSSON

For Ramona Karlsson, just making the start of a round of the FIA World Rallycross Championship has been a victory. A member of the FIA Women In Motorsport Commission (WIMC) since late 2013, Karlsson grew up in a rural Swedish village and was raised in a relatively poor farming family with a healthy interest but no professional background in motor sport.

Although she started early – Karlsson's first motoring memory is of riding her autocross bike into her mother's flower patch aged four – she believes her lack of funding and mentorship has been compounded by gender prejudices to slow her path to the top. But there's no chip on Karlsson's shoulder, just a determination to succeed while inspiring other female drivers to similar heights. Her WIMC involvement is pivotal in achieving that goal.

"I want to tell other young girls how I have succeeded and explain the mistakes I've made," she says. "When I started I found my own way. I am proud of what I've achieved, but if I could have had someone to share their experiences, it would've saved a lot of time."

Now aged 33, Karlsson balances a full-time career in motor sport with mentorship for Young Female Drivers, a programme she launched in association with Sweden's National Sports Federation. The drivers, aged between 15 and 20, receive career guidance, driving instruction, physical training, nutritional advice and coaching for public speaking.

This work is in addition to Karlsson's separate role with the WIMC. In a neat circularity, this involvement allows Karlsson to work alongside her own role model, 1982 World Rally Championship runner-up and WIMC president Michèle Mouton.

"It is extraordinary how Ramona dedicates so much time to helping young women progress in motor sport," says Mouton. "She has a full competition programme, yet still manages to pass on her knowledge and experience to others. This is really valuable, especially when it comes from someone they can relate to who has already faced so many of the challenges they will have ahead.

"Additionally, by sharing first-hand what she learns from other young women, we can better understand their needs and how we, and all our ASNs [national sporting authorities], can address specific issues and encourage more women into our sport."

Founded in December 2009 at the FIA World Motor Sport Council, the WIMC has 30 members and aims to encourage and promote the participation of women in all areas of motor sport, from drivers and mechanics to officials and team managers. Sauber F1 team principal Monisha Kaltenborn, Audi LMP1 engineer Leena Gade and Williams F1 test driver Susie Wolff are all involved.

"Working with the WIMC gives me energy because I have been frustrated many times in my career, and there are a lot of prejudices," says Karlsson. "If a girl listens to them, she can believe they are true. My goal is for people to not even react when a girl does motor sport."

Mouton is adamant that Karlsson's career should come first and believes it provides the most effective way to inspire young women. This year, Karlsson has progressed to the World Rallycross Championship, her debut at the top level of a world series.

In the FIA's newest championship, World RX Supercars closely resemble World Rally Cars – the Citroën DS3, Volkswagen Polo and Ford Fiesta are all represented – but produce 600bhp and race on mixed-surface tracks rather than gravel, Tarmac and snow-covered stages.

Drivers including Petter Solberg, Jacques Villeneuve and Ken Block compete in four preliminary heats, before the initial entry is whittled down to 12 cars for two semi-finals. The best six drivers meet in the final.

Karlsson, the series' only female driver, is currently contesting seven of the 12 rounds in an Eklund Motorsport Saab 93 Supercar. Results have been mixed: she beat 1997 Formula 1 world champion Villeneuve in round one at the Montalegre circuit in Portugal, progressing to the semi-finals and scoring eight points before being hit by fellow competitor Jos Jansen. Since then, a combination of disappointing results and technical problems has slowed progress.

But Karlsson has faced larger obstacles. As a child, she looked up to her father, whose hobbies included shooting and autocross bikes. Noticing her interest in both, he encouraged his daughter. The flower patch incident was just a taste of things to come.

"I was quite wild when I was young and my father was afraid I was going to break my legs doing autocross," laughs Karlsson. "He was keen for me to be safer, so he suggested I try crosskart, which is basically autocross with four wheels and a rollcage."

Less well known outside Scandinavia, a crosskart is a small, single-seat off-road buggy with enclosed bodywork. Competitors race on dirt ovals against other drivers, or on rally stages against the clock. Karlsson's father also competed in crosskart races, but when his daughter beat him on her maiden attempt, he quickly retired and devoted his time to helping her progress.

Karlsson won the Swedish crosskart championship three times between the ages of 12 and 16. A switch to the junior rallycross category followed, but at the age of 19 she reached a crossroads.

"At the same time as I was moving into division two in rallycross, I also got a place in the national gun-shooting team and was going to study to become a physician," she recounts. "I needed to think about what I wanted to do and decided to be a professional rally driver." ▶

Karlsson is undertaking seven rounds of the new-for-2014 World RX championship, driving a Saab 93 Supercar for Per Eklund's team.

Ever since, Karlsson has struggled to fund her rally programmes, but is quick to acknowledge there are both pros and cons for a female driver seeking sponsorship.

"For a girl starting out it is harder to have people believe in what you are doing," she says. "But once you have the success, in some ways being female can be an advantage. It has taken many years, and it has been a steep learning curve, but it is easier for me now."

Since committing to motor sport full-time, Karlsson has contested the production car-based PWRC in 2012 and competed in the Swedish rally championship from 2009 to 2013, latterly in a 2005 Škoda Fabia WRC. It was her hard-fought victory on Rally Uppsala – becoming the first woman ever to win a round of the championship – together with a strong second place in the overall standings that piqued Mouton's interest.

"I got a really nice phone call asking if I would like to join the Women In Motorsport Commission as a driver representative, and I thought it was a great idea," beams Karlsson. "Michèle has always been special to me; the first time I met her I was shaking because she has achieved so much and has always been inspiring to me."

It's early days for Karlsson's involvement in the WIMC and she has attended just one meeting so far, but already she's hungry to contribute further.

"We discussed a lot of issues for women in motor sport: how to make the environment better, how to promote women," says Karlsson. "The commission has a small budget for sponsorship, and we discussed what to do with this money, how to support women, how to have more women in motor sport and increase their acceptance."

