# HIGH-LEVEL GROUP ON ROAD SAFETY CONSULTATION ON THE DEVELOPMENT OF THE INJURIES STRATEGY

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## 2nd Working Document:

### NEXT STEPS IN THE DEVELOPMENT OF THE INJURIES STRATEGY

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# Contents

## Summary of recommended next steps

Recommendation 1. The *Injuries Strategy* should adopt the long-term *Safe System* goal and approach to eliminate deaths and serious injuries recommended to all countries by the main international organisations concerned with road safety.

Recommendation 2. The *Injuries Strategy* should adopt a simple, aspirational, interim quantitative EU target to reduce serious injuries (MAIS=>3) by 2020 at a targeted level against baseline to be agreed.

Recommendation 3 The *Injuries Strategy* should target key road safety problems and improved intermediate outcomes (e.g. increasing seat belt use) with evidence-based intervention packages to include EU and country actions and using an agreed set of safety performance indicators in line with international best practice.

Recommendation 4 The national representatives of the CARE expert group should play a key role in assisting Member States, where necessary, with country management of the process of preparing for and reporting on the new common definition of serious injury as an additional field to the existing CARE database.

Recommendation 5 Subject to any further proposals by the CARE expert group, it is recommended that Member States should report on the total number of serious injuries (MAIS=>3) starting with an annual total for 2014 and agree an acceptable timescale for fuller reporting of CARE database variables. In the meantime, it is envisaged that Member States would continue contributing as usual to the CARE database.

Recommendation 6 It is recommended that the High Level Group considers the range of identified actions on driver assistance technologies actions by the EU and Member States and which are broadly consistent with the CARS 21 strategy and the stated aims of the EU institutions. These include recommendations on EU type approval as well as good practice national actions to promote the take-up of effective new technologies.

Recommendation 7 It is recommended that monitoring and evaluation of the effectiveness of vehicle safety technologies is included in the discussion of driver assistance measures, particularly in relation to the establishment of a Pan-European in-depth crash investigation system.

Recommendation 8 It is recommended that the next meeting determines whether a small HLG *Injuries Strategy* working group comprising road safety policy leaders, supported by technical experts, should be established to assist the Commission in determining the scope and further development of the strategy, based on the conclusions of the next HLG meeting.

# 1 Background

This Working Document has been prepared at the request of the European Commission and provides complementary information to the first working document [1] prepared for the High Level Group meeting held in Copenhagen on June 27th on the development of an EU *Injuries Strategy*. Some material is duplicated where relevant and for ease of reference. It is not the intention to set out a draft injuries strategy but to outline key issues and approaches which can inform the next steps for development of the new strategy taking account of the June 2012 HLG discussion.

The background to the high-level consultation is as follows. The Commission's White Paper[2] proposed the development of a comprehensive strategy of action on road injuries as a priority for EU action including common definitions of injuries and fatalities and with a view to adopting an injuries reduction target. This subsequently formed one of the strategic objectives outlined in the *Policy Orientations on Road Safety 2011-2020.*[3] These elements have been widely supported by the EU institutions and stakeholders and in the *Public consultation on an EU strategy to reduce injuries resulting from road traffic accidents*[4] launched by the Commission on 17th April 2012. A report of this Consultation was circulated to the high level group on 3rd August 2012 and is appended in Annex 1 [5]. The aim of the *Injuries Strategy* is to provide a framework for road safety activity to 2020 which develops the themes covered in the White Paper and in *Policy Orientations on Road Safety 2011-2020.* These developments provided the context for the high-level consultation with Member States' representatives which commenced during the meeting of 26th-27th June 2012.

Following several expert presentations at their June meeting, the High Level Group had a first discussion based on several questions concerning the scope, content and performance framework of a common road injuries strategy. The main focus of the discussion was a common definition of serious injury (non-fatal severe injury) and secondly, the setting of a measurable quantitative target. A number of conclusions were reached:

- A positive response was received from Member States representatives towards the development of an EU Injuries Strategy;
- Support was expressed for a long-term goal and quantitative target for serious injury to be set and adopted in line with the aspirations for the prevention of fatal injury;
- A common definition of serious injury is needed;
- Length of stay in hospital (24 hours) stay is not the best way to define serious injury;
- All countries agreed to MAIS 3+ (Maximum Abbreviated Injury Scale) as the common definition of serious injury to be applied;
- Member States would assess their national capacity to apply the new definition and present to the next HLG meeting a timeframe for reporting serious injury outcomes in national statistics using the new definition towards a common serious injury target.
- A questionnaire would be sent to Member States in order to receive more detailed information on the above. A further working document concerning the application of the new definition. would be prepared for the next HLG meeting, the focus of which would be

