ITF/OECD WORKING GROUP[1] ON THE SAFETY OF POWERED TWO-WHEELERS - FINAL REPORT

18th November, 2014

Comments on the document

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The purpose of the following comments in the timescale available is to provide further information or offer an alternative perspective, which may assist the editors of the report on the safety of Powered Two Wheelers (PTWs) in order to ensure that the final document can inform stakeholders and governments on the latest methods and information with regards accident causation, training and best practice in motorcycle road safety matters.

We have concentrated mainly on the issues that we and our own contributors are active in their own field of knowledge therefore we have not commented on all aspects of the document.

However we certainly welcome and appreciate the opportunity offered to enable us to comment with the assistance of others in the motorcycle community from the UK and the USA.

While we recognise that this report is still in draft format and needs further editing, what we would like the authors to consider is that there are quite a few repetitions and overlapping of information – which we will aim to identify in our comments.

In the event we are undoubtedly aware that a huge amount of work has been done to provide information and data to ensure that the outcome of the report is second to none, however we believe that there are knowledge gaps and in some cases what we would consider “inconsistencies” – which we will endeavour to explain in more detail.

Key Messages

As a suggestion, it might be helpful if included in the key messages, there is an executive summary rather than anticipating the conclusions and recommendations.

Chapter one

1.1 Opportunities and challenges of powered two-wheelers in the 21st century
1.2 An excessive risk
1.3 A systemic approach to PTW safety

What would be helpful is more detailed reference to the outcome of the Lillehammer Motorcycle Workshop 2008, which was instigated and organised by the OECD/ITF. Specific reference to the list of priorities from the Lillehammer workshop would be beneficial in order to provide continuity.

[1] OECD – Organisation for Economic Cooperation and Development based in Paris, which also hosts the International Transport Forum

1.1.2. The role of powered two-wheelers within transport systems - Moreover, the sensory experience linked with riding a PTW makes it an object of pleasure for a certain category of people.

With regards the so called difficulties mentioned in the report (in items 1.2.1 - why is it riskier to ride a PTW?) and 4.1.3 - age and experience) of riding a motorcycle.

Simply, they go, they stop, they steer. Conceptually they are no more difficult to operate than a bicycle – an auto even has the same arrangement of controls on the handlebars, barring the throttle. In either case each and every input has a mechanically predictable response - they are FAR less difficult to operate than a horse for example, where any rider input will meet with an essentially unpredictable response! So why are people saying the motorcycles are difficult to ride? The only answer can be because they are making an intuitive leap that doesn't look at the mode of operation but by the results of failing to handle the machine correctly. The single track vehicle is more likely to capsize when there is a loss of control event but this doesn't mean that control is more difficult. Yet no-one is considering graduated licencing and age restrictions for bicycles (or horses!!). The only differences are the means of propulsion and the speeds they can reach - it's worth pointing out that mopeds are little quicker than cyclists.

Arguably in urban areas, PTWs are easier to use than cars because mopeds and motorcycles have the option to use more of the lane before coming into conflict with other vehicles or the environment. We could say it's more difficult to drive a much wider car on a busy street because the driver needs to be more accurate.

Attempting to create some sort of philosophy from a form of transport in our view undermines the positive aspects of this document and the rest of the text in the paragraph, as does the categorisation of specific sections of road users, referring to item 1.1.2 although we are certain that it was not intentional, this appears to be discriminatory as does the comments in item 1.2.2.

1.2.2. Atypical behaviour - Atypical behaviour also refers to "deviant" behaviour, including stunts, wheelies, etc. Such behaviour is not necessarily frequent but may contribute to a negative opinion of the PTW community.

One definition of "Atypical behaviour" is – "A psychological condition or behaviour that departs from the norm or is harmful and distressing for the individual or those around them." – perhaps a better definition could have been used that does not reflect that as the document states that *"normal behaviour" (i.e. behaviour common to PTW riders)* is related to the *"deviant" behaviour which includes stunts, wheelies, etc.*

While this *"deviant" behaviour* certainly exists and the document explains that s*uch behaviour is not necessarily frequent but may contribute to a negative opinion of the PTW community"* it perhaps would have been better to make the point that in all social groups including car drivers, pedestrians, cyclists or whatever activity human kind participates in, there will be a minority which is not reflective of the majority.

Furthermore, the inclusion of "filtering" as deviant behaviour is NOT an abnormal or illegal activity. It is included in the Highway Code guidelines in the UK. Recently in countries such as Australia this so-called "deviant behaviour" has now been recognised in some states as a useful and safe means of progressing through traffic and has been explained further on in the report.

Chapter one – Introduction, item 4. Countermeasures Promoting Appropriate Behaviours of road users

"As an attitude, defensive riding enables the rider to systematically foresee what the riskiest scenario may be at any given moment... to avoid - or cope with - the riskiest situations should they occur".

Excellent statement of what training does NOT achieve even when intended to do so. Practicing emergency routines in isolation fails to link them with the situation in which they are needed - untrained Thai riders turned out to be better than highly trained US police when it came to actually performing a collision avoidance manoeuvre. It's doubtful if practicing off-road emergency stop and watching hazard perception clips featuring vehicles emerging in front of motorcycles forges any meaningful link between problem and solution in the new rider's mind in a genuine emergency.

We should also be asking why it is that when 80% of UK riders hold a car licence, so many motorcyclists still get caught out by errors made by car drivers - that's a good clue there's a fundamental disconnect between the way we expect other people to use the road and they way they actually use it which doesn't seem to depend on training. Rather than building on "existing standards" this is a good case for going back to basics and discovering just how people learn!

Chapter two: Fleet and usage

2.1.2. Attractiveness of mopeds and motorcycles

PTWs are not emission free. They emit local and global pollutants and are a significant source of noise.

Our issue is with the text *and are a significant source of noise,* this text as a standalone statement is incorrect. PTWs have to meet strict noise type approval/global technical regulations, which we understand are being improved at the UNECE. In legal terms manufacturers meet these regulations as do after market exhaust manufacturers so that they can place their PTWs and exhausts/end cans on the market for sale as “road legal” items.

Perhaps the authors may want to review this statement?

2.2.1. PTW usage and users

In many OECD countries, there is an increasing number of “returning” riders, typically males in the 40-50 year age group, who stopped riding a PTW for a period of more than 5 years and usually return to riding on powerful motorcycles.

This comment appears in other chapters in the document, but there does not seem to be any detailed evidence that this phenomenon (which was first circulated as fact in the UK called “born again bikers”), still exists in the UK or in other countries. These claims need supporting evidence.

2.2.2 Access and Training (Licencing) also see chapter five.

This sub heading, in part is a repeat of issues addressed in Chapter five and perhaps these two chapters should be separated so that one focuses only on licencing while the other focuses on training and/or education to avoid repetition or overlap.