Shortly after joining the WIMC, Karlsson switched from rallying to rallycross. Rallycross appealed because of its recent return to popularity, comparative affordability, close racing, good media coverage and an arena format that facilitated sponsor events. The first year, decided Karlsson, would be a part-time campaign.

"I had to decide between doing seven rounds in a less competitive car, or four rounds in something more competitive," explains Karlsson. "The Saab has a lot of potential and doing seven rounds also means I have more time to plan for next year; previously I've always had to work hard just to survive the season."

Karlsson's time in autocross, crosskart and junior rallycross series has given her plenty of experience at racing head-to-head, but adapting to the new discipline has nonetheless proved as challenging as it is rewarding.

"My style has always been quite explosive, and I felt comfortable at once in rallycross," she says. "I like to get into battles. It's exciting, but you have to be tough at the right moment. I've made beginner's mistakes where you run into another car in the wrong place, and it's finished. You need to learn when to attack and when not."

Previously, Karlsson's left-foot braking had complemented her Škoda Fabia WRC's active centre differential, allowing her to adjust the speed and attitude of the car through corners. But the rallycross cars' absence of an active differential has necessitated a change of approach. The Tarmac sections of track used in rallycross competitions have introduced a further complication for Karlsson, who's used to loose surfaces.

"That's something I'm struggling with a little," she admits. "I like to go wide and slide and attack the curves like in rally, and sometimes I'm too aggressive going into the corner and lose time coming out. But I'm making time against the other drivers in every competition.

"Everything is really on the edge, you have maybe 20 cars that can make the final, so every team needs to be very professional, to take everything out of the materials. It's not just about the car, it's the team you work with, and so I will be very careful next year which team I choose."

With that tantalising nod to the future, Karlsson leaves us. She's catching a plane, heading to northern Sweden to open a motor sport exhibition and give what she hopes will be an inspiring lecture about her career. No doubt any young female drivers in attendance will be shaking in awe at the prospect of meeting Ramona Karlsson. Michèle Mouton should be proud. ■

RISING THROUGH THE RANKS *Five other female racers to watch*

▲ MICHELA CERRUTI

SERIES: Formula E, Auto GP, Blancpain Endurance Championship
NATIONALITY: Italian
AGE: 27
The daughter of Italian touring car racer Aldo Cerruti, Michela made her racing debut in 2008 in the 2-litre category of the Italian Touring Endurance Championship (CITE). In 2010 she moved to the Superstar Series and the next year won race two in the opening round at Monza. In 2012 she drove for Team BMW Italia in the Italian GT championship, winning at Mugello. Last year she embarked on a multiple series programme taking in GT racing, the FIA F3 European Championship and Auto GP. This season, after becoming the first woman to score a podium finish in Auto GP in round four at Monza, she won the next round at Imola. She landed another podium finish at Austria's Red Bull Ring. Earlier this year she also finished on the podium at Silverstone in the Blancpain Endurance Series. She recently signed to race for the Trulli team in the FIA's new electric series, Formula E. "Michela is a talented driver with natural skill," said team boss Jarno Trulli. "She is an up-and-coming star, one to watch for the future."

BEITSKE VISSER ▼

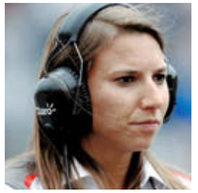
SERIES: Formula Renault 3.5
NATIONALITY: Dutch
AGE: 19
As with most modern racers, Visser started young, karting at the age of five and competing when she was seven. After a successful spell in the KZ2 and KZ1 karting categories she stepped up to single-seaters with a drive for the Lotus/ Motopark team in the ADAC Formel Masters. In her first season she took two wins and one pole to finish eighth in the points. Last year she became the first female to join the highly regarded Red Bull Junior Team. Her second Formel Masters campaign yielded more good results, with a win at the Sachsenring and a podium finish at the Slovakiaring. But it wasn't enough to keep the Red Bull backing and she was dropped from its junior programme last October. Visser has bounced back this year by stepping up to the ultra-competitive Formula Renault 3.5 series, which in recent seasons has established itself as a major F1 feeder series. Driving for the AVF team she scored her first top-10 finish in round four at Spa. She currently lies 19th in the championship.

▲ MICHELLE GATTING

SERIES: Porsche Carrera Cup
NATIONALITY: Danish
AGE: 20
In 2012, Aarhus native Gatting was selected by the FIA Women in Motorsport Commission and VW Motorsport for a supported drive in the Junior category of the manufacturer's Scirocco R-Cup touring car series. After finishing fourth in the Junior standings and 11th overall in her first year, she spent 2013 racing in the senior championship, ending up fifth in the points. The experience gained led her to step up to the Porsche Carrera Cup this year where she has so far taken a best-place finish of 19th in the 32-car series. She is currently fourth in the rookie standings. Gatting also earned a wildcard entry to this year's FIA Institute Young Driver Excellence Academy, although she ultimately missed out on the Driver of the Year Award, which brings together the top 10 young competitors from ASN's around the world. Gatting ended the course on a high note by winning both the final-round kart races.

TATIANA CALDERON ▼

SERIES: FIA F3 European Championship
NATIONALITY: Colombian
AGE: 21
Bogota native Calderon is in her second season of the FIA Formula 3 European Championship and is the only female racer on the grid of this hotly-contested series that recently saw title contender Max Verstappen chosen to join the F1 grid for 2015. Calderon first made an impression in single-seaters in 2011, racing in the Star Mazda series and taking two podium finishes on her way to sixth in the points. After moving to Europe in 2012 she competed in European F3 Open, again finishing on the podium in the winter series on her way to ninth in the standings. She made her debut in the new F3 European series last year and became the first woman to score a podium finish in British F3 at the final event of the season at the Nürburgring. This year she joined Jo Zeller Racing and scored points in race two at the daunting Spa-Francorchamps, with an impressive fifth place. She's taken five more points finishes since and is currently 17th in the series.



