



Mission critical

▲ A view of Malaga, where the Road Network Safety Management Workshop was held in March this year

Claudio Caferri and **Antonio Montalvo** report from an International Road Federation event that focused on a topic that can often be inexplicably overlooked in conference programmes but is of vital importance

Road safety professionals from nine different countries gathered in Málaga, Spain, on 30 and 31 March 2017 to attend a Road Network Safety Management Workshop. The event was organised by the International Road Federation (IRF) - a global non-for profit organisation which aims at promoting the benefits of a sustainable road transport infrastructure at all levels of society - and supported by the Smart Transportation Alliance (STA) - a collaborative platform for transportation infrastructure innovation

across modes and the Smart City.

A panel of 11 internationally renowned experts shared their views and best practices to better implement road safety measures. With the support of the Málaga City Council and the Professional Association of Civil Engineers of Málaga, this course was aimed at delivering practical pathways to improved road safety performance through policies and measures that target recurrent road safety management and engineering weaknesses found in countries experiencing high growths

in vehicle and motorcycle ownership.

This two-day workshop provided the participants with the necessary theoretical background and applied practices on traffic injury risk diagnosis and reduction to ensure their programs and investments are adequately dimensioned and targeted. In addition, particular focus was given on complementary aspects of safe road and roadside management, including the correct selection and application of safety equipment based on site conditions.

During day one economic analysis, correct usage of accident statistical data, safety performance evaluation and road network management, were discussed as the means to quantify the true burden of traffic injuries for societies and to identify cost-effective preventive measures for road safety.

To close the first day, a social dinner was organised at the Málaga City Council where the Mayor of the City, Francisco de la Torre, expressed his gratitude to the IRF's representatives for choosing Málaga as the venue for this important event and invited IRF to organise other events promoting road safety.

Day two focused on safe road and roadside management. Participants were given insights on key aspects of road safety such as roadside management, safety of work zones, Road Restraint Systems (RRS) norms and standards, as well as monitoring and management tools for safer roads.

The Road Network Safety Management Workshop successfully attained its objective by providing the participants high-level learning material. Both the experts and participants demonstrated a strong appreciation toward this two-day workshop.

Following the event, some of the speakers and participants were invited to share their views on the different topics addressed during the workshop.



MICHAEL DREZNES,
EXECUTIVE VICE
PRESIDENT AT IRF

What are the main challenges to reduce fatal road crashes?

Speed management is one of the most important factors that must be considered in any road safety strategy. The proper speed limits must be set and then proper enforcement must be used to ensure drivers adhere to those limits. Automated enforcement (safety cameras) has proved to be very effective and their use should be expanded. In addition, a variety of speed management countermeasures, such as roundabouts or speed humps or raised platforms should be in every road design.

Requiring motorists to only use vehicles that meet the New Car Assessment Pro-

“My biggest fear is that not every country in the world will implement these road safety measures and they will not conduct the road safety workshops to even learn about them”

gram (NCAP) vehicle crash standards and include a variety of safety features including Anti-Lock Braking Systems, Curve Speed Warning Devices, High Speed Alert Devices, Automatic Emergency Braking, Electronic Stability Control, Traction Control. Side View Cameras, Adaptive Headlights, Forward Collision Warning, Left Turn Crash Avoidance, Back-up Cameras, Obstacle and Pedestrian Detection would go a long way to making the roads safer. Implementing these requirements will increase the cost of a vehicle, but it is only a fraction of the value of a life.

Finally, because drivers will continue to make mistakes all roads must be designed to be “forgiving roads”. This will include the use of proper containment longitudinal barriers with proper transitions and terminals, crash cushions, motorcycle attenuating devices, rumble strips, safety edge, forgiving poles, etc. Road Safety Audits and Inspections and continuous classroom education programs and workshops for road professionals like the one conducted in Málaga must be mandated to ensure road authorities are aware of the many countermeasures available that may not be in their current standards.