3rd Driving Licence Directive

With regards the third European Driving Licence directive and its implementation. There is progressive access with categories and depending where the rider wants to commence (which is related to age), there must be a test. Before moving between categories (A2 and A), the rider must complete a further test (or training), but this has been left to legislators to decide whether this should be training or testing and what this should entail.

The problem is that these legislators put together the structure for this Directive without listening to the advice of motorcycle experts, therefore the category (engine size/output) of motorcycles to be used in the training/testing is now being decided retrospectively by committee.

What is possibly the most unfortunate outcome of this directive is that there is no guarantee that it will have the slightest affect on road safety although undoubtedly, the costs for governments to implement it will be eye-watering.

2.2.2. Access and training - European Union

In addition, the minimum age to ride an A-class motorcycle in most countries is about 20 or 22 years, not 24 years as prescribed in the Directive (see Tables 2.4 and 2.5).

Although the 3rd European Driving Licence directive is explained somewhat here and in other chapters this comment appears to take a negative position against the directive without explaining why and the purpose that the directive allows 20 or 22 year olds to gain a full A motorcycle licence.

Perhaps as an explanation something similar to this could be inserted:

The 3rd European Driving Licence as implement in the UK allows a progressive access approach, dependent on age, experience and competence, for younger motorcyclists who wish to progress in stages to the larger and more powerful machines – category A1 at 17, category A2 at 19 and category A at 21.

These younger riders will be obliged to qualify and gain a minimum of two years experience riding a less powerful machine before they can take a further test for a higher category of motorcycle.

Under the progressive access route, riders will be able to access the largest motorcycle, for example a young rider who gains an A2 licence at 19 years will be able to take a further test at 21 years – similarly if a young rider who gains an A2 licence at 21 years would have to wait until they are 23 years to take a further test for an A licence.

It has been said that the European driver licencing regime as it stands is complicated, prescriptive, expensive and discriminatory against lighter and female riders. However anecdotal evidence from those smaller and lighter female riders shows that with tenacity, the correctly adapted motorcycle (lowered seat – lowered suspension) a trainer who understands the need of their trainee and the requirements that enables a rider to pass their test is not unsurmountable. More discussion is required so that the European test is seen as fit for purpose straight out of the box for all riders no matter what their size or gender.

2.3.2. Examples of local strategies influencing PTW usage

Filtering

In Belgium, filtering has been authorised since July 2011. PTW riders are allowed to move between two lanes at a maximum speed of 50 km/h and with a speed difference of less than 20 km/h compared to the traffic in the adjacent lanes. On motorways/highways, this manoeuvre is only allowed between the two left lanes. There has not yet been assessment in terms of traffic or crashes.

In France, this issue is on the political agenda and experimentation on filtering could start in 2014 or 2015.

Please see our previous comments on filtering in1.2.2. Atypical behaviour regarding filtering.

There appears to be a knowledge gap as regards filtering especially recent changes in some of the states in Australia. NSW – New South Wales - recently applied lane filtering laws – to make filtering "legal" with a definition - Motorcycle lane filtering is when a motorcycle rider moves alongside vehicles that have either stopped or are moving slowly, less than 30km/h.

NSW[2] also give a definition of Lane splitting – which is where a motorcycle rider moves past vehicles at an unsafe speed of more than 30km/h. Lane splitting is illegal in NSW and if there is an Atypical behaviour then lane splitting would be a better explanation.

http://roadsafety.transport.nsw.gov.au/stayingsafe/motorcyclists/lanefiltering/faqs.html

However care would need to be taken as the difference between Lane Filtering and Lane Splitting has a different definition in different countries

In Queensland commencing in early 2015, motorcycle riders with an open RE or R motorcycle licence will be allowed to move between lanes of stationary or slow moving vehicles travelling in the same direction as the rider, provided they are not travelling at more than 30km/h and it is safe to do so.

Learner and provisional riders will not be allowed to lane filter because of their relatively limited riding experience.

Motorcycle riders will be prohibited from lane filtering in school zones during school hours.

Motorcycle riders will be advised to always look out for pedestrians and cyclists when lane filtering. It will also be recommended that a motorcycle rider should not lane filter near heavy vehicles or buses, due to the safety risk as drivers of heavy vehicles and buses may have trouble seeing motorcycles.

If done safely, lane filtering may ease traffic congestion for all road users, allowing motorcycle riders to move quickly and safely away from congested traffic.

In the ACT – Australian Capital Territory[3] a lane filtering trial will be conducted for a period of two years commencing 1 February 2015.

The trial area will encompass the whole of the ACT which will ensure that there is no confusion about the areas in which lane filtering will be permitted.

[2] http://roadsafety.transport.nsw.gov.au/stayingsafe/motorcyclists/lanefiltering/faqs.html
[3] http://www.justice.act.gov.au/page/view/3733/title/act-lane-filtering-trial

For the purpose of the trial, lane filtering will:

only be allowed when safe to do so;
not be allowed at a speed greater than 30km/h;
only be allowed by fully licensed motorcyclists (i.e. learner and provisional licensed motorcyclists will not be allowed to lane filter);
not be allowed on kerbside next to a footpath or e.g. in bicycle lanes or breakdown lanes;
not be allowed in school zones during school zone hours; and
not be allowed past heavy vehicles and buses.

Again the difference between lane filtering and lane splitting is explained. Lane splitting involves higher speeds (above 30km/h), which increases the unpredictability of motorcyclist movements for other road users. Lane splitting will not be permitted as part of the trial.

Perhaps this section on filtering could be expanded to cover other countries that allow filtering or have filtering explicitly allowed.

For example in the Highway Code in the UK:

Rules for motorcyclists - Rule 88

Manoeuvring

You should be aware of what is behind and to the sides before manoeuvring. Look behind you; use mirrors if they are fitted. When in traffic queues, look out for pedestrians crossing between vehicles and vehicles emerging from junctions, or changing lanes. Position yourself so that drivers can see you in their mirrors. Additionally, when filtering in slow-moving traffic, take care and keep your speed low.

Remember: Observation–Signal–Manoeuvre

Road users requiring extra care - Motorcyclists and cyclists

Rule 211

It is often difficult to see motorcyclists and cyclists, especially when they are coming up from behind, coming out of junctions, at roundabouts, overtaking you or filtering through traffic.

Always look out for them before you emerge from a junction; they could be approaching faster than you think.

When turning right across a line of slow-moving or stationary traffic, look out for cyclists or motorcyclists on the inside of the traffic you are crossing.

Be especially careful when turning and when changing direction or lane. Be sure to check mirrors and blind spots carefully.

As the draft document comments in the conclusions to Chapter 2 Powered Two-Wheeler Fleet And Usage:

“There would be many benefits, in terms of mobility and traffic management as well as traffic safety, in a better integration of PTWs into mobility plans and in the development of national and local transport strategies”.