▲ SIMONA DE SILVESTRO

SERIES: Formula One
NATIONALITY: Swiss
AGE: 25
Following the usual path through junior karting, de Silvestro took the unusual step of moving to the US to race in single-seaters. In 2006 she competed in Formula BMW and in '07 made her debut in Formula Atlantic, in which she scored points in nine of the 12 races. In 2008 she earned her first win at Long Beach, and in '09 took four dominant victories. She ended the season third overall. Her success led to a move to IndyCar in 2010. Her first season was a baptism of fire – the Swiss racer walked away from an accident that saw her trapped in a burning car for 30 seconds. But she won the prestigious Indy 500 'Rookie of the Year' Award. Last year she recorded her best qualifying result with |a third-place start at St Petersburg and scored her first podium finish with second at Houston. With two top-five and nine top-10 finishes she was 13th overall. In February she was signed by Sauber as an 'affiliated driver', with a training programme aimed at preparing her for F1. She tested a 2012 Sauber in April, completing 112 laps of Ferrari's Fiorano test track. One admirer is F1 legend Mario Andretti, who told *F1 Racing*: "I've followed her closely since her first Indycar test. She's a talent to be reckoned with."

AUTO / ISSUE #8

Young drivers

ACADEMIC ACHIEVEMENT

With almost half of the current Formula One drivers having participated in a young driver academy or junior team programme, are they now an essential step on the path to the top?

TEXT: MARC CUTLER

From left: former F1 driver Helmut Marko spearheads Red Bull's driver development programme; Luca Baldesserri (top) and the Ferrari team coach F4 driver Lance Stroll; 16-year old Max Verstappen has been chosen by Marko to enter Formula One with Toro Rosso next year.

"If a driver comes into the pitlane and says the car is 'crap', it is hard to sort out crap. You have to come in and analyse the car."

Helmut Marko, head of Red Bull's driver development programme, does not mince his words. But his point is a clear one. There is so much more to being a top driver than speed. Learning and understanding are essential. And this is where academies and young driver programmes have come into their own in recent years.

Marko is basking in the glory of two recent success stories from the Red Bull Junior Team, the official name for its young driver programme. Australian Daniel Ricciardo, who joined the Junior Team in 2011, has already taken three grand prix wins this season and looks set for a long career at the top of the sport. Russian Daniil Kvyat joined the Junior Team in 2010 at the age of 16, made his debut with Toro Rosso last year and has been winning praise for his performances up and down the paddock this season.

"I found him in karting," says Marko about Kvyat with the air of an antique dealer who has picked up a Picasso in a pawn shop. "I have my contacts and my system and I know who is offering drivers. I watched him and in the older days we did tests at Estoril in identical cars. Everyone got a long run and qualifying and this is where we found him."

Marko does not deny that Red Bull has a cut-throat philosophy for its programme. The entire aim is to find drivers for its two F1 teams and if a driver is not good enough he will be dropped without a safety net.

"Some say it's hard and tough but, for example, if someone has a weakness in qualifying and it doesn't change during the season he will never succeed in Formula One."

One thing that Marko will not tolerate from any of his protégés is a lack of commitment. "They think they will be racing in F1 in two years because they are with Red Bull, but if they are not working hard or have the right commitment then it is not possible. Unfortunately, this is the reality. If we see someone who is at the disco every night during the weekend then I understand that they aren't committed."

It helps to keep drivers in check that Red Bull can offer them financial stability. In addition to funding a drive, Red Bull will train its drivers in all areas from physiology to technical understanding.

"We support them on the physical and vehicle side," explains Marko. "We have a centre near Salzburg where they are trained. Red Bull has about 600 athletes who all train at the diagnostics centre. They go through certain tests, show them their weaknesses and how they can improve from there. We also have a system where, ▶

when they are in higher categories, they get supported by selected physiotherapists."

To give his drivers the right experience Marko puts them in the most competitive championship available. He is full of praise for the new FIA Formula 3 European Championship, restructured by Gerhard Berger, president of the FIA Single Seater Commission.

"We choose the categories where there is the most competition," says Marko. "We are not putting people in easy categories so they can win, we want them to face the toughest racers. At the moment the best thing is the new European Formula 3 from Gerhard Berger. You have three races, a lot of mileage and new engine providers. He has done a very good job and gets nearly 30 cars in each race."

Red Bull's latest young star has been plucked straight from European F3. Max Verstappen is set to become the youngest-ever driver in Formula One when he joins the Toro Rosso team next year. He will be just 17 years and five months at the first race.

But Marko sees no problem with his age. "He is very mature for his age. He knows exactly what he wants. He has got very quick genes with his mother [ex-karter Sophie Kumpen] and father. His father Jos has done very well to teach him the lessons he himself learned."

At Red Bull, if you're quick enough you're good enough. But if you're not good enough then you're out.

MANUFACTURER SUPPORT

The Ferrari Driver Academy is similarly single-minded. Launched in 2009, it is run by Luca Baldisserri, who was previously chief track engineer with the team.

Again it is seeking to develop drivers for Formula One but it is also focused on providing a fully-rounded education for participants. "The aim is to bring on talented youngsters through a programme which looks at every aspect of their preparation, from fitness to mental training, and from track tests to simulator sessions, following them every step of the way through their racing activity," says Baldisserri.

The Ferrari Academy currently has five drivers on its books, all at different levels in the sport, from France's Jules Bianchi in F1 and Switzerland's Raffaele Marciello in GP2, to Canada's Lance Stroll in the FIA Formula 4 Championship and China's Guanyu Zhou in karting.

When choosing the drivers, Baldisserri does not simply look for raw speed but also "dedication, precision and the will to succeed".

To join Ferrari's programme young drivers are invited to Maranello and, after an in-depth check-up, they do a test on the circuit. Only the very best make it through to the Academy where they are given a full development schedule.