How has technology and innovation helped reduce road accidents?

Many of the vehicle innovations mentioned above are designed to actually reduce road crashes. Other road features such as rumble strips, central hatching, proper yellow light timing, pedestrian refuge islands, tested roadside safety hardware, “forgiving” poles, speed management devices and automated enforcement technologies continue to make roads safer where they are properly used.

Many road authorities are unaware of these state of the art technologies and best practices, and the increased use of Road Safety Auditors and classroom training programmes have helped to increase this level of awareness. Since road safety will cost money to implement, insurance compa-

nies are becoming more involved to help to finance certain road safety countermeasures, and this needs to continue.

How do you imagine road safety in 20 years?

Twenty years from now, the vehicle features mentioned above will be standard in new cars. More vehicle features, including autonomous vehicles will be commonplace. Reducing driver error by removing the driver will make a significant difference. The speed of vehicles will be automatically controlled based on properly specified speed limits, and/or automated enforcement technologies will be commonplace.

Every road will be designed as a “forgiving” road.

City planners will take into account pedestrian safety when designing new cities to provide walkways and intersections that work for pedestrians, including those with handicaps.

Designers will give more consideration to the vehicle fleet when designing roads, such as the percentage of motorcycles on a road.

There will be an added emphasis on the use of bicycles and facilities will be designed and implemented for their use.

Road building technologies and pavements will advance to provide longer use thereby reducing maintenance requirements, and thus reducing the number of work zones.

My biggest fear is that not every country in the world will implement these road safety measures and they will not conduct the road safety workshops to even learn about them. Right now, 92 per cent of the road fatalities are in lower and middle income countries. As the higher income countries introduce these new technologies and concepts, their fatality rates will continue to drop. Since the lower and middle income countries may not take advantage of the new state of the art technologies and best practices, that figure of 92 per cent will only get higher.



BRENDAN HALLEMAN,
VICE PRESIDENT, EUROPE
AND CENTRAL ASIA AT IRF

Why is it important to quantify the economic and health burden of road traffic incidents (RTIs) and what are the major challenges in doing so?

Motorised road transport is closely linked to several threats to human health and well-being and these are not always fully captured in official statistics. Like any other disease, traffic injuries cause deaths, but they also cause morbidity (which results in visits to hospitals and emergency services), and they can trigger short- or long-term disability. They also affect the economy, both at an aggregate level and in the economic well-being of individual households, with disproportionate impacts for lower-income families. Understanding the full scale of these health and economic impacts is essential to optimising public policy and intervention priorities, and engaging with a wider range of stakeholders than is the case today.

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What are the criteria used to quantify RTIs?

Public health indicators, such as DALYs (Disability-Adjusted Life Years), that combine information on fatal and non-fatal health outcomes offer a much better picture of the burden of road traffic injuries since they capture both premature mortality and the disability impacts of road traffic injuries. Traffic crashes often constitute a leading cause of death for the age group of 15-34 years old in fast-motorising countries, and indicators such as these, help convey the sheer magnitude of the resulting years of life lost compared with other causes of death.

The other key benchmark is the Value of Statistical Life, which aims to place a monetary value on the loss of life resulting from traffic injuries. As a universal language, the figure can also be used as an advocacy tool, for instance you can determine that RTIs cost X billions of dollars to society and this can be compared with the actual cost of intervention, also expressed as a monetary value.

What elements should be taken in consideration for effective road safety interventions?

I believe a first step, particularly in low-income countries, is to correctly measure the current scale of the problem in order to formulate evidence-based road safety programmes. Official data provided by these countries tend to be “directionally” accurate only (meaning you can use them to measure progress from one year to the next, but for little else) and in many cases need to be adjusted based on a range of criteria before they can be included in international benchmarks. Data collection at the source is often the guilty party – lack of tools, lack of training and in some cases, lack of interest all need to be addressed if the goals of the UN Decade of Action are to be met.