Our opinion is that the advantages of the motorcycle to filter has been long recognised by riders in terms of the benefits weighted against traffic safety and is cost and benefit free if included in the development of national and local transport strategies.

Chapter Three: PTW Crash Characteristics

Regardless of what has been produced before, it has not changed the way accident causes repeat themselves and why injuries occur. Unfortunately this happens all too often at the road side and there is always present the notion that the individuals involved were not expecting a situation to unfold as it did, were not prepared to deal with the emergency situation and or could not avoid it and ultimately lacked applying greater knowledge to assist them to predict and prepare for a given situation.

There needs to be a change in how we train, what we train for and the knowledge we should be applying to a given situation. How do we gather information, how do we interpret it and how we can understand and misunderstand scenarios and ultimately how do we disseminate that throughout the riding population. How do we learn more about accident and near miss causes, more about injuries and more about errors and how do we learn about fixing the problem of repeat causes.

We can find a solution to the majority of motorcycle accidents and we can deliver that in a rather simple fashion by focussing on the fundamentals of rider skills, improving knowledge...and applying it, have initial & recurrent training models that emphasise the core elements and provide initial & periodic testing to achieve a higher level and greater understanding of potential and developing hazards and taking preventative and or emergency evasion action. This can be achieved and introduced at all levels and is not even cost prohibitive either as it should be an 'every solution - every rider' strategy.

3.4 Characteristics of PTW fatal crashes

The sub heading relating to the characteristics of PTW fatal crashes is an expose' on data, but it does not explain the reasons for the crashes, nor the dynamics leading to the fatalities. Without this knowledge, the data remain exactly that.

Furthermore, due to the different methodologies of gathering data throughout the world, as suggested in the report, it is difficult to grasp the overall problem of collision fatalities which is exacerbated by the use of million (or billion) kilometres (or miles) travelled as a means of identifying risk. The reason for this is that for example in Northern European countries, PTW usage tends to be far less than car usage and seasonal and therefore incompatible with other forms of transport and with PTW usage in southern European and Low Income countries.

The Department for Transport in the UK acknowledges that the measurement for travelled distances as a means of calculating risk (identified as flow monitoring)[4] is flawed, partly because of the seasonality of PTW usage in the UK, but also because of the problems of identifying two wheeled vehicles while surveying passing vehicles on the road. Also ref. Page 78 DfT Road Safety Good Practice Guide: *"Two-wheeler flows tend to be extremely low, compared with those of other motor vehicles, and therefore assessing, subjectively or objectively, the effect of the scheme on cyclists or motorcyclists is very difficult".*

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More to the point, the lack of evidence from in depth studies lessens the impact of the report. Thus we would propose as an example, the following excerpts from the report Motorcycle Fatalities in Northern Ireland 2012. This study was an analysis of n. 39 case files of the

[4] http://www.ukroads.org/ukroadsafety/articlespapers/roadsafetygoodpracticeguide.pdf

Road Traffic Collision Investigation Unit of Forensic Science Northern Ireland and the Northern Ireland Coroners' Service between 2004 and 2010[5].

"The report contains an analysis of the collisions investigated and includes information relating to vehicle data, the collision scene and the environment as well as human factors. Overall, n.41 motorcyclists were fatality injured.

The evidence provided in this report indicates that each road traffic collision is unique but that in all cases the time frame from the perceived hazard to the conclusion of the impact either with another vehicle or with road infrastructure was typically between 2 and 3 seconds.

Information from the case studies indicates that the conditions for riding were generally optimal and during daylight. There were no evident mechanical faults with the vehicles found, although in two cases the tyres were significantly underinflated which contributed to the collision.

Braking

In 63.4% of cases, (n.26/n.41) motorcyclists applied their brakes prior to the collision and n.18 (43.9%) applied their brakes severely. Of the n.17 (41.4%) motorcycles that slid after falling, n.10 (24.4%) fell onto their right side and the remaining n.7 (17.1%) fell onto their left side. There were two cases identified where Anti-Lock Braking Systems (ABS) may have made a difference to the outcome of the collision, both were on a straight section of road. At this point in time, the application of ABS on motorcycles is limited to straight sections of the road (although the development of this form of braking system will aim to include braking on curves as well).

Other Vehicles and Conspicuity

Of the n.39 cases analysed, there were n.17 cases (43.6%) in which another vehicle was considered the primary cause of the collision. In thirteen of these cases (76.5%), the evidence highlighted that the motorcycle's lights were switched on and therefore the other vehicle driver was in a position to see them (in three further cases the investigators were unable to determine whether the motorcycle lights were switched on). However, there appears to be a problem of looking but not seeing which may be due to the size of the motorcycle or simply because the car/van driver is expecting to see another car or van and has difficulty coping with the unexpected. There also appears to be an issue with the visibility from the cab of trucks to see the dipped beam of the motorcycle, which appears to be limited due to the height of the truck, this may have an effect on the perception of the oncoming motorcycle".

Other Motorcycle Fatality studies

As an example of an excellent study, Jim Ouellet, who worked closely with Prof. Harry Hurt on the 1981 "Hurt Report" of 900 motorcycle accidents, is completing a final report on a second study of 304 motorcycle fatalities in California. His study focuses in particular on the effect of helmets on neck injuries (providing more evidence that helmets do not cause neck injuries). This is an important study entitled "*On-Scene, In-Depth Investigation and Analysis of Motorcyclist Fatalities in Los Angeles, 1978-1981*". Further comments from this report are included in chapter six under the heading "Helmets".

[5]Motorcycle Fatalities in Northern Ireland 2012 www.righttoride.org.uk

Chapter four: Factors contributing to PTW crashes and their severity

4.1 PTW rider-related crash factors

Alcohol

In reference to violations including speed and alcohol, the analysis provided suggests that these violations are a global phenomenon, but this is not necessarily true in the sense that different cultures have different attitudes to alcohol (ab)use and therefore what may be considered a problem in certain countries is less important or not problematic in other countries. e.g. the Southern Mediterranean countries have a completely different attitude to "drinking" from Anglo-Saxon countries and we would presume that in Muslim countries this violation would be less of an issue for religious and/or prohibitive reasons.

In the case of Europe, different countries have different legal limits, so for example in Sweden where the legal limit for driving or riding is 20 mg per 100 ml, it is far more likely that "alcohol" violations would be far greater than in the UK where the legal limit for driving or riding is 80 mg per 100 ml – or four times greater than in Sweden. In other words, it is relative to the conditions, culture and circumstances of countries as well as to attitudes.

Speed

There is a focus on speed and the influence that it can and does have on the severity of the crash. Equally there is mention of the speed according to the conditions of the road, however, this is relevant in terms of control of the vehicle and the skills of the rider.

Furthermore, the design of motorcycles has made them increasingly more specialised and increasingly safer. However, certain motorcycles are manufactured with race tracks in mind which can create problems both in terms of injuries and attitude as highlighted by accident causation studies in Sweden, the U.S. and the U.K. What perhaps requires consideration is that until recently – some PTW manufacturers actively promoted urban racing and encouraging young riders to be "like their heroes".