"They are given complete support, which features an intense training programme, both physical and psychological, as well as several sessions on the simulator," says Baldisserri. "Apart from the practical side, the Academy provides theoretical lessons on how a single-seater is constructed, the importance of set-up and technology, so they can learn about how an engine works and about aerodynamics.

"In their respective track activities, the youngsters are followed through various coaching activities and we are with them at the races, supporting the teams they race with in order to achieve the best possible results."

The aim is to develop a well-rounded driver who can compete on any level – not just winning, but winning well. As Baldisserri puts it: "The win must come as a result of driving well, of being precise, learning to minimise mistakes and at the same time being as quick as possible. These qualities are what make for a real champion."

GLOBAL ACADEMY

A less ruthless but no less competitive programme is the FIA Institute Young Driver Excellence Academy, which launched in 2011 and has seen a number of graduates make it to the top.

The selection process takes place across the globe with every FIA National Sporting Authority eligible to nominate one driver for one of the six regional selection events. The winner of each event gets an automatic place on the Academy and is joined by a further four wildcards.

The Academy itself is run by two-time Le Mans winner and former F1 driver Alex Wurz, alongside former World Rally Champion co-driver Robert Reid, who provide expert tuition throughout.

The aim of the Academy, which covers both racing and rallying disciplines, is not necessarily to get drivers to the top but rather to help develop their motor sport careers while increasing safety skills and promoting fairness and responsibility on and off the track.

"The objective is to support, educate and train our participants to become elite drivers and safety ambassadors," explains Wurz. "We show them, we coach them, we give them the tools to become a professional competitor. But further and maybe more importantly, we educate them to become motor sport safety and road safety ambassadors. That acts as a sort of safety net for the guys who will not make it as professional drivers. These guys can use the education they receive and still work in the motoring industry as test drivers, driver trainers and coaches."

This Academy is different from other team and manufacturer programmes in that it focuses on learning rather than competing.

"We explain to them, in a blended learning process, about driving-related laws of physics and vehicle dynamics, so that they get better in self-assessment and understand what they do and the effect of their actions on the vehicle," says Wurz. "The more they understand, the deeper we go into it; we adjust to both the individual and the group." ▶

"IF WE SEE SOMEONE WHO IS AT THE DISCO EVERY NIGHT THEN I UNDERSTAND THEY AREN'T COMMITTED"

HELMUT MARKO

Clockwise from above: Marko has overseen Russian star Daniil Kvyat's rapid rise to F1 where he is impressing at Toro Rosso; another Junior Team driver, Daniel Ricciardo, has won grands prix for the main Red Bull team this season; drivers demonstrate technical expertise in all conditions at the FIA Institute Young Driver Excellence Academy .

Vandoorne says he still relies on lessons learned at the FIA Institute Academy in his McLaren driver programme.

This method of teaching has even benefited Wurz. He recalls "racing my WEC LMP1 prototype at Spa during the opening stint of a six-hour race, and thinking about slip angles and minimal steering wheel inputs for driving line perfection. I thought, 'I drill the Academy drivers about that stuff so I better do it myself inch-perfect'. We won the race, and the Academy participants laughed when I shared that experience at the next workshop."

Wurz, who is also a driver mentor for the Williams F1 team, admits that participation in an academy is not essential for a driver to make it to the top, but it can certainly give him or her the edge over rivals.

"Being part of an academy or having a proper mentor will accelerate the learning curve," he says. "So it can give the driver an edge over the others. We get that feedback from graduates of the FIA Institute Academy, which is very rewarding for our entire Academy team."

Graduates include Formula One reserve drivers such as Alexander Rossi and Robin Frijns, and World Rally Championship drivers including Andreas Mikkelsen, Pontus Tidemand and Craig Breen.

THE GRADUATE

Another FIA Institute Academy graduate is Belgian Stoffel Vandoorne, who went on to join McLaren's Young Driver Programme.

He says it was a great springboard for his career and would encourage other young drivers to join similar training programmes. "I didn't have much experience at that point in my career so I had to learn everything," he says. "We had classes about fitness, driving and also the technical side. Since the Academy I've realised motor sport is much more than just racing a car on a circuit."

Vandoorne admits that he is still using the lessons learnt from the Academy. "One thing we always worked hard on was steering inputs as this can change a lot the behaviour of the car. In GP2, steering input is one of the key factors for tyre saving. We are racing with Pirelli tyres and they are difficult to manage over a race distance. I'm usually very good on tyre management during the race."

The McLaren programme is focused on preparing him for F1. "I get support with a specific physical training programme, media training, simulator days and technical meetings. Since I am the reserve driver, I'm involved with the technical side and do a lot of simulator work. I've driven the F1 car twice this year and felt very comfortable, which means my preparation has been good."

Vandoorne represents the opportunities that are available now to the modern driver (he was also involved in the Royal Automobile Club of Belgium national team). So what advice would he give to young drivers looking to make it to the top?

"Trust your own talent and always remember your goals in life. Hard work pays off at some point!" ■

YOUNG DRIVER ACADEMIES

SKIP BARBER RACING SCHOOL
One of the world's largest racing schools, Skip Barber has a reputation as one of the best places to learn racecraft. Since 1983, graduates have accounted for one-third of all Indy 500 competitors and one-quarter of all NASCAR Sprint Cup Drivers.
ALUMNI: Hélio Castroneves (IndyCar), Juan Pablo Montoya (IndyCar), Ryan Hunter-Reay (IndyCar), Scott Speed (Global Rallycross), Tony Kanaan (IndyCar)

McLAREN YOUNG DRIVER DEVELOPMENT PROGRAMME
Offering year-by-year guidance through training and nutrition programmes, contractual guidance, media education and more.
Alumni: Lewis Hamilton, Kevin Magnussen, Stoffel Vandoorne (all F1)

LOTUS F1 JUNIOR TEAM
Building off a previous incarnation of a young driver programme from Renault, the Lotus scheme places drivers in junior teams and helps them develop through their careers.
Alumni: Romain Grosjean (F1), Lucas di Grassi (Formula E), Pastor Maldonado (F1)