MICHAEL VAN DER VLIST,
DIRECTOR AT LAURA
METAAL ROAD SAFETY

What is positive work zone protection and why is it important in the context of road safety?

Positive work zone protection is the protection of a work zone with a device that contains and redirects vehicles in accordance with a relevant standard, preventing their intrusion into the workspace. The key is that vehicles are redirected, rather than merely stopped. Redirection is important for the safety of the occupants of the vehicle. The device can only be tested in a relevant way if tested against a standard. These days, that is

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the MASH standard, or the EN1317 in Europe. Testing needs to be standardised in order for Road Authorities to be able to demand meaningful comparable qualifications.

What are the main challenges to improve road construction workers’ safety?

Unfortunately, there are still many challenges and they differ from country to country. A crucial part is awareness with drivers and the workers. If we are not aware of the dangers in and around a work zone, and adjust our behavior accordingly, severe accidents will continue to happen. When we use a tested-positive barrier to secure a work zone and so create positive work zone protection, we can minimise the effects of work zone accidents that will occur. Good use of tested barriers is key here. Untested products will only make the situation worse, as there will be a false perception of safety.

What will make a real difference in road safety: innovation and new technologies or better implementation of road safety rules?

We will need exactly those two elements. A continuous movement towards better products based on smarter design, newer technology. Raising standards when the newer and better products become available is a key element to this. If the better products are not required by law, who will invest in them? But also, we will need road authorities to enforce the rules that they have set. In most cases, there is a good system in place for this, but it remains a point of attention.



CÉSAR BARTOLOMÉ,
R&D DIRECTOR
AT IECA

Why is pavement design and condition important? What are the main characteristics of road pavements? What measures should be taken to ensure their optimal usage over time?

The main reason why pavement condition

▼ Vehicle Restraint Systems in operation



“Intelligent transport systems and vehicles are developing much faster than infrastructure, and safety improvements are mainly related to both of them”

is important for road safety is its influence on the braking distance, which mainly depends on the micro- and macrotexture of the pavement and its preservation throughout the service life of the road. Micro and macrotexture must be monitored by measuring the skid resistance and the mean profile depth (MPD) and its evolution with time. Megatexture is also important since it affects to the control of the car by the driver.

What have been the main technological improvements in this sector in the last decades?

In the pavement sector, the main efforts have been made in finding a balance between skid resistance, drainage and noise. In the field of asphalt mixes, innovative products for wearing courses have been developed. In the case of rigid pavements, two-layer pavement with exposed aggregate texture is probably the most important development related to safety.

How research and innovation have become essential to improve road safety?

The transport sector, particularly vehicles and ITS, are developing much faster than infrastructure and safety improvements are mainly related to them. In the next two decades, autonomous vehicles will have a deep impact on the reduction of accident rates. Pavements must evolve quickly to give an answer to the requirements of autonomous vehicles. Infrastructure must not delay the implementation of these technological developments.



**PATRICK ASIMUS,
TRAINING COORDINATOR
AT STA**

What are the Standard for Vehicle Restraint Systems (VRS) and why are they important?

In the past, safety barriers and parapets have been categorised according to national standards using “engineering” design as main criteria while neglecting performances parameters such as impact and containment levels.

With today’s variety of vehicle fleets, types of roads and speed variation, the safety barriers standards require to be developed and organised based on case-by-case criteria.

In addition, the increasing demand at all societal levels for enhanced road safety requires the restraint system to guarantee performance under vehicle impact prior its installation on the roadside. This is only possible if the validation is performed through a full-scale crash tests. In the recent years, an increasing number of countries have made mandatory the use of certified safety barriers.

The most important VRS standards available are the European EN 1317 and the American MASH.

In both cases, the main criteria taken into consideration are their deformation level, the trajectory of the impacting vehicle and the potential risk of injuries for occupants or other road users.