The incitement to take risks can be due to the marketing strategies of the motorcycle manufacturers[6]. With sales videos and websites[7] that encourage riders to do stunts like 'knee down', 'wheelies' or 'stoppies' or sliding the bike - these are the sort of actions that risk takers tend to enjoy -all those things that create an image of risk.

Advertising is important for the whole motorcycle industry and their products require an emotional acceptance by consumers.

Twenty years ago, the car industry realised that selling speed and power was detrimental to the safety of car drivers and stopped using this type of marketing strategy. Perhaps the time has now come for all motorcycle manufacturers to "grow up" and realise that mobility for all, should not include advertising that promotes "Action Man" imagery i.e. stunts, speed and power.

However we recognise that the industry's stance on safer riding is to encourage good behaviour and perhaps the industry association may wish to ensure that its members do the same.

[6] http://www.autoevolution.com/news/2010-aerox-fiat-yamaha-team-race-replica-revealed-19124.html
[7] http://www.youtube.com/watch?v=JHw2BpcImZE

4.3.1. Road design, condition and maintenance

Road restraint systems / barriers

"However, according to Rizzi et al (2012) no significant differences are found between wire-rope and other type of discontinuous guard rails. Nevertheless they found that the position of the motorcyclist when impacting the guard rail is the most important influence on the overall outcome of the collision".

The issue of wire rope barrier restraint systems is a major concern for many riders and rider groups in the injuries that they can inflict. While we understand that the document cannot but mention this *but can be very aggressive for PTW riders in case of a collision with them* and can only be brief in discussing the pros or cons but only quoting one study from a raft of studies that are of differing views appears to be from a riders stance brushing over the issue.

To be brief as regarding our own concerns regarding these "aggressive" restraint systems in the context and for the overall fitting of wire rope barriers (Vehicle Restraint Systems -VRS) as regards motorcyclists, TD19/06 (Highways Agency GB) quite plainly states that the Road Restraint Risk Assessment Process – RRRAP – is not capable, at present, of assessing the risk to motorcyclists.

Therefore in our opinion these systems are being fitted without consideration for the risk regarding injury and death to motorcyclists – in fact there appears to be no consideration to other vehicles or non motorised users (i.e. behind the VRS installation) or how a motorcycle reacts when striking the wire rope barrier.

A study by DEKRA (Germany) and the University of Monash (Australia) carried out in 2005 supports the reference from Rizzi et al (2012) on the rider position when striking a "guard rail":

"In all simulations the motorcycle slides along the wires until it hits a post, squeezing and trapping the rider's leg against the wires as it does so. The post contact causes the motorcycle's front wheel to snag lifting the front of the motorcycle up and throwing the rider's torso and head forward."

"Because the rider's leg is trapped between the motorcycle and the wire ropes and the foot snags in the ropes, the head and torso slap into the front of the rising motorcycle. Eventually the leg becomes free as the motorcycle rotates and the rider is then catapulted over the barrier"

Chapter five: Countermeasures addressing road user behaviour

5.2. Licencing, training and education (see previous comments regarding sub heading 2.2.2 Chapter two)

With reference to Initial training, what is conspicuous from its absence is any reference to the Initial Rider Training Programme developed by FEMA, the Federation of European Motorcyclists, FIM, Federation Internationale di Motocyclisme and ACEM – the European Motorcycle Manufacturers Association.

The programme overwhelmingly covers almost all the points raised in the OECD/ITF document in reference to good basic training and hazard perception and behaviour. It is unfortunate that a European Union funded initiative of such scope is not mentioned.

In the event, the Initial Rider Training (IRT) programme has been translated into numerous languages and can be found or ordered online here http://www.initialridertraining.eu/

The absence of reference to this document needs to be addressed, in consideration of the fact that it was repeatedly referred to in the OECD/ITF Motorcycle Workshop held in Lillehammer, Norway in July 2008 (ITF/OECD/JTRC/TS6(2008)1)

From the Introduction of the IRT document, it sets out the aims and objectives clearly:

> *"The IRT Project has addressed one of the main problems affecting the quality of initial rider training, namely the concentration on machine control skills to the detriment of hazard awareness and rider attitude and behaviour. The relationship between newly qualified rider overconfidence, failing to recognise hazards and take risks and pre licence training that has overly focussed on machine control skills, has been recognised for a long time.*
>
> *Notwithstanding this the IRT Supervisory Board are unaware of any previous serious or structured endeavours to develop a pre-licence training programme that even attempts, let alone achieves a balance between machine control and hazard awareness.*
>
> *This, we believe, the IRT Project has successfully done. Working with acknowledged experts covering a wide range of motorcycling, academic and road safety interests, the resulting IRT model European initial rider training programme can deliver machine controls skills in the context of their relevance to the hazardous environment of today's roads, with an understanding of the rider having a primary responsibility for his or her own safety. The IRT Supervisory Board are sure that the IRT model European programme will offer a real improvement to much of the pre licence training presently available to riders within the European Union.*
>
> *The modular structure and pedagogical approach of the IRT model European initial rider training programme can also offer a real improvement to the availability of initial rider training. Whilst it has been primarily developed to be used in a training environment where the rider is paying for the services of the instructor, in can also be utilised in a range more informal training situations. It will offer real assistance to the family member or friend, or the motorcycle club or safety organisation, seeking to impart good, safe riding skills, often in circumstances where professional training is not available or is of poor quality.*
>
> *In support of these main aims the IRT Project has considered the very exciting and innovative area of e-Coaching and the contribution that it could make to improving initial rider training, particularly in the context of exposing riders to virtual hazardous situations without putting them in any way at risk. The work undertaken by the IRT Supervisory Board has concluded that an e-Coaching approach as envisaged within this Final Technical Implementation Report and the report of the Hypermedia Unit of Tampere University of Technology, does have the potential to make a major contribution to the safety of riders of motorcycles and scooters. The IRT Supervisory Board believes that it is particularly important that their work on this question is followed up and see the European Commission as possible being the only institution able to so do.*
>
> *Riding a motorcycle or scooter offers freedom and flexibility for many people. It is fun and can be exciting. It has to be recognised however that the rider is vulnerable and even if the rider is not at fault, as is the case in the majority of accidents, without the*

benefits of the range of passive safety measure available to drivers they are more likely to be hurt.

The IRT model European initial rider training programme in its present Theoretical, Machine control and Traffic interface three element form, offers to the new rider the best chance of meeting the challenges and recognising and managing the hazards that will be met. The addition of a fourth e-Coaching element could further and significantly improve the situation.

The conclusion and recommendations of the IRT Project are in no way seeking to advance any vested interests. Their intent is only to make future riders of motorcycles and scooters better trained and safer".