[1] Breen J, *Working document for the meeting of the High Level Group on Road Safety 27th June 2012,* Copenhagen.
[2] European Commission (2011) White Paper: *Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system* COM(2011) 144 final, Brussels, 28.3.2011.
[3] European Commission (2011) *Towards a European road safety area, Policy orientations on road safety, 2011-2020,* Brussels.
[4] European Commission (2009*), Public consultation on the European Road Safety Action Programme 2011-2020,* Brussels.
[5] European Commission (2012) *Report on public consultation on an EU strategy to reduce injuries resulting from road traffic accident,* Brussels.

to agree a time-frame for reporting on the new serious injury definition. A discussion of road safety ITS solutions which might be included in an *Injuries Strategy* was also envisaged.

# 2 What road safety results should be targeted in the *Injuries Strategy?*

## *2.1 Goals and targets are the focus of road safety strategy*

The EU aspires to be the world leader in safety and security of transport in all modes of transport.[6]

Experience in EU countries and elsewhere indicates that the rationale for effective road safety strategy is a focus on achieving results produced by the implementation of system-wide intervention made possible by well-orchestrated and government-led institutional management which engages fully with the private sector and civil society.[7] [8]

The level of road safety ambition whether at international, country or organisational levels is expressed in terms of long-terms goals which provide a far-reaching vision statement for road safety work supported by measurable interim quantitative targets, usually expressed as a reduction in numbers of fatal and serious injuries. This approach is recommended to all countries, jurisdictions and organisations by the ITF/OECD, ISO and other international bodies. [7] [9]

### *2.1.1 The strategy's long-term goal*

Countries have become progressively more ambitious in the results they want to achieve culminating in the *Safe System* (the generic term used globally by the UN, OECD and others) goal to eliminate in the long-term road user deaths and severe injuries (See Box 1). This long-term goal and associated strategy, first promoted by the leading EU road safety performers, re-defines what is meant by 'safety' in effective road safety management and has been adopted in the Commission's Transport White Paper and by the EU Council [10], although in the former only in relation to the prevention of fatalities.

***Box 1:* T*he four evolutionary phases of managing for better road safety results*** [15] [16]

Progressive shifts in road safety management thinking and practices in high-income countries have been evident. Since the 1950s there have been four significant and progressively ambitious phases of development:

- Phase 1: focused on driver intervention, with safety management characterized by dispersed, uncoordinated, and insufficiently resourced units performing isolated single functions.
- Phase 2: focused on system-wide interventions guided by the 'Haddon Matrix'. Dr. William Haddon, an American epidemiologist, developed a systematic framework for road safety based on the disease model which encompassed infrastructure, vehicles and users in the pre-crash, in-crash and post crash stages [11]

[6] European Commission (2011) W*hite Paper: Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system* COM(2011) 144 final, Brussels, 28.3.2011

[7] World Bank Global Road Safety Facility, Bliss T & Breen J (2009). *Implementing the Recommendations of the World Report on Road Traffic Injury Prevention. Country guidelines for the Conduct of Road Safety Management Capacity Reviews and the Specification of Lead Agency Reforms, Investment Strategies and Safe System Projects, ,* Washington DC

[8] OECD (2008) *Towards Zero: Achieving Ambitious Road Safety Targets through a Safe System Approach.*OECD, Paris

[9] ISO 39001 (2012) *Road traffic safety (RTS) management systems – Requirements with guidance for use*, International Standard, ISO.

[10] Council of the European Union (2010*), Council Conclusions On Road Safety* 3052th Transport, Telecommunications And Energy Council Meeting Brussels, 2–3 December 2010.

[11] Haddon Jr W (1968). *The changing approach to the epidemiology, prevention, and amelioration of trauma: the transition to approaches etiologically rather than descriptively*. American Journal of Public Health, 58:1431–1438. 33. Henderson M. Science and society.

- Phase 3: focused on system-wide interventions, targeted results and institutional leadership. Good practice countries used action plans with numerical outcome targets to be achieved with evidence-based packages of system-wide measures based and new institutional leadership.
- Phase 4: is focusing on system-wide interventions; long-term elimination of death and serious injury; shared responsibility – *Safe System.* This comprises stepwise targets towards a long-term goal to eliminate death and serious injury which are seen as an unacceptable price for mobility; system-wide intervention (foreseen in Phase 2 and used successfully in Phase 3), but with renewed emphasis on better road and vehicle crash protection, post-crash care; new emphasis on speed management aimed at more effective injury prevention; strengthened, accountable institutional leadership and meaningful shared responsibility to achieve results.