The European EN 1317 standard also considers the quality of the manufacturer’s production plant (through inspections and audits of the factory), the compliance of installed VRS with regards to the initial tested system, and full

“The increasing demand at all societal levels for enhanced road safety requires the restraint system to guarantee performance under vehicle impact prior its installation on the roadside”

respects of the indication provided in the installation manual.

What are the criteria to take in consideration when choosing the type of VRS?

Deaths on our road networks should not be considered as normal. The first criteria to be taken in consideration is the choice of a systems that effectively reduces the risk of serious injuries or death due to driver's error.

First and foremost, it is necessary to perform an in-depth analysis of the roads that have to be equipped with VRSs: factors such as the speed limit, width of the embankment, roadsides obstacles, types of vehicles using the road, the quality of the soil, etc. must be carefully taken in consideration.

Beside the EN 1317 or MASH standards that provide product characteristics and evaluation of conformity, it would be helpful to promote the selection of safety barriers based on features such as containment, impact severity, working width, with specific provisions for verges and central reserves or bridges. A practical example is the inconsistent use of severity indexes as criteria for choosing the right restraint system. For instance, the ASI value defined for class of severity or the occupant protection defined through the THIV (Theoretical Head Impact Velocity) are too often disregarded in tenders, despite they represent one of the most important decision criteria for road safety.

Another important criterion is to use a family of product so that the working width or the Dynamic deflexions – criteria that are used for installing the systems in front of obstacles or to follow the declivity of the roadsides - can be adapted to local needs.

The maintenance of the VRS is also very important in order to ensure long-term safe roadside.

To ensure that the system can perform as affirmed by the manufacturer, a minimum construction length must be taken into account and the installer must carefully follow the instructions provided in the installation manual.



▲ The maintenance of VRS is important in order to ensure long-term roadside safety

Finally, the VRSs end terminals must be energy absorbing and avoid being safety threats themselves. Similarly, crash cushion acc. part 3 of EN 1317 must be able to effectively redirect the vehicles so that we can maximise the chances to reduce road injuries or fatalities.

Are new standards necessary, and if so, what are the obstacles for its implementation? What is a realistic timeframe for their implementation?

Of particular interest is the hardware and processes used to reduce death and serious injuries of motorcyclists after a collision into a safety barrier. MPS drivers can slide along the pavement and collide with the VRS with disastrous consequences. Further efforts are required worldwide to establish risk assessment processes to identify the appropriate locations to install motorcycle protection systems. CE labelling for dedicated safety barriers requires standards such as the EN 1317-8 to be harmonised across Europe.

Requirements for adapting barriers to non-standard installation configurations are also needed. In fact, road configurations often differ from the one tested by the manufacturer. For example, it is nec-

essary to establish clear rules for safety barriers to be installed on curves, and more specifically how to modify their shape without affecting their resistance. Other requirements such as the fitting of additional equipment (anti-glare screens, reflectors, MPS, infill, etc.), specific modifications (expansion joints, drainage, installation on kerb, post spacing), and define soil characteristics would also greatly contribute to safer roads.

These important points are to be considered by the European Commission in order to start working for a directive for standardisation of safety systems.



CHRISTINA HAENELT,
CIVIL ENGINEER

Why did the IRF workshop about road safety attract your interest?

Mainly, I was interested in IRF because I am civil engineer and in our career we design roads, and the design, in my opinion, is one of the factors that helps in safety. The better we do our job the safer the roads we get.

What topics did you find more interesting and useful for you, both as a professional and as a user?

The topic I found more interesting was “the forgiving roads” because, as it was said during the lecture, humans will always make mistakes but our responsibility as engineers is to find a solution to decrease the number of casualties, even with the same number of mistakes.

Do you believe road safety can be significantly improved in your country in the next 10 years?

Luckily it will, because as far as I know people and not just road designers are more and more conscious about this problem and they are trying to invest in different solutions for this, although we have still a long way to go.

Claudio Caferri is STA
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