In sum, the evaluation of crash avoidance skills training should include the following elements:

- Braking effectiveness in real-world traffic situations with the various existing and future braking systems.
- Cornering skills and strategies on the road.
- Swerving effectiveness on the road.
- Development of essential mental strategies for safe riding judgement, including visual directional control and an active hazard search, and anticipation.

However, experienced based knowledge shows that such manoeuvres are extremely difficult to carry out in real-life situations, particularly for inexperienced, novice riders. It requires skills and experience to be able to apply the correct braking force to the two systems. It is also one of the most critical operations, especially in panic situations.

A typical error in a panic situation is generally the incorrect use of the brakes, causing the wheels to lock and the tyres to lose grip. Riders often fail to avoid collisions through insufficient use of braking force because of the fear of over-braking and losing control.

According to Duncan MacKillop, a motorcycle instructor in Great Britain, in an accident scenario the rider is confronted to a fundamental surprise, where the instinctive reaction is to try to stop rather than to take avoiding action. Because the rider is looking at the car, the result of this reaction is to collide with the car. One of the co existing conditions during fundamental surprise situations is most often that of fear.

In a fundamental surprise situation only those actions that are instinctive or which can be performed without command will be used (in an emergency, you will only do what you know), any strategies that need any conscious thought processes will immediately be abandoned. Hence, just knowing about a strategy will not be sufficient for that strategy to be implemented in an emergency[8].

With reference to the comment in item 5.2.6 – Effectiveness of training and expectations vis a vis riding safety - "Ideally the effectiveness of training should be based on the reduction in numbers of killed and injured". This is a fundamental flaw.

Training is designed to prevent CRASHING. We don't teach people how not to hurt themselves when they crash therefore you cannot effectively measure one against the other - too many other variables. A better way to start would be to state what we don't know. We don't know how often riders crash - the report makes that clear.

[8] http://www.network.mag-uk.org/smidsy/How%20Close%20is%20Too%20Close.pdf

Without a clear statement of distance travelled per crash rather than per injury, it's doubtful whether any comparison of data between nations - even between regions - makes a great deal of sense.

We don't know why riders crash. We know a lot about where they crash and how they crash, we know a lot about the consequences of crashing, and we know a lot about post-crash interventions. But as far as I am aware we know very little about how it is that one moment a rider who is making logical decisions that are based around staying upright and out of conflict with other road user and the environment, and is thus creating a pattern of behaviour that generates a "won't crash" state steps over some invisible line into a "will crash" state.

Virtually every manoeuvre we make is really a controlled near-miss - it's only the variation in the margin for error that's built-in by each and every road users that turns a 'safe' manoeuvre into a dangerous one. We may be able to see behaviours and activities that can pre-dispose riders to crash but that doesn't explain just what went wrong at that moment. The idea that roads can be safe is essentially a flawed view.

Looked at logically, no-one would ever design the free-for-all that constitutes our road network and the way we all use them!

In item 5.5 – conclusions "Access to PTWs should be gradual...aimed at managing young and novice riders risk as they are getting more experience? How - by restricting them to riding only in 'safe' conditions?

Why should access to PTWs be gradual? If one of the factors that affects accident risk is experience, why should access via a gradation of capacity / power be expected to have any effect on accident frequency? It's logical that new riders will have the same kind of accidents regardless of what machine they ride. Keeping them away from 'risky situations' only means that they have to approach those situations at a later date.

Reference item 5.3.1 General principles of Enforcement. Is there evidence for effectiveness? Do riders just get better at not getting caught? In any case, many errors are slips and lapses, not abhorrent behaviour. If the person making the mistake which leads to an accident, whether the rider or the driver, thinks they are making a correct rational decision which turns out in hindsight to have been wrong, how is enforcement to have any effect?

Chapter six: Countermeasures promoting the use of personal protective equipment

Riders in Europe recognise that personal protective equipment may help to reduce injuries and death. However, in terms of mitigating factors for injuries, the On The Spot (OTS) study carried out in Great Britain on behalf of the Department for Transport, (Feb. 2008) reports that protective clothing including helmets had no effect on the severity of the injuries incurred by riders. The table below shows a range of countermeasures for motorcyclists (behaviour). There were no significant effects of countermeasure on the accident severity rating.

The effect of countermeasures on ISI

Countermeasure	Mitigating factor	Relative effect on severity (difference from baseline)	Total Frequency	
			Present	Not present
Road user behaviour	Helmet worn	No effect	166	14
	Reflective clothing worn	No effect	174	28
	Dedicated motorcycle clothing worn	No effect	83	119

Source On The Spot study, DfT 2008, page 52 Table 4.39; (ISI: Injury severity index)

However, in the UK as in most northern European countries, the motorcycling community is safety conscious and riders have purchased protective clothing worth hundreds of thousands of pounds, therefore the use of personal protective equipment should not be made compulsory.

In fact the response to a questionnaire by BikeSafe UK, demonstrates that the overwhelming majority of motorcyclists use correct protective clothing.

Protective Clothing

	% of respondents
Jacket with reinforced padding/armour on the elbow, shoulders or back	96.2%
Boots with reinforced padding/armour on the ankle, knee or shin	87.8%
Trousers with reinforced padding/armour on the knee, outer knee or hip	87.6%
Gloves with knuckle/palm guard	80.5%

There is some confusion with regards to the standards for protective clothing. The European Standards for protective clothing set minimum levels for various characteristics that should ensure that all clothing which claims to conform to the standards will provide a reasonable level of protection. Clothing, gloves and boots which are subjected to testing and carry an independent and recognisable mark of reliability are a less risky purchase than unmarked clothing.

Motorcycle clothing can be divided into three groups:

- Non-protective. Outer clothing which constitute a barrier to the elements: heat, cold, wind and rain. Claims for any other form of protection breach the PPE Regulations, UK law, and industry and riders' groups' agreements with the European Commission.
- Non-protective supplied with CE impact protectors. A non-protective outer garment, as above, fitted with for example accredited shoulder, elbow, knee and back protectors bearing CE marking.
- Protective. Jackets, trousers, one-piece or two-piece suits, boots and gloves which are claimed by the manufacturer to be protective. Tested according to the European Standard (or the Cambridge or SATRA standards) and bearing CE marking. Garments must be fitted with CE marked protectors.

Where CE marked protectors are fitted to a non-protective garment (for example a textile jacket, or leather jacket, trousers and suits), this is misinforming consumers, because it claims that the whole garment is approved, but it is not. Some garments feature a "CE" label which is sewn to the lining, but this refers only to the status of the fitted protectors[9].

Helmets

Helmets are designed to prevent head injuries and helmet use is widely accepted in the motorcycling community. The most important issue with helmets is that helmet brands are frequently driven by commercial advertising rather than reliability.