According to key international organisations including the OECD, World Bank, WHO, and ISO the *Safe System* approach represented as Phase 4 in Box 1 represents the current recommended road safety management approach and is the only means by which the ambitious ultimate goal can be reached. In addition, the *Safe System* approach aligns well with other societal objectives such as sustainable development and environmental protection, energy security, public health as well as occupational health and safety policies. They present opportunities, given sufficient stimulus, encouragement and the right frameworks, for integrating, building better business cases and achieving co-benefits with these and other areas of activity. There is remarkable international alignment in support of this approach.

The last public road safety strategy consultation carried out by the Commission (2009/2020) outlined the need for the EU and Member States to address levels of death and serious injury throughout the road network – both in built up and non built up areas; to reduce levels of socio-economic cost; to adopt and promote a long-term vision to eradicate death and serious injury and to set challenging but achievable quantitative targets to reduce them for the interim.[12]

In line with the recommendations of the EU institutions, other international organisations and the public consultation with the key stakeholders on the road safety action programme, it would be consistent with current policy that the long-term goal of the *Injuries Strategy* is the elimination of death and serious injury. Furthermore, in line with the global Decade of Action on road safety it is recommended that the injuries strategy adopts the *Safe System* approach (See Annex 1). In so doing, the EU can continue to play its important global road safety leadership role.

**Recommendation 1. The Injuries Strategy should adopt the long-term *Safe System* goal and approach to eliminate deaths and serious injuries recommended to all countries by the main international organisations concerned with road safety.**

### *2.1.2 Interim quantitative target(s) to reduce serious injury*

Setting challenging but achievable step-wise quantitative final and intermediate outcome and output targets towards the ultimate *Safe System* goal to eliminate death and long-term injury is recommended as effective practice.[13] Quantitative targets lead to better programmes, more effective use of public resources and an improvement in road safety performance.[14] An ambitious long-term or purely symbolic goal which is not supported by interim targets has little value.[13] However, targets that are ambitious are associated with better performance than

[12] COWI (2010) *Final Report: Technical Assistance in support of the Preparation of the European Road Safety Action Programme 2011-2020 prepared for the European Commission* DG-TREN February 2010.
[13] OECD (2008) *Towards Zero: Achieving Ambitious Road Safety Targets through a Safe System Approach* .OECD, Paris
[14] OECD (1994)*Targeted Road Safety Programmes*, Paris.

less ambitious targets.[15] The ambitious target set by the EU to 2010 to halve road deaths and the national and regional targets set by Member States underscores an amalgam of successful activity, associated with a 43% reduction in EU road deaths.

Interim quantitative targets are usually expressed in terms of *final outcomes*[16] e.g. numbers of deaths and serious injuries. Targets can also be expressed in terms of *intermediate outcomes*[17] which are causally related to *final outcomes*, as practiced in several better performing countries. One example is targeting percentage increases in seat belt use. It is known that seat belt use reduces serious and fatal injury risk by around 50%. Around 12,400 car occupants survived serious crashes in 2009 in EU countries because they wore a seat belt. Another 2,500 deaths could have been prevented if 99% of occupant had been wearing a seat belt.[18] Targeting reductions in seat belt use from a known baseline will contribute to reducing serious and fatal casualty reduction targets. Some countries go further and set targets for their service delivery in terms of institutional *outputs* [19] e.g. number of seat belt checks required to be given annually by the police which, combined with publicity will contribute a high visibility activity deterring seat belt offences or the percentage of the national vehicle fleet fitted with seat belt reminders. [18]

An ambitious EU interim quantitative target has been set to reduce deaths by 50% by the year 2020. In line with the recommendations for the EU institutions and the public consultation with the key stakeholders on the road safety action programme, a preferred option is to set an interim EU-wide target(s) for *serious injury* for the *Injuries Strategy.*

The casualty groups which determine the priorities for reductions in deaths and serious injuries in EU countries are *car occupants*, *powered two-wheeler users* and *pedestrians.* The casualty groups which determine the priorities for reductions in numbers of deaths and serious injuries amongst highest risk (number of deaths per 100,000 of population) groups in EU countries are *young novice drivers, powered two-wheeler users, pedestrians* and *cyclists.* The main road traffic crash types which need to be addressed to reduce fatal and serious injury are head-on crashes, run-off-road crashes, intersection crashes and pedestrian and other vulnerable road user crashes.[20]