RED BULL JUNIOR TEAM
Formed in 2001, the Red Bull Junior Team is one of the most recognised young driver academies in the world.
Alumni: Sebastian Vettel (F1), Daniel Ricciardo (F1), Jaime Alguersuari (Formula E), Sébastien Buemi (WEC, Formula E), Jean-Eric Vergne (F1)

NISSAN GT ACADEMY
An academy with a difference, Nissan GT is a driver discovery/development programme that is a collaboration between Gran Turismo and Nissan. Online racers compete through various stages, both online and on track, to be chosen to join the academy.
Alumni: Jann Mardenborough (GP3), Lucas Ordonez (Super GT), Mark Shulzhitskiy (Blancpain Endurance Series)

FERRARI DRIVER ACADEMY
Another academy provided by a Formula One team, the Ferrari Driver Academy boasts vast resources and expertise.
Alumni: Jules Bianchi (F1), Antonio Fuoco (FIA F3 European Championship), Raffaele Marciello (GP2)

SAHARA FORCE INDIA ACADEMY
Aiming to nurture and develop young talents from India, the academy prepares junior racers for life as a future Formula One driver. Growing out of the successful 'One From A Billion' initiative that the F1 team ran, the academy now has Jehan Daruvala as its first member.

PORSCHE YOUNG DRIVER ACADEMY
Focusing on North American talent, the Porsche Young Driver Academy aims to find top talent to race for the German marque in various series.
Alumni: Cooper MacNeil (United SportsCar Championship), Spencer Pigot (Pro Mazda Championship)

BRITISH RACING DRIVERS' CLUB – SUPERSTARS AND RISING STARS
The SuperStars programme has been specifically developed for the most serious and talented young drivers in Britain. The Rising Stars scheme is only open to those aged 24 years and under and is designed to provide support to drivers looking to make it to the upper echelons of motor sport.
Alumni: Lewis Hamilton (F1), Alex Lloyd (IndyCar)

MERCEDES-BENZ YOUNG STAR DRIVER PROGRAM
This programme, which aims to find talent exclusively in India, is being run for a second time this year.

ESCUDERIA TELMEX
The Escuderia Telmex programme aims to find and promote young driver talent from Latin America and is backed by Mexican telecommunications company **Telmex.**

In his FIA Institute role Wurz helps young drivers not only to progress their motor sport careers but become safety ambassadors.

AUTO / ISSUE #8

Legends

KING OF THE ROADS

Carlos Sainz will undertake his eighth Dakar Rally next year in an all-new Peugeot - the latest challenge in a long and illustrious career that the legendary Spaniard looks back on with pride

TEXT: ANTHONY PEACOCK

PHOTOGRAPHY: FLAVIEN DUHAMEL/RED BULL CONTENT POOL

S

ome rally drivers command admiration, others inspire frenzied attention, but there is one who simply commands total respect, at all times. And that is the intensely charismatic Carlos Sainz, known as ‘The King’.

His rally career started in 1987 on the world stage and is still going: he has just signed for Peugeot to start his eighth Dakar Rally in the all-new 2008 DKR.

It’s a gamble because unusually this is a rear-wheel drive car and the last time a two-wheel drive car won Dakar was back in 2000.

“Sure, it’s a risk,” agrees Sainz. “But sometimes you have to do that to achieve something. The concept we have for the Peugeot is a completely new one. So we’ll see what happens.”

One of the things that made Sainz a legend was the fact that he was never afraid to look beyond the conventional, right from the beginning of his career. His route into rallying was through racing, as it was easier to find sponsorship that way. And that’s how he found himself competing in the 1983 Formula Ford Festival at Brands Hatch. He never lost his touch for circuits: the very first stage he won, on the 1987 Portugal Rally, was on the Estoril grand prix track, and while at Toyota he tested the GT-One Le Mans car in 1999. His times were right on the pace of the regular drivers.

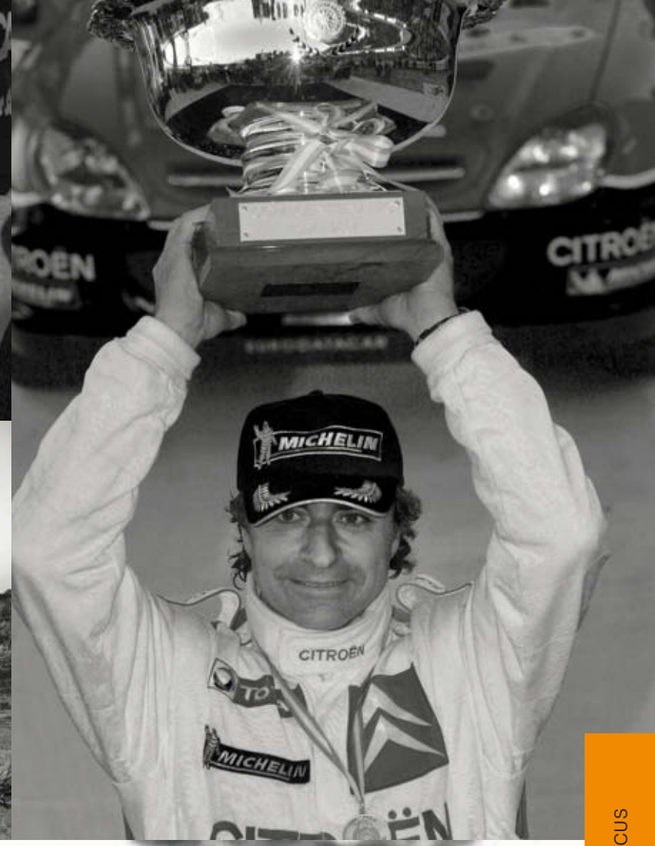
But there was no doubt where his real passion lay. In 1989, in only his first full World Rally Championship season, he came tantalisingly close to his debut win on more than one occasion. “We lost the lead of Italy and Rally GB with mechanical problems – both rallies we should have won,” says Sainz. “Back then Rally GB was blind, so it really meant something.”