The Department for Transport (GB) has issued guidelines for helmets. The scheme is called SHARP and is the Safety Helmet Assessment and Rating Programme for motorcyclists. SHARP enables riders to more easily select a helmet which matches their needs. It provides consumers with an independent assessment of the safety performance of helmets sold in the UK. The SHARP RATING reflects the performance of each helmet model following a series of advanced laboratory tests and rates helmets from 1-5 stars. SHARP now offers a

[9] There is an excellent description of the issues surrounding personal protective equipment on the following website: http://www.pva-ppe.org.uk/standards.htm#EuropeanStandardsformotorcyclists

single, easy to understand rating for helmet models available within the UK. The website: http://sharp.direct.gov.uk allows riders to rate the quality of their helmet of choice. The objective advice will help riders to choose the safest helmet suitable for them. The SHARP tests - which award ratings of between one and five stars - showed that the safety performance of helmets can vary by as much as 70%.

All helmets must meet minimum legal safety standards but the SHARP scheme uses a wider range of tests to provide riders with more information on how much protection a helmet can provide in a crash. However, Dr Nigel Mills, safety engineer from Birmingham University believes the European helmet testing system is flawed. During an intensive six-month study, Dr Mills found areas of concern, which has prompted the scientist to ask for SHARP ratings to be scrapped. Dr Mills feels that the British and European helmet standards could be amended to include tests for oblique impact protection, based on scientific consensus, with the design consequences considered[10].

The SHARP scheme only tests CE standard helmets, so if as Dr Mills implies, CE standards are flawed, then there is a major problem and this begs the question, are any of the helmets that riders wear in Europe fit for purpose? Irrespective of Dr Mills' findings, what the SHARP testing has highlighted is that the price of the helmet is not a measure for better protection. A helmet costing less than £100 may offer better protection than one that costs twice that amount.

In spite of all sorts of studies and claims, mandatory helmets do very little to reduce the possibility of brain injuries in severe crashes. The impact tests are all fine-tuned to measure what happens to the metal head form, but what's important is the brain, not the skull or ears. If any money is to be spent, it should be on finding better ways to protect the brain, not on enforcement or campaigns. Or, just change the wording from "prevent fatality" to "prevent injury". Some pie charts in the study show that head injuries are only about 25% of total fatalities. Unlike seat belts and airbags that prevent impacts to the head, a helmet only works upon impact, and doesn't reduce serious/fatal injuries to other parts of the body. In the U.S. the DOT helmet drop tests result in about a 12 mph impact.

In any case, helmets do protect against injury, and also contribute to reducing distractions, and therefore reducing crashes. Helmet testing standards should be worldwide, and if helmets are made mandatory, there should be a requirement to evaluate the results.

From the study "*On-Scene, In-Depth Investigation and Analysis of Motorcyclist Fatalities in Los Angeles, 1978-1981*". In the Executive Summary, the authors comment:

"The primary effect of helmet use was NOT to increase or decrease brain injuries in the helmeted riders who died in a crash. Instead, the primary effect was to save many helmeted riders from death, so they simply didn't show up in this study. Two comparisons illustrate this point. First, in the 1981 Hurt Report of 900 motorcycle accidents at all levels of severity in Los Angeles, unhelmeted riders were 2¼ times more likely to die, on a per-accident basis, than helmeted riders (7.6% vs. 3.4%). Second, comparing that study to this one, 39% of the 900 riders were wearing a helmet when they crashed, while in this study of 304 fatalities, helmeted riders were 18% of fatalities unless we made a special effort to investigate more helmet cases."

According to Jim Ouellet the general rules for helmets are simple:

"More coverage is better, as the late Snell founder/director George Snively used to say, "if it looks like it provides protection, it damn well better provide real protection." (or something like that.) Full facial coverage helmet must have good energy-absorbing foam in the chin. It's

[10] http://perg.bham.ac.uk/pdf/motorcycle_crash_invest.pdf

usually less than in the crown, but it must not have any energy absorbing foam. Beyond that, in all these years of looking at crashes and helmets, it's been extremely rare for me to look at a helmet and say, "this guy would've been better if he'd worn this other helmet with the same coverage." It seems to me extremely rare to see the helmet that tickles the fine line of helmet quality actually affecting injury outcome.

There's a huge difference between wearing any properly made helmet and no helmet at all. On the other hand, there are very small differences between helmet effect on injuries and those differences mainly reflect helmet coverage. Let me put it this way: I think there is a range of impact energies that riders and helmets sustain, and there's a frequency with which those energies occur. It seems to me that the range of the energy band where helmet quality makes a difference is very narrow. The great majority of helmet impacts are well are well below that narrow band, while some (much less frequent) impacts are so severe that no current helmet can prevent brain injury or death. Combine that with the frequency of impacts that fall into that very narrow bandwidth, and you're looking for very rare events".

Chapter seven: Countermeasures targeting vehicles[11]

Collisions between cars and motorcycles can constitute more than 50% of all motorcycle accidents. Studies indicate that 8 of 10 collisions between cars and motorcycles are caused by inattentive car drivers, usually violating the motorcyclist's right-of-way. [12].

Several factors have been put forward, trying to explain why car drivers tend to overlook motorcyclists:

- Motorcycles and their riders are a relatively small component of total traffic and therefore the ability to recognise them is reduced. Many drivers do not have routine encounters with motorcyclists in traffic.
- Drivers tend to scan for large rectangular objects with their main axis being horizontal (cars) rather than smaller objects with their main axis being vertical (motorcycles).
- Cars have blind spots, such as door pillars, that can hide a motorcycle and rider.
- Objects and environmental factors, including other vehicles, roadside objects and light patterns can make it more difficult for drivers to identify motorcyclists in traffic.
- Distractions for drivers, such as eating, smoking, managing audio systems and operating mobile phones or GPS systems.

The most effective way to reduce fatalities and injuries resulting from collisions between cars and motorcycles is to focus on driver awareness and rider collision-avoidance strategies. Awareness of motorcycles and mopeds should become a compulsory element in initial driver training and licensing[13].

According to the ITF/OECD report on the workshop for motorcycle safety (2008) priority number eighteen recommends that "The minimum safety performance of PTWs should be based on Global Technical Regulations". This is contentious, as the World Forum for Harmonization of Vehicle Regulations (WP.29) and its various working parties at the UNECE (United Nations Economic Commission for Europe) depends on the strength of lobbying, thus the influence of motorcycle manufacturers which are strongly represented, as well as the car lobby that has its own vested interests, is a major problem for the motorcycling community in this arena.

[11] Ref: European Agenda for Motorcycle Safety, 2007, FEMA
[12] Data in the UK Department for Transport (DfT) report (2003) relating to collisions with other road users, highlights that 43% of motorcycle serious injuries are due to collisions with cars. The data from DfT Road Casualties report (2003) show that serious injuries are proportionately 3 times higher (24.5%) for motorcycles than for cars (8.2%)
[13] The EU Transport Commission has recently now decided to consult stakeholders about harmonizing driver training in Europe
http://ec.europa.eu/transport/road_safety/consultations/doc/2009_06_22_training_education_consultation_paper.pdf .

