An overview of serious road injuries in EU countries

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Abstract

Internationally, it is estimated that for every road death there are four permanently disabling, ten serious and forty minor injuries. The objective of this paper is the presentation of the latest knowledge and developments on the issue of serious road injuries in Europe.

A critical literature review was undertaken, covering the analysis of the definition and meaning of serious injuries, an overview of reported serious road injuries in EU, an estimation of their cost, the description of targets related to the prevention and mitigation of serious road injuries and how to address them through the Safe System approach.

A range of definitions of injury severity are used throughout EU. A new common definition of serious injuries agreed in the EU is an injury level of three or higher on the Maximum Abbreviated Injury Scale (MAIS3+).

In 2014, the number of officially reported serious injuries in EU countries was estimated just under 220,000, representing a 13% reduction since 2010.

Although the long-term impacts of road injuries are largely unknown and many national estimates do not consider the cost of long-term disability, it is clear that reported serious road injuries amount to substantial socio-economic costs.

A number of intervention strategies are proposed by the Safe System Approach towards minimizing and preventing serious road injuries such as safety conscious planning and design, encouraging the use of safer modes and routes, safe separation/integration of mixed road use, managing speeds, providing protective roadsides and vehicles, deterring dangerous behaviour, managing risk via vehicle and driver standards and fast and efficient emergency medical care.

Keywords

Road Safety; Serious Road Injuries; European Union

1. Introduction

While road deaths are typically used as the benchmark for defining and comparing road safety performance internationally, it is estimated that for every death there are four permanently disabling injuries, ten serious injuries and forty minor injuries. While progress has been made towards their reduction – an average over 40% decrease in serious injuries has been achieved since 2001 across Member States (ETSC, 2015b), serious non-fatal road injuries present a major EU health problem with substantial humanitarian impacts and economic costs to society:

- In 2014, the number of serious road injuries in the 23 EU countries that distinguish between seriously and slightly injured was more than 203.000.
- Since 2010 the number of people seriously injured on roads of the above 23 EU countries has been reduced by just 1,6%, compared to an 18% decrease in the number of road deaths.
- The number of serious road injuries in 2014 increased by more than 3% compared to 2013 results.
- Research indicates that 50% of the total social costs of road crashes in high, middle and low-income countries relate to injuries. Two-thirds of these are serious injuries.

The World Health Organisation (2015) states that serious and fatal injuries are predictable and preventable. Accordingly, the road safety focus is turning away from the need to try and prevent all crashes (which is seen as unrealistic and of insufficient priority) to the prevention of death and serious injury. At the same time the acknowledged need is to define better, understand the scale and cost of, target the prevention of and monitor

both fatal and serious injury in road traffic crashes. The Safe System approach calls for a broader focus on the ultimate prevention of both fatal and serious injury, supported by interim quantitative targets for reducing these outcomes as well as targeting improvements in intermediate outcomes which are causally related to these. It calls for government–led shared responsibility in addressing goals and targets amongst system providers and users, different sectors and levels of government, business and the community.

At EU and national levels there is an increasing concern about seriously injured casualties, alongside road traffic deaths. New attention is being given at EU policy level and in the High level Group on Road Safety given the prevalence of serious injuries, the slower improvement achieved for serious injury as opposed to fatal injury and the new reporting for Maximum Abbreviated Injury Scale (MAIS) >=3 serious injury expected in 2015. EU action falls mainly within the framework of the European Commission's Transport White Paper (2010); Road Safety Strategy (2011-2020), the TEN-T network, the Horizon Research Programme (2015), vehicle standards initiatives crossing many sectors and its work with accession countries and neighbours.

The reduction of serious road injuries was one of the seven strategic objectives set by the Commission in 2010 in Policy Orientations for Road Safety (2011-2020). A strategy of action on serious road injuries was subsequently identified as a priority initiative in the Commission's 2011 White Paper on a Single European Transport Area. The Commission has noted that "a focus on serious injuries does not compete with a focus on fatalities – the objectives complement each other". The Commission also recently reported in the interim evaluation of the road safety strategy that "the strategic target and the actions under the Policy Orientations are not seen to sufficiently tackle the large number of serious road injuries. Monitoring of injury reduction at EU level is weak." In a declaration signed in March 2017, transport ministers recommitted to an existing EU target to halve roads deaths by 2020 and also promised long term targets for reducing deaths and, for the first time, serious injuries by half by 2030.