Once upon a time all rallies were like that: driven without pre-prepared pace notes, with the co-driver relying on just an ordnance survey map to read the stage. Effectively, the driver had to drive the road as they saw it and those who could adapt to unforeseen conditions quickest were the ones who triumphed.

Sainz was always phenomenally good at that, which is why he became the first non-Nordic driver to win Rally Finland, in 1990. To date, only Didier Auriol plus Sébastiens Loeb and Ogier have emulated that feat.

This typifies what Carlos is most proud of, when it comes to his achievements in the sport.

“If there is one thing I’d choose to keep as a memory, it’s the fact that I changed the mentality that existed in rallying about having specialist drivers for specialist events,” he says. “I wanted to be a specialist everywhere. When we won in Finland, we proved this could be possible. Now, it’s what all the teams look for in a driver.” ▶



Clockwise from top left: Sainz won the second of two WRC titles with Toyota in 1992; he joined Volkswagen for the Dakar Rally in 2006, winning four years later; Sainz’s final WRC victory was on the 2004 Argentina Rally with Citroën; in 1990 he became the first non-Nordic driver to win Rally Finland – a standout moment from his career along with his first title win that year; Sainz was fourth on that year’s Safari Rally, an event he won two years later; the Spaniard at the first test for Peugeot’s new Dakar car, the 2008 DKR; Sainz tested in Argentina with co-driver Timo Gottschalk and the SMG-Red Bull Rally team prior to this year’s Dakar.

PHOTOGRAPHY: RED BULL CONTENT POOL

He got there not just through talent and ambition, but also a phenomenal amount of hard graft. His work ethic is formidable: he used to berate younger drivers who weren't interested in testing. "I really don't understand him," he said of one team-mate, who had decided to cut a test session short. "When I was his age, I would have done anything to be in the car for as long as I could."

Stories abound of Sainz testing late into the evening, with engineers thankful that the lack of a light pod would call a halt to proceedings when darkness fell. They reckoned without Sainz's insistence that he knew the road so well by then a light pod wouldn't be necessary...

Prodrive technical director David Lapworth, who worked with Sainz at Subaru, remembers: "In terms of work ethic and commitment, there was nobody better."

But the Germanic efficiency that Sainz so admired in the Cologne-based Toyota team (with which he won both his world titles, in 1990 and '92) didn't mean that he was scared of emotion. He just knew how to control it.

"There's only one time when I let my heart rule my head and that was a big mistake," says Sainz. In 1993, he signed for the Jolly Club Lancia team – what remained of Lancia's all-conquering factory squad following the marque's official withdrawal from rallying at the end of '92 – so that he could continue his relationship with personal sponsor Repsol. This would have been impossible at Toyota as the team was backed by rival oil giant Castrol. But by then the Delta was outdated and uncompetitive, with Carlos enduring a winless season.

"If I could turn back time I'd have stayed with Toyota and said goodbye to Repsol," he adds. "But most seasons I was winning at least once and I am very happy about this: it means I was competitive from start to finish. I think I could have won more championships, but I prefer to focus on the positive than the negative things."

In 1995, Sainz and Colin McRae were locked into a fierce battle for the title, armed with the new Impreza, which was the class of the field. The championship situation was finely poised: not dissimilar emotionally to what you find now with Mercedes in Formula One.

To minimise the risk of both its drivers crashing, Prodrive instituted team orders. On Saturday evening at the Catalunya Rally, the penultimate WRC round, it was agreed that Sainz would win his home event. McRae saw it differently, and took the lead on the final day (despite Subaru team members standing in the middle of the road to slow him down) only conceding it by stopping after the finish of the last stage and taking a penalty.

In an interesting twist, nearly exactly the same scene repeated itself eight years later, when McRae and Sainz were again team-mates at Ford. On this occasion, however, it was McRae who was the beneficiary of team orders at the 2003 Acropolis Rally, and it was Sainz who stopped at the very end of the stage, to prove a point.

"My view on Catalunya has always been the same: we had an agreement, which even the media knew about because it was in the press release," he insists. "My mistake was trusting it rather than my instincts. I've never hidden anything: I say what I know is true."

McRae won Rally GB to claim the 1995 crown: the same event where in '98 Sainz had the title snatched away after his Toyota's engine caught fire within sight of the finish. Co-driver Luis Moya famously hurled his crash helmet through the car's rear screen in disgust while a stupefied Sainz wandered off into the Margam Park woods.

Unlike Catalunya, his perspective on that incident – and others like it, such as crashing out of the lead at the end of the 2009 Dakar – has changed. "At the time these things feel like a hard moment, but those aren't the things that hurt you at all. What really hurts is the people you lose: you've been speaking to them, and later you hear there has been a stupid accident and they are gone."

Having spent six seasons as team-mates, it's clear that McRae is never far from Carlos's thoughts. "Colin became one of my best friends in rallying," he explains. "We spent a lot of time together, also away from rallies. It was Colin who first made me think about doing Dakar. We were sitting in Majorca – Colin had a place there and I was staying for a few days – and he was doing Dakar with Nissan. He was telling me about it and I remember thinking it sounded like a really good way to stay involved in motor sport when I stopped driving in rallying."

Having joined Volkswagen in 2006, he finally won Dakar in 2010. His work with VW also gave him the chance to drive the modern generation of rally cars – he helped develop the all-conquering Polo R WRC in 2012.

"The cars have changed so much. The biggest change is the suspension, it's much more sophisticated now. When I was driving, the suspension could do some pretty nasty things – throw you off the road over bumps and so on. Now everything is smooth, and maybe because of that the new cars feel a lot easier to drive. That's not being disrespectful to any of the current drivers, because extracting the last tenth of a second is as hard now as it ever used to be. But physically the demands are less."

The last World Rally Car Sainz drove in competition had many of these modern hallmarks: the Citroën Xsara.