This is compounded by governments with their strength and agendas that tend to recommend only technical regulations as a solution. The representation of consumer interests is highly limited in challenging preconceived views and industry positions in this forum.

It is true that the design of motorcycles has made them increasingly more proficient and specialised and generally reflects a greater emphasis on safety. Current motorcycles have better brakes, greater stability, more responsive steering, more effective controls, improved ergonomics for reduced fatigue and improved reliability in all systems, than those of even a decade ago.

However, according to Prof. Harry Hurt[14], Sport bikes with raised gas tanks can be a problem. He argues that this design is perfect for racing, as a rider can tuck-in, resting his torso on the shape, to maximize straight-line speed. But *"there aren't many frontal collisions on the track. In real-life, though, frontal collisions are the most common form of crash".*

Based on 70 in-depth evaluations of specific cases that Prof Hurt's team of experts has already done, they discovered that the racing gas tank design results in far more serious pelvic and groin injuries, including the so-called 'Open Book Fracture' of the pelvis'.

Vehicle Equipment and warning systems

Because motorcyclists are usually separated from the motorcycle at some time during a crash, protective equipment attached to the motorcycle, e.g. so called 'leg protectors' or airbags, is less likely to be effective than protective clothing and should not warrant serious attention[15].

An EU Commission funded project in which advanced driver automated systems (ADAS) and In Vehicle Information systems (IVIS) were being developed for motorcycles in order to make motorcycles "safer" will include the use of Human Machine Interface (HMI) technology in order to warn the rider of a potential crash or collision. HMI systems may include vibration (seat or handlebar), pulsation (throttle), flashing lights on the display panel (dashboard), head-up displays on helmet visors and/or audio systems to act as an alarm to "warn" the rider.

However, in his presentation to the UNECE WP.29 ITS Informal Group, Peter Burns[16] highlighted that *"there are more effective and reliable ways to protect people and property than warnings:*

1. Eliminate the hazard through improved design, or
2. Offer some form of protection to limit damage.
3. If that does not work then – Warn"

Studies such as one carried out by Bliss and Acton[17], indicated that their experiment participants (70) *"reacted poorly to alarm urgency, becoming distracted and confused. Urgent, reliable alarms evoked responses that, while appropriate, led to a greater number of collisions. For this reason, advocating quick, reflexive reactions to automated alarm systems may not be a wise course of action. Furthermore, the negative impact of such reflexive behaviour may well be compounded in situations where task workload is heightened, or where there are a number of collateral alarm systems".* (2003:507).

[14] Motorcycle Consumer News, February 2005
[15] as highlighted in both the Hurt report (1981) and the MAIDS report (2004)
[16] Guidelines for Safety Critical Warnings; Peter Burns IHRA-ITS Informal Document No. ITS-15-09; 15th ITS informal group, 16 November 2007, agenda item 5.
[17] Bliss J.P, Acton S.A.(2003): Alarm mistrust in automobiles: how collision alarm reliability affects driving; Applied Ergonomics 34 pp 499–509

An NHTSA report (2006) on distractions highlighted that *"glances totalling more than 2 seconds for any purpose increase near-crash/crash risk by at least two times that of normal, baseline driving"*[18].

According to Burns (2007) A signal informing the driver of a hazardous situation, which if not corrected by an immediate action (0 to 3 seconds), will result in equipment damage and/or personal injury.

According to Dingus et al, *"The relation between advisory and collision warnings is conceptually similar to that between preventative medicine and disease treatment. An advisory warning may provide information and draw a driver's attention early in the consequence chain for the prevention of an emergency situation, but a collision warning follows a chain of events close to a crash or to a near-crash that needs immediate treatment. Thus the potential value of some advisory warnings might be the avoidance of the very need for collision warnings"* (1998:73) [19]. NB: an advisory warning system could be simply a warning sign on the side of the road.

Dingus et al also argued that *"Long term use of the systems and their effect on driver behaviour will have to be closely monitored. It is possible that behaviours such as driver over-reliance could result in a crash rate increase for particular designs. Technology has given system designers an opportunity to make great strides in crash reduction and improvements in transportation safety. However it must never be forgotten that technology in this application is a double-edged sword that must be wielded with care" (C.3:91)*

There are a number of other factors that need consideration, such as the accuracy of GNSS and GPS maps which are fundamental to the design of some warning systems. Furthermore, there are concerns about the reliability of hardware and software, the propensity for malfunction and the potential to go into a dangerous and/or unanticipated safety mode.
In a scenario where the rider has all these warning systems available but still crashes, who would be liable: the rider, the vehicle manufacturer, the ITS developer, the government, or the insurance company?

7.2. Vehicle maintenance and inspection

The current EU rules which only set minimum standards for vehicle checks date back to 1977, with only minor updates. The new proposals published on 13th July 2012 aim to widen its scope and include powered two-wheelers in particular. The Commission proposes mandatory tests for PTWs four years after the date of registration, followed by a second roadworthiness assessment after two years, after which the test must be carried out every year. As of January 2014, this measure was not yet implemented and a decision has been postponed to 2022.

It might be worthwhile expanding that: The directive compromised on the introduction for motorcycles – heavy motorcycles would be subject to periodic roadworthiness tests from 2022. However member states could exclude heavy motorcycles from testing if they have put in place alternative effective road safety measures, taking into account in particular road safety statistics of the last 5 years. Heavy motorcycles in this context are (L-vehicles with an engine displacement of more than 125 cm3).

[18] Report No. DOT HS 810 594 The Impact of Driver Inattention on Near-Crash/Crash Risk: An Analysis Using the 100-Car Naturalistic Driving Study Data; 2006:V
[19] Dingus T.A, et al. Human Factors Design Issues for Crash Avoidance (Chapter 3) Systems in Barfield and Dingus (1998) Human Factors in Intelligent Transport Systems

However for light motorcycles, within five years the Commission will submit to the European Parliament and the Council a report on the effectiveness of their possible inclusion in the scope of the directive.

Chapter eight: Countermeasures targeting infrastructure and traffic management

Riding defensively is important for motorcyclists. Riders need to concentrate on the traffic environment rather than on the quality of the road surface. In fact, infrastructure is the primary or contributing factor in many motorcycle accidents.

Road design, maintenance and construction are generally directed towards the needs of multi-track vehicles, with the needs of motorcycles often not taken into consideration. A possible explanation could be a lack of experience or awareness by engineers and maintenance personnel.

Road design and maintenance contribute to motorcycle accidents, particularly single vehicle accidents. Basic motorcycle needs for the best type of road network include:

- good adhesion whatever the weather conditions;
- clear signage that riders can see and understand;
- good visibility;
- minimal risk of impact against obstacles[20].