In view of these developments the objective of this paper is the presentation of the latest knowledge and developments on the issue of serious road injuries in a scientifically sound text, easy to read and ready to use. Specifically, an extensive review of the most recent existing literature on serious road injuries was carried out and the results of pertinent studies were gathered, analysed and combined.

The objective of this paper is to present and discuss aspects of serious road injuries including what is meant by serious injury; key factors and how progress towards preventing and mitigating costly humanitarian and socio-economic outcomes can be made; and key activity to date as well as a brief outline of recommended action at EU and national levels.

2. The meaning of serious injury

2.1 Defining, measuring and recording serious injury

A range of definitions of injury severity and approaches to measuring serious health loss are used throughout the EU (Table 1). Criteria used in police records and official statistics to classify the severity of a crash vary from country to country. The following list provides examples of such criteria but is not exhaustive:

- The length of hospitalisation (used in many countries), a person seriously injured is a person hospitalised, other than for observation, for more than 24 hours.
- The type and level of injury. In some countries an injury scale is used (e.g. MAIS).
- The inability to work.
- The length of recovery.
- Long-term disability.

Due to differing definitions of serious injuries in national road crash reporting systems, comparisons of performance and target-setting have not been possible at EU level. Whereas a casualty which might be recorded as seriously injured in one country, the level of injury might be recorded as slight or minor in another. While most fatalities are reported to national crash data systems, studies have indicated that only around 70% of all serious injuries are reported (Elvik and Myersen, 1999). Misreporting and underreporting are largely due to the fact that in most EU countries, the national road traffic injury databases are only based on police reports.

It is widely acknowledged that no single database provides enough information to give a complete picture of serious road injuries and to fully understand underlying injury mechanisms. Road safety experts agree that the use of health sector data for meaningful injury classification at country level is necessary to complement police data and to provide an optimal means of defining serious injury (Broughton et al., 2008; IRTAD, 2011).

Furthermore, in-depth data is needed from crash injury research to lead to meaningful conclusions concerning serious crash and serious injury causation (Breen, 2012).

Different measurement approaches are also used in hospital reporting and in the public health sector. These are used for assessing injury severity, the probability of survival and long-term serious health loss. They are also used for determining the appropriate hospital for the crash victim, evaluating trauma system performance and for research purposes.

Table 1: National definitions of serious road injury (European Commission, 2013)

Member State	Country definitions of serious road injury (2013)
Austria	> 24 days health impairment
Belgium	> 24 hours in hospital
Bulgaria	As defined in penal code
Croatia	Definition unknown
Cyprus	Hospitalised
Czech Republic	As decided by medical doctor or >=24h hospital
Denmark	Intracranial injury, skull fracture, face or eye injury; injury of trunk (chest and/or abdomen); injury of spine and/or pelvis; fracture/dislocation or severe sprain of shoulder, arm or hand; fracture/dislocation or severe sprain of hip, leg or foot; serious injuries in more than one main region, burn. The statistics only include injuries reported by the police.
Estonia	Not defined
Finland	Not defined
France	>=24 hours in hospital
Germany	>=24h in hospital
Greece	Police records; presumed >=24h in hospital
Hungary	Injuries needing hospital care or >8 days to heal
Ireland	Hospitalised or according to national definition: An injury for which the person is detained in hospital as an 'in-patient', or any of the following injuries whether or not detained in hospital: fractures, concussion, internal injuries, crushings, severe cuts and lacerations, severe general shock requiring medical treatment.
Italy	Not defined
Latvia	>=24 hours in hospital
Lithuania	Definition unknown
Luxembourg	>=24 hours in hospital
Malta	Health department/Police definition
Netherlands	>=24 hours in hospital
Poland	Serious disability, serious incurable illness or a long term illness actually endangering life, permanent mental illness, complete or a significant loss of ability to work or a permanent disfigurement of the body as well as injuries such as fractures, damage of the internal organs, serious cut or irregular wounds
Portugal	>=24 hours in hospital
Romania	Hospitalised or: Injuries requiring hospitalisation or any of the following injuries whether or not they are detained in hospital: Organ injuries, permanent physical or psychological disability, body disfiguration, abortion, fractures, concussions, internal wounds, serious cuts or broken parts, or severe general shock which requires medical care and injuries causing death 30 or more days after the accident.
Slovakia	Doctor's opinion + change of state between 1 and 30 days
Slovenia	>=24 hours in hospital
Spain	>=24 hours in hospital
Sweden	Injuries expected to result in hospitalisation
UK	Hospitalised or: An injury for which a person is detained in hospital as an "in-patient", or any of the following injuries whether or not they are detained in hospital: fractures, concussion, internal injuries, crushings, burns (excluding friction burns), severe cuts, severe general shock requiring medical treatment and injuries causing death 30 or more days after the accident.