"I will always have good memories of Citroën and Guy Fréquelin, who was in charge," says Sainz. "I had two very good years there and I was still winning. That's why I retired: I wanted to go while I was still competitive and while it was still my decision. The timing was right."

Sainz's last success, in Argentina in 2004, gave him the record at the time for the highest number of WRC wins (26). The Spaniard didn't participate in his last scheduled rally, that year's Rally Australia, due to a back injury sustained in the recce. He appeared at the opening superspecial though for an emotional standing ovation.

Yet he was back in a Citroën for two events in 2005, deputising for François Duval. His final and 196th start – a record yet to be beaten – was the Acropolis Rally, where he finished third, after six months out of the sport, at the age of 43. Competitive to the very last. ■

"YOU HAVE HARD MOMENTS, BUT WHAT REALLY HURTS IS THE PEOPLE YOU LOSE"

CARLOS SAINZ

PHOTOGRAPHY: RED BULL CONTENT POOL

CARLOS SAINZ JUNIOR

Like father, like son. The two look uncannily similar, and now it seems that 19-year-old Carlos Sainz Jr is destined for the very top of the sport.

'Carlitos' decided from a young age that he wanted to go circuit racing, as while interested in rallying, he never wanted the inevitable comparisons a rally career would bring.

"Carlos is probably more interested in my rally career now than he was before," recounts his father. "When I was driving he was still very young. But now he asks me lots of things about what I remember from the past."

Sainz gave his son a helping hand into motor sport via karting, but from then on he was picked up by the Red Bull Junior Team, which is effectively managing his career.

"Carlitos had the opportunity I never had," adds Sainz. "My parents were against me going into motor sport. So I had to do it on my own. From the start I said to Carlitos that I would help him, on the condition he worked for it. And he is very professional and works hard at his racing. Now he has reached the level where my involvement is less, but he still asks for advice from time to time."

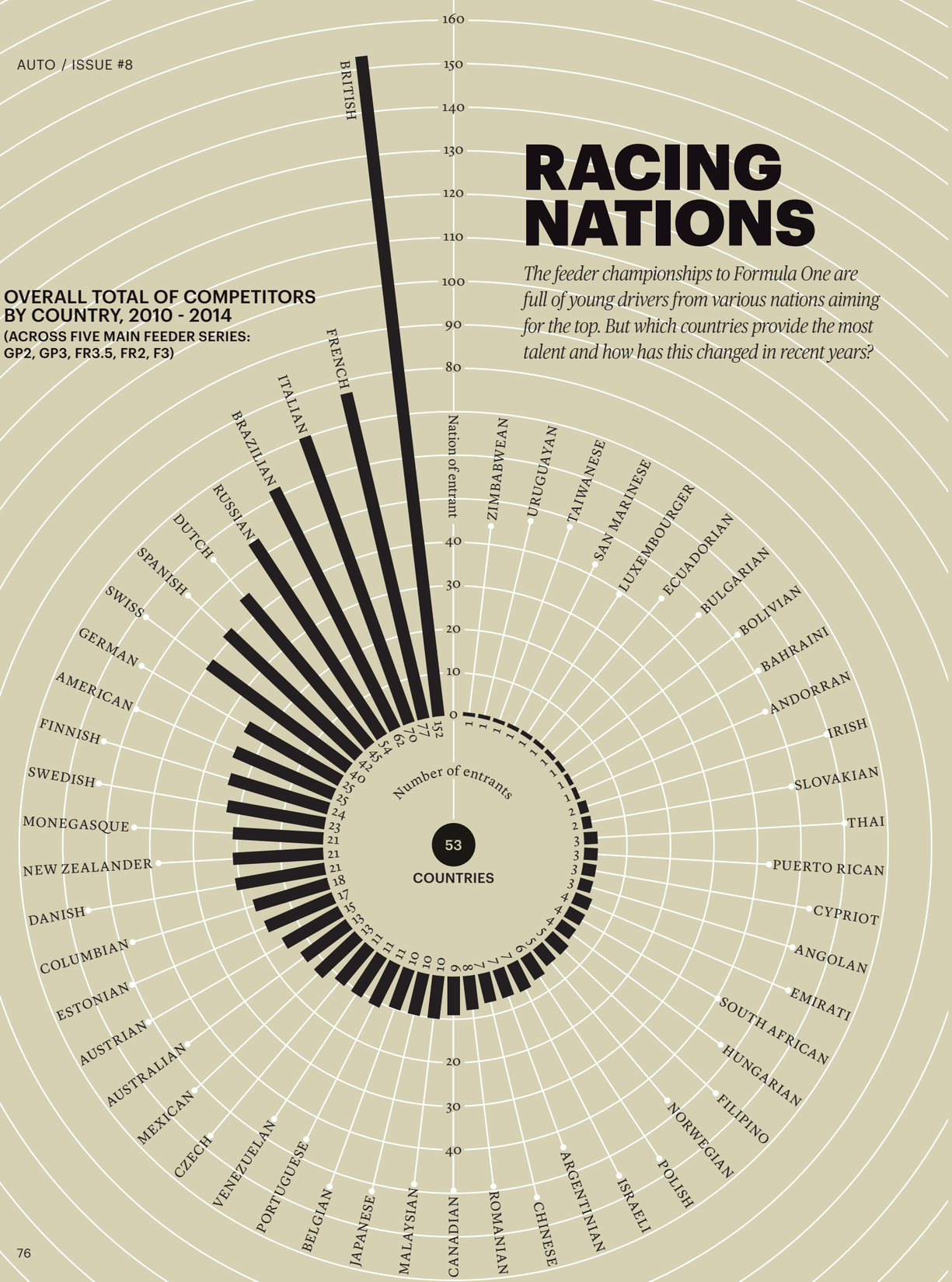
If Sainz Jr is anything like his father, he's set to have crowds following him as if he were the Messiah – the only downside to the heights of fame that Sainz scaled in his homeland.