Standards need to be revised and developed to reflect the needs of motorcyclists, by encouraging motorcycle-friendly design, construction and maintenance procedures.
It follows that road design and maintenance personnel must be educated about conditions posing hazards to motorcyclists. Above all there is a need for quality audits to be undertaken on a regular basis, in which the needs of motorcyclists are included.

Infrastructure requirements for motorcycles would not lead to a substantial increase in public expenditure. It could however make a sizeable contribution to the sustainability of urban traffic.

Some European countries have already created a national standard for motorcyclist protection, with several others in the process of doing so. The ERF/IRF discussion paper points out that the Committee of European Normalization (CEN) has mandated the drafting of a new part to the European Standard for road restraint systems (EN1317-8), so that in the near future motorcyclists will benefit from roadside barriers studies, designed and tested with their specific safety in mind.

There is however, debate regarding motorcyclists and the EN1317-8 standard due to the fact that some pressure groups would like immediate recognition of motorcyclists based on the Spanish guidelines which only tests motorcycle friendly barrier systems with a sliding dummy (30 degree angle) in their standard (one of the issues with this is that the dummy is not a “motorcycle dummy” but is an adaptation of a car dummy).

Other road safety technicians would prefer to include more specific crash scenarios, including riding the motorcycle with rider sitting on it, as well as different collision angles and so forth. This view considers in-depth studies such as the German In Depth Accident Study data which develop crash scenarios focusing on the real world.

According to Swedish Road Safety technicians, studies had shown that 51% of riders were sitting upright on the motorcycle while hitting the barrier and about 47% were on the ground,

[20] Ref: European Agenda for Motorcycle Safety, 2007, FEMA

sliding towards the barrier. In Great Britain forward thinking road authorities in conjunction with crash barrier manufacturers e.g. The Highway Care Ltd - BikeGuard system[21] are fitting retrospective motorcycle friendly guardrails in locations which are prone to or identified as high risk.

With reference to wire rope barriers, there is evidence from a study by DEKRA (Germany) and the University of Monash (Australia) carried out in 2005[22]. The authors found that:

"In all simulations the motorcycle slides along the wires until it hits a post, squeezing and trapping the rider's leg against the wires as it does so. The post contact causes the motorcycle's front wheel to snag lifting the front of the motorcycle up and throwing the rider's torso and head forward. Because the rider's leg is trapped between the motorcycle and the wire ropes and the foot snags in the ropes, the head and torso slap into the front of the rising motorcycle. Eventually the leg becomes free as the motorcycle rotates and the rider is then catapulted over the barrier" (page 11).

The Institute of Highway Incorporated Engineers (IHIE) Guidelines for Motorcycling[23] sets out practical guidance for transportation professionals to provide a safer environment for motorcycles, mopeds and scooters.

The guidelines state that, *"In view of their vulnerability, the specific safety needs of motorcyclists need to be carefully considered by road designers and traffic engineers in the design, implementation and maintenance of any works on public roads."*
"However, it is unlikely that professionals on the operational side of road infrastructure provision will make a step change in their approach to catering for motorcyclists if the lead has not been set by policymakers at local, regional and national level."

The guidelines reflect that the role of the maintenance engineer is critical to this (motorcycle) mode of travel specifically regarding:

- In providing a consistent road surface with suitable skid resistance
- In keeping roads clear of contamination and debris
- In maintaining visibility, especially at bends and junctions
- In ensuring best practice in maintaining road signs, road studs and markings
- In setting up efficient, well-publicised systems so that members of the public can report road defects that receive prompt attention
- In implementing maintenance policies that focus on preventative action
- In designing winter maintenance regimes that keep the needs of riders in mind
- In ensuring that road works are safe for all road users

In Europe the ACEM report "Guidelines for PTW-Safer Road Design in Europe"[24], identifies road maintenance as an important aspect of motorcycle safety and lists specific issues for this purpose:

- a consistent road surface with proper skid-resistance;
- that the roads are kept clear of refuse and rubbish;
- that visibility is maintained, especially at curves and junctions;
- that the road-signs, studs and markings are maintained.
- that roadway defects are noticed and repaired quickly.

[21] http://www.highwaycare.co.uk/product_info/18/motorcycle-safety-barrier---bikeguard
[22] MOTORCYCLE IMPACTS INTO ROADSIDE BARRIERS – REAL-WORLD ACCIDENT STUDIES, CRASH TESTS AND SIMULATIONS CARRIED OUT IN GERMANY AND AUSTRALIA http://www-nrd.nhtsa.dot.gov/pdf/nrd-01/esv/esv19/05-0095-O.pdf
[23] http://www.motorcyclingguidelines.org.uk
[24] http://www.acem.eu/media/d_ACEMinfrastructurehandbookv2_74670.pdf

Chapter nine: Low and middle income countries and PTWs

Would it not be helpful to have further input from road safety stakeholders in countries such as India or China, in consideration of the high volume of usage of PTWs in these countries? The limitation of comments from these countries suggests that the report has not provided an encompassing global perspective.

Chapter ten: Developing and implementing an integrated road safety strategy for ptws

With regards to other vehicles, there appears to be a problem of looking but not seeing which may be due to the size of the motorcycle or simply because the car/van driver is expecting to see another car or van and has difficulty coping with the unexpected.

Further investigation into the perception of lights on motorcycles by OV drivers would be warranted.

Panic braking by motorcyclists is an important factor in the cause of PTW fatalities. Anti-lock braking systems (ABS) will be mandatory shortly through proposed legislation from the European Union, however this technology is relevant in some circumstances, but not all. At this point in time, the application of ABS is limited to straight sections of the road. It is not (yet) designed to work when the motorcycle is in a lean. The development of braking systems that can function as efficiently when the motorcycle is leaning either left or right, may improve casualty rates. However, care should be taken about too much focus on technology rather than good training and attitude.

There is one important factor that perhaps the motorcycle industry could easily address. All PTWs should have standardized control locations. The rear brake lever should be a foot pedal on the right side, to better equip a moped driver to step up to a large PTW with less confusion.

Emphasis is needed in car driver training to include more focus on scanning for VRUs. However it is difficult to test awareness out on the road *unless the novice driver or rider is presented with a situation which requires them to apply the skills acquired during training.* A possible solution could be simulator training whereby situations which include the unexpected (cases of VRUs appearing suddenly, or in the case of novice riders, the sudden appearance of another vehicle at a junction), may help to avoid panic situations, or prepare the novice to take more care and give more attention in specific situations – e.g. at junctions, or exiting onto a road from a private entrance.

The best solution to avoid road traffic collisions is anticipation and hazard awareness training. The only reliable way to prevent motorcyclist injuries and deaths is to prevent the collision in the first place, which means the rider needs to get his/her eyes up and scanning ahead, and then taking evasive action when a potential collision is still several seconds from happening.