2.2 A new common EU definition of serious injury

While a common definition of fatal injury in road crashes has been in place for many years, no common definition of serious injury has been available until recently. In order to start to address these issues the European Commission and the High Level Group on Road Safety agreed on a new common definition of serious injuries in January 2013. Serious injury is newly defined as an injury level of MAIS3+ which was recommended by EU projects such as SafetyNet and international organisations such as the International Transport Forum.

The Maximum Abbreviated Injury Scale (MAIS) is a globally accepted and widely used trauma scale used by medical professionals. It provides an objective and reliable basis for data collection and international comparisons. The injury score is determined at the hospital with the help of a detailed classification key. The score ranges from 1 to 6, with levels 3 to 6 considered as serious injuries. Injuries classified as ≥3 on the MAIS scale are the most serious injuries and ones that involve significant or long-term damage, consequences and costs

and where efforts should be focused. The aim is for serious injury data to also be made available in the longer term in disaggregated form allowing more detailed analysis, as is already the case with road fatalities (European Commission, 2013).

All EU countries are expected to provide data to the new definition of serious injury. This reporting system is running in parallel with reporting using Member States own definitions for a transitional period.

The High Level Group identified three main ways Member States can collect data: 1) by applying a correction on police data. The Commission has entered into a contract with the AAAM for making available a methodology and conversion algorithm from ICD codes to MAIS codes to all Member States, 2) by using hospital data and 3) by using linked police and hospital data (European Commission, 2013).

3. Serious road injuries in EU countries

Since 2001 a 29% decrease in serious injuries has been achieved compared to a 53% decrease in deaths with the majority of EU countries experiencing more rapid reductions in road deaths than in serious injuries. In 2014, the number of officially reported serious injuries in the 23 EU countries that distinguish between seriously and slightly injured (using Member States' differing definitions) was estimated by the European Commission to be more than 203,000. This represents a 1.6% reduction compared with 2010. The number of serious injuries is not decreasing as rapidly as road deaths and increased by 2.6% in 2014 compared to 2013. There are 8 to 9 reported serious injuries for every road death (European Commission, 2015). Many serious injuries, however, go unreported. For every person killed on the roads it is estimated that there are around 10 serious injuries, 4 of which involve permanent disability (Mackay, 2003). Based on reported data, it is estimated that on average there are 5 serious injuries for each road fatality in the EU (European Commission, 2016).

In EU countries more than half of all serious injuries occur inside built-up areas. 45% of all seriously injured persons are vulnerable road users (pedestrians, cyclists, powered two-wheeler drivers). Within urban areas the vulnerable road users are almost 67% of those who are seriously injured. The young and the elderly are over-represented among the seriously injured in road crashes and especially the elderly pedestrians.