RACING NATIONS

The feeder championships to Formula One are full of young drivers from various nations aiming for the top. But which countries provide the most talent and how has this changed in recent years?

OVERALL TOTAL OF COMPETITORS BY COUNTRY, 2010 - 2014

(ACROSS FIVE MAIN FEEDER SERIES: GP2, GP3, FR3.5, FR2, F3)



Over the last five seasons the main feeder championships to Formula One have been GP2, GP3, Formula Renault 3.5, Formula Renault 2.0 and Formula 3 (a combination of British F3, 2010-2012, and the resultant European F3 Championship, 2013-2014). A look at how the competing nationalities have changed over the years makes for interesting reading.

A total of 53 different nations had drivers competing in at least one of the series over the last five years. Britain was by far the biggest contributor, leading the nationality table each year. But then it gets much more competitive.

In 2010, Spain was the second biggest contributor of drivers to these championships but since then it has dropped out of the top five never to return. Similarly, Dutch drivers were the fourth most prevalent group in 2011 but never made a reappearance in the top five.

Only Britain, France and Italy have been the mainstays at this level of motor sport, appearing in the top five every year for the last five years.

Russia has made steady progress, first appearing in the top five in 2012, moving up to fourth place in 2013 and to joint-second this year, indicating an increasing interest in the sport in the run-up to its first grand prix.

But the top five are shrinking. In 2014, they make up the smallest share of the total number of nations than they have done previously. In fact, there are 42 nations competing across the main feeder series this year, more than ever before. Motor sport participation is clearly spreading far and wide.

PARTICIPATING DRIVERS (BY NATIONALITY)

2014

Country	BRITISH	FRENCH	RUSSIAN	DANISH	ITALIAN
GP2	3	3	1	1	1
GP3	6	-	3	1	3
FR3.5	5	3	3	2	1
FR2	7	5	5	2	4
F3	4	1	-	4	1
Total	25	12	12	10	10

2013

Country	BRITISH	FRENCH	ITALIAN	RUSSIAN	SWISS
GP2	5	2	5	-	2
GP3	10	-	2	1	2
FR3.5	4	3	1	4	4
FR2	8	14	4	5	2
F3	9	-	4	2	1
Total	36	19	16	12	11

2012

Country	BRITISH	ITALIAN	BRAZILIAN	FRENCH	RUSSIAN
GP2	4	4	4	2	-
GP3	5	4	-	-	1
FR3.5	4	4	4	2	5
FR2	11	3	4	10	6
F3	9	2	3	-	-
Total	33	17	15	14	12

2011

Country	BRITISH	FRENCH	BRAZILIAN	DUTCH	ITALIAN
GP2	5	3	1	1	-
GP3	8	1	2	2	3
FR3.5	5	6	3	1	1
FR2	5	7	2	6	6
F3	7	-	7	3	2
Total	30	17	15	13	12

2010

Country	BRITISH	SPANISH	BRAZILIAN	FRENCH	ITALIAN
GP2	4	1	2	3	6
GP3	4	4	4	3	3
FR3.5	3	4	-	3	2
FR2	5	6	2	2	4
F3	12	1	7	4	-
Total	28	16	15	15	15

Jarno Trulli believes the new Formula E series provides a fresh and innovative challenge for his eponymous team.

Final lap

EMBRACING THE FUTURE

Ex-Formula One driver Jarno Trulli has jumped headlong into the FIA Formula E championship as both a team owner and driver

Q What made you return to motor sport with Formula E?
A There is not as much interest in other series as there is in Formula E. People are looking for something new and this series is fresh, it has futuristic technology and is the first single-seater championship powered by electric motors. It gives a strong ecological message to the world and it is the way to go for the future. It represents innovation and it gives a chance to engineers, teams and anyone involved in renewable energy technology to work and develop systems that will in future be used in road cars.

Q How challenging has it been so far?
A It has been a big challenge considering we were starting at least eight months behind every other team. We are late in preparation but the performance is there, we are just missing some experience on how best to manage the strategies and systems. We are still learning. It is a new series so we all have to learn and discover the differences and key points to being competitive.

Q Having taken over the Drayson Racing entry, how is the partnership between themselves and your team working?
A We were interested in working with Drayson from the start. We can't change too many things this season, but for the future we hope we can merge our experience and create something that will translate to our racing cars and eventually to normal life.

Q What made you come back as a driver?
A When I set up the team I thought it was fundamental to have a technical direction led by an experienced driver. It is interesting to get back in the car although my initial aim was not to be driving. I do find myself in the car though and I'm enjoying the challenge and hope I can succeed.

Q What would be a successful first season for the team and yourself?
A We want to win but obviously being late to the grid doesn't make our lives easier. We will have to wait and see if we can catch up with the top two or three teams. I believe at present we are in the top four teams, but we are still missing something so I hope we can overcome this and compete.

Q Who do you see as your main rivals?
A The teams with manufacturer support like e.dams with Renault and Abt with Audi look strong. They look prepared and they know the car and the systems, so I think they are looking best at the moment.

Q Your team-mate is one of two female drivers in the field, Michela Cerruti. What skills does she bring to the team?
A Michela proved to be very quick in a powerful single-seater like Auto GP. This is a new challenge and she can benefit from my experience and grow as a driver. She is a good asset for the team and the image, but she will also bring strong results because that is what she has done in the past. I hope it works out for her as she has been unlucky so far with a number of electrical problems and hasn't got too much mileage. I'm looking forward to her producing some strong results.


QUALCOMM
RENAULT
MICHELIN
DON'T CRACK UNDER PRESSURE
TAG HEUER
TAGHeuer
SWISS AVANT-GARDE SINCE 1860
TACHYMETRE
CARRERA
CAL. 1887
TAG HEUER CARRERA CALIBRE 1887
Formula E is the first all-electric racing car that combines the best of motorsports technology and the latest improvements in clean energy. Like TAG Heuer, Formula E is an avant-garde technology which never cracks under pressure.