There is no EU-wide collated data at present on patterns of injury in serious road crashes, although a new study has recently been launched. In-depth studies conducted in different parts of Europe and elsewhere have indicated that:

- Motor vehicle crashes are the leading cause of traumatic brain injury. Some 25% of road accident victims admitted to hospital sustain traumatic brain injuries. Brain injuries often have long-term consequences for victims and their ability to function.
- The priorities for preventing MAIS >=3 injuries in road collisions are head and spinal injuries. Neck and spine injuries require on average the longest hospital stays and can also cause chronic pain or permanent disability. Injuries to legs and pelvis are often not life-threatening, but are very common and also entail a risk of permanently impaired mobility.
- Serious burns and wounds can lead to permanent disfigurement affecting the individual psychologically as well as physically. In addition, survivors of crashes, including their families and carers, often suffer from social and psychological trauma.
- Pedestrians and motorcyclists suffer the most severe injuries as a result of motor vehicle collisions, report more continuing medical problems and require more assistance, compared with other types of road user. Some 81% of all seriously injured motorcyclists have head injuries. Lower-leg motorcyclist injuries are frequent but may be less severe in terms of threat to life, resulting either from direct contact with the impacting vehicle or result from impact between the motorcycle and the ground.
- Head or brain injury is present in about 50% of all younger hospitalised crash victims.
- Around 1 in 5 patients attending hospital with fractures to the upper or lower limb, or a soft tissue injury to their cervical spine (whiplash) have some form of disability 4 years after the crash.

4. The cost of serious road injuries

The methodology for assessing the cost of serious injuries, where this is carried out, varies amongst EU Member States (European Commission, 2016). The estimated social costs of traffic injuries also vary amongst EU Member States (Table 2).

As indicated previously, the long-term impacts of road injuries within the EU are to a large extent unknown. Many national estimates, therefore, do not take account of the cost of long-term disability resulting from road traffic crashes and associated intangible costs.

While more work is being carried out at EU level on serious injury costs, it is clear that reported serious injuries in road crashes already amount to a substantial value of prevention. One study found that around 50% of the total social cost of road crashes in high-income countries is related to injuries, of which about two thirds are serious injuries (Wijnen, 2013). Motorcycle leg and head injuries and injuries to vulnerable road users are particularly costly (Peden et al, 2004). The large burden of costly injuries is borne by society in general, but particularly by the health sector and by employers with the premature loss or disablement of the EU's most economically active citizens. Road crashes also have implications for social equity and have a disproportionate impact on disadvantaged citizens. The loss of the major family wage earner in road crashes can push people into poverty as well limiting the ability of victims to cope with the consequences.

The potential for socio-economic savings is thus very large. Estimates undertaken by ETSC show that, if all serious injuries recorded in 2010 could have been prevented, the benefits to society would have been more than 50 billion Euro in that year (ETSC, 2015).

Table 2: Average social costs of traffic injuries at market prices (PPP) in Euro, (Ricardo-AEA, 2014)

Member State	Fatality	Severe Injury	Slight injury
Austria	2.395.000	327.000	25.800
Belgium	2.178.000	330.400	21.300
Bulgaria	984.000	127.900	9.800
Croatia	1.333.000	173.300	13.300
Cyprus	1.234.000	163.100	11.900
Czech Republic	1.446.000	194.300	14.100
Denmark	2.364.000	292.600	22.900
Estonia	1.163.000	155.800	11.200
Finland	2.213.000	294.300	22.000
France	2.070.000	289.200	21.600
Germany	2.220.000	307.100	24.800
Greece	1.518.000	198.400	15.100
Hungary	1.225.000	164.400	11.900
Ireland	2.412.000	305.600	23.300
Italy	1.916.000	246.200	18.800
Latvia	1.034.000	140.000	10.000
Lithuania	1.061.000	144.900	10.500
Luxembourg	3.323.000	517.700	31.200
Malta	2.122.000	269.500	20.100
Netherlands	2.388.000	316.400	25.500
Poland	1.168.000	156.700	11.300
Portugal	1.505.000	201.100	13.800
Romania	1.048.000	136.200	10.400
Slovakia	1.593.000	219.700	15.700
Slovenia	1.989.000	258.300	18.900
Spain	1.913.000	237.800	17.900
Sweden	2.240.000	328.700	23.500
UK	2.170.000	280.300	22.200
EU average	**1,870,000**	**243,100**	**18,700**

5. Targeting the prevention and mitigation of serious road traffic injury

5.1 Serious injury and the long-term *Safe System* goal and approach

Safe System has as its long-term goal a road traffic system which is eventually free from death and serious injury. It involves an important paradigm shift from trying to prevent all crashes to preventing death and serious injury in road crashes. The adoption of this 'Towards Zero' goal is fundamental to using a *Safe System* approach since it has an important influence on the choice of intervention. Measures which prevent death and prevent and mitigate serious injury may be quite different from measures to prevent crashes in general. *Safe System* tolerates the occurrence of crashes as long as they do not lead to serious health loss. *Safe System* is based on the underlying principles that:

- human beings make frequent mistakes that lead to road crashes;
- the human body has a limited ability to sustain crash forces – tolerance to injury thresholds are well-known

- it is a shared responsibility between stakeholders (road planners and managers, vehicle manufacturers, emergency medical system providers and road users etc.) to take appropriate actions to ensure that road crashes do not lead to serious or fatal injuries (ITF/OECD, 2008)

The extent to which road traffic system elements address known human tolerance thresholds and other human characteristics is critical. A focus on road network safety factors, vehicle safety factors, emergency medical system factors that address common human error as well as offering crash protection and injury mitigation to address known human characteristics is key to identifying actions to address goals and targets for serious and fatal injury. The speed of motorised vehicles is central since it affects both crash causation and crash severity and influences the effectiveness of a range of measures. This understanding forms the basis of the *Safe System* approach which is being promoted widely by international organisations and adopted increasingly all over the world (Breen, 2015; OECD, 2016).

5.2 Interim targets at EU and national levels

The long-term *Safe System* goal needs to be backed up by interim, quantitative targets over a defined period to reduce numbers of deaths and serious injuries (OECD, 2008). In a *Safe System* approach there is much focus on targeting intermediate outcomes that are casually related to death and serious injury. Intermediate outcome targets include percentage increases in seat belt use and crash helmet use; percentage reductions in average speeds or speeding over the limit; percentage reductions in levels and drinking and driving; improving the safety quality of the new vehicle fleet through use of Euro NCAP star ratings or for the road infrastructure using road assessment programme ratings Euro RAP and improvements in emergency medical response. This approach is highly recommended as international best practice by the OECD, World Bank, ISO and other organisations and EU countries are increasingly working with these factors.

While many measures simultaneously address serious and fatal outcomes, specific targeting of serious injury is warranted since, for a number of reasons, preventing serious injury can require different countermeasures from those selected to address fatal injury prevention.

As for the previous action programme, the existence of the EU road safety goal, fatality reduction target and road safety strategy is playing a key role in encouraging ambitious national targets, many of which replicate or align with the EU 2020 target. (Breen, 2015)

The interim review of the current EU road safety strategy (June, 2015) noted that “a target on the serious road injuries remains to be set.” In September 2015, the European Parliament reiterated calls for a pan-European target to reduce the number of serious road injuries calling for “the swift adoption of a 2020 target of a 40% reduction in the number of people seriously injured, accompanied by a fully-fledged EU strategy.”

The European Transport Safety Council (ETSC) recommends that the EU should adopt a target of a 35% reduction between 2014 and 2020 in the number of people seriously injured on the roads. A 35% reduction in the number of seriously injured between 2014 and 2020 would be similarly challenging and achievable for the Member States to the target to halve road deaths between 2010 and 2020.

Experts underline that any target for serious injuries set in this decade can only be aspirational since setting a target based on historic standardised figures would require at least 5 years of MAIS3+ data and experience of effects of safety policies and measures on MAIS3+ numbers (ETSC, 2015).

Several Member States have been setting serious injury targets for many years. Currently, round eleven EU Member States have set national quantitative targets to reduce serious injuries (Table 3). Current best practice involves the setting of a long-term goal towards the prevention of serious injury, interim time-limited targets over a period of 10 years to reduce serious injuries, supported by interim targets for a range of intermediate outcomes causally related to the occurrence and severity of serious injury (OECD, 2008).

Table 3: National Serious Road Traffic Injury Targets (European Commission, 2015)

Member State	Target level	Target period	Required % decrease from one year to next
Austria	40%	2010-2020	5.0%
Belgium	-	-	-
Bulgaria	20%	2010-2020	2.2%
Croatia	-	-	-
Cyprus	50%	2010-2020	6.7%
Czech Republic	40%	2010-2020	5.0%
Denmark	50%	2013-2020	9.4%
Estonia	Average for 2013-2015 to be 25% less	2010-2015	5.5%
Finland	25%	2010-2020	2.8%
France	-	-	-
Germany	-	-	-
Greece	-	-	-
Hungary	-	-	-
Ireland	30%	2013-2020	5.0%
Italy	-	-	-
Latvia	-	-	-
Lithuania	-	-	-
Luxembourg	-	-	-
Malta	-	-	-
Netherlands	25%	2007-2020	2.2%
Poland	40%	2010-2020	5.0%
Portugal	-	-	-
Romania	-	-	-
Slovakia	-	-	-
Slovenia	-	-	-
Spain	-	-	-
Sweden	25%	2007-2020	2.2%
UK	-	-	-

6. Discussion

The main road crash types which need to be addressed to reduce both fatal and serious injury on EU roads (Euro NCAP, 2014; Breen, 2015; EuroRAP, 2015) are as follows:

- *Head-on crashes* typically kill and seriously injure car occupants even in the best designed vehicles at speeds greater than 70 km/h. In depth research shows that frontal crashes account for about 55% of passenger car fatalities and serious injuries. Different factors influence crash severity, the most important being speed of travel, seat belt use, vehicle mass and the level of crash protection and mitigation provided in the vehicle and roadsides.
- *Side impacts at intersections* typically kill and seriously injure car occupants even in the best designed vehicles at speeds greater than 50 km/h. Of passenger car fatalities and seriously injured, side impacts account for about 35 to 40%.
- *Run-off-road crashes* into rigid fixed objects produce a high number of fatal and serious outcomes at speeds greater than 70 km/h for frontal impacts and 50 km/h for side impacts even in the best designed vehicles.
- *Other motor vehicle impacts*. The remainder include rear impacts (5%) which is an important source of whiplash injury and other impact types.
- *Walking and cycling across or along the road.* The risk of being killed in traffic per kilometres travelled is 9 times higher for pedestrians than car occupants and 7 times higher for cyclists. Pedestrian and cyclist risk increases steeply in mixed speed traffic when traffic speeds are greater than 30 km/h. Research suggests that the majority of all fatally and seriously injured pedestrians in Europe are hit by the fronts of cars. The survival of these vulnerable road users depends upon their separation from the high speeds of motor vehicles or, where shared use is common, sufficiently low vehicle impact speed to prevent severe crash injury and provision of crash protective car fronts and, for cyclists, underrun protection on trucks. Single vehicle crashes are most common for cyclists.

Safe System intervention choices which accommodate human vulnerabilities are principally to separate dangerous mixed use (e.g. motorised vehicles and non-motorised users where speeds are high); to separate two-

way motorised traffic above certain speeds; to provide adequate crash protection to prevent death and serious injury (e.g. crash protective vehicles and roadsides); to provide efficient emergency medical care to reduce the consequences of injury or to lower speeds to allow safe mixed use.

As stated by the European Commission (2013) *"Reducing the seriousness of injuries from road accidents will require the introduction of a range of diverse measures. A future comprehensive strategy of action on serious injury reduction should take into account what may be done on different levels, by different actors and using many different tools."*

OECD provides a useful summary of *Safe System* intervention strategy and measures. Highly summarised this requires a systematic, multi-disciplinary and multi-sectoral approach which addresses the safety needs of all users; fatal and serious injury crash prevention, crash protection and mitigation and post-crash care and aligns with other policies for co-benefits such as health, occupational health and safety, sustainable development, poverty reduction. The range of well-documented intervention strategies which can be deployed include (OECD, 2008):

- Safety conscious planning and proactive safety engineering design
- Encouraging use of safer modes and safer routes
- Safe separation/ safe integration of mixed road use
- Managing speeds to crash protection levels
- Providing crash protective roadsides and vehicles
- Deterring dangerous behaviour and ensuring compliance with key safety rules by social marketing and increased highly visible police enforcement using camera technologies and other means, by providing proven driver assistance safety technologies in cars to help drivers keep to speed limits, wear seat belts, or avoid excess alcohol.
- Managing risk via vehicle standards/designs and driver standards e.g. graduated driver licensing.
- Fast and efficient emergency medical help, diagnosis and care.

Specific recommendations for EU action by an independent review of Policy Orientations (Breen, 2015) are listed below:

Planning, design, operation of road network

- Encourage knowledge transfer and the adoption of the Safe System approach to road safety engineering on TEN-T and the secondary network.
- Establish a safety performance framework for the TEN-T network, require measurement of safety indicators e.g. Euro RAP ratings and mean speed levels.
- Target a percentage increase in Euro RAP star rating of TEN-T roads to 2020 and beyond.
- Update TEN-T guidelines to ensure that all EU-funded infrastructure conforms to EC Directives 2004/54/EC and 2008/96.
- Set a speed limit of 120 km/h or lower on TEN-T roads.
- Promote and fund Safe Corridor and Safe City/Safe Town projects on the TEN-T and secondary network comprising road safety engineering and multi-sectoral intervention to intervention to achieve results and develop road safety management capacity.

Enforcement of key road safety rules

- Set up/support annual surveys of levels of compliance with speed limits, excess alcohol legislation and levels of front and rear seat belt use and report on findings.
- Set targets to 2020 at EU and national levels for improved compliance with speed limits, excess alcohol limits and seat belt use legislation and request annual reporting by the High Level Group on Road Safety and CARE.
- Provide new guidance on best practice enforcement of key road safety rules.
- Promote and fund enforcement activity and other intervention in Safe Corridor and Safe City/Safe Town projects on the TEN-T and secondary network.
- Mandate EU fitment of speed assistance systems and seat belt reminders in all seating positions in all motor vehicles at the earliest opportunity and take a variety of actions in the short-term to encourage the fitment

and use of alcolocks e.g. in cross-border enforcement and in best practice guidance on their use in alcohol user rehabilitation.

Vehicle and equipment safety standards

- Ensure that EU vehicle safety standards need to provide a high level of protection.
- Propose a range of new EU vehicle safety legislation to reduce the number and risk of serious and fatal injury including the following priorities: Autonomous Emergency Braking Systems (AEBS) in cars, Speed Assist (advisory and voluntary systems); seat belt reminders for front and rear seat passengers; fitment of adaptive restraints in cars, protection of far-side car occupants in side impacts; improved heavy goods vehicle front end design to protect other users, rear underrun protection and side underrun protection; and lane keeping assist.
- Promote and fund a Euro SHARP consumer information programme on powered two-wheeler use crash helmets in cooperation with the UK SHARP programme.
- Monitor the usage levels of helmets by powered two-wheeler riders and cyclists across the EU and promote/propose mandatory cycle helmet use legislation for school-aged children across the EU and target increased levels of use; establish a European cycle helmet consumer information programme.
- Promote zero-rated Value Added Tax for cyclist and motorcyclist helmets.
- Revise EC Directive 2014/24/EU on public procurement to include road safety, alongside existing provisions covering environmental and social aspects.
- Invite the High Level Group on Road Safety to consider national incentives to fast-track proven technologies via procurement, safe travel policies, and tax and insurance incentives.
- Through the EU Health and Safety at Work agency, devise safe travel policies for the European Commission as well as promoting take up of ISO 39001 on road safety management systems for organisations.

Driver and rider standards

- Review Directive 2006/126/EC towards the introduction of a package of effective Graduated Driver Licensing measures for car drivers and powered two-wheeler riders.
- Review Directive 2003/59/EC with a view to introducing new provisions/guidance on demonstrably effective training schemes for professional drivers.

Post-impact care

- Commission a study to review the scope of post impact care in reducing deaths and serious injuries in road collisions.
- Include first responder training in commercial and public transport driver training and emergency services personnel.
- Monitor and rank annually through EU databases the role of road traffic injury as cause of death and disability compared with other mortality and morbidity.

While many serious injuries can be addressed by the same measures adopted to prevent fatal injury, recent research indicates that crashes resulting in serious injury may have different characteristics compared to fatal crashes, possibly requiring different countermeasures (Reurings et al., 2012). This may be one of the reasons that past road safety policies have been more effective in preventing road deaths than in preventing serious injuries. The prevention of serious injury in road traffic crashes warrants ongoing research focus, not least in the context of an ageing society and the need for greater equity in the planning, design, operation and use road traffic system to ensure the safety of walking and cyclists.

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