Based on current practice, four possible further options were identified in Working Document 1 circulated to the High Level Group in June and some conclusions can be drawn based on the discussion in the Copenhagen meeting:

- There was general support for establishing an EU interim targets for serious injury to 2020 to accompany the existing target to reduce fatalities to provide a focus on serious injury reduction in EU road safety work in the current timeframe. The public

[15] Wong S. C., Sze, N.N., Yip, H.F., Loo, Becky P.Y.; Hung, W.T., Lo, H.K. (2006) *Association between setting quantified road safety targets and road fatality reduction*. Accident Analysis and Prevention, 2006, 38, 997-1005.

[16] *Final outcomes* can be expressed as a long-term goal of the future safety of the road traffic system and as short to medium-term targets expressed in terms of social costs, fatalities and serious injuries and also in terms of fatal and serious injury rates per capita, vehicle and traffic volume.

[17] *Intermediate outcomes* are linked to improvements in final outcomes and typical measures include average traffic speeds, the proportion of drunk drivers in fatal crashes, seat belt wearing rates, helmet wearing rates, safety ratings of the vehicle fleet, safety ratings of the road network and the efficiency of emergency medical assistance.

[18] European Transport Safety Council (ETSC) (2012) Thomas P, *How can improved vehicle safety contribute to EU road safety targets for 2020?* Presentation to CARS 21 WP1 meeting on road safety 31 January 2012, Brussels.

[19] *Outputs* represent physical deliverables that seek improvements in intermediate and final outcomes and typical measures include kilometres of engineering safety improvements, the number of police enforcement operations required to reduce average traffic speeds or excess alcohol or alternatively they can correspond to milestones showing a specific task has been completed (Bliss, 2004).

[20] COWI (2010) *Final Report: Technical Assistance in support of the Preparation of the European Road Safety Action Programme 2011-202*0 prepared for the European Commission DG-TREN, January 2010.

consultation on the current road safety action programme and road safety organisations identified a 40% reduction in serious injuries to 2020 (based on Member States existing definitions) as challenging but achievable. The rationale for a lesser target than the fatality reduction target is that serious injury reduction poses a greater challenge.

- It was agreed that the need was to target serious injury rather than non-fatal injury in general.
- Some reservations were expressed about setting an EU-wide target using existing definitions of serious injury. While this may encourage Member States to set a target for serious injury where such a target is absent, international comparisons of results achieved would not be possible.
- A target based on the new common definition of serious injury (MAIS 3 = >) was seen as the preferred option to be adopted as soon as possible. A simple percentage reduction for all serious injury based on the new definition seems entirely possible but dependent on Member States' capacity and time-frame to deliver. Technical input will be needed to determine a challenging but achievable level to 2020. The baseline year will depend upon the year selected for common reporting of serious injury to the new definition.
- An option for disaggregated final outcome targets (for example by user groups) would be more challenging and require more work. It is noted that no such targets exist at EU level for road fatalities, nor are used widely in road safety work..
- While not discussed in the June meeting due to lack of time, additional sub-targets or intermediate outcome targets could be set using safety performance indicators for key safety behaviours such as increasing seat belt use, crash helmet use and reducing average speeds; 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 (See Box 3). 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. Where linkages are made between targeting intermediate outcomes and final outcomes, then the targeting process becomes increasingly manageable and meaningful.[21] It is worthy of note that in countries which have yet to establish effective national crash injury databases and arrangements for data sharing, the use of this type of intermediate outcome survey data can be very useful in getting started with demonstration projects targeting high-volume, corridors and areas and is being used widely in current country assistance aid in international development.

**<u>Recommendation 2</u>. The *Injuries Strategy* should adopt a simple, aspirational, interim quantitative EU target to reduce serious injuries (MAIS=>3) by 2020 at a targeted level against baseline to be agreed.**

**<u>Recommendation 3</u> The *Injuries Strategy* should target key road safety problems and improved intermediate outcomes (such as increasing seat belt use) with evidence-based intervention packages to include EU and country actions and using an agreed set of safety performance indicators in line with international best practice.**

[21] OECD (2008) *Towards Zero: Achieving Ambitious Road Safety Targets through a Safe System Approach.*OECD, Paris.

# 3 The common definition of serious injury

## 3.1 HLG agreement and rationale for a common definition

The main focus and outcome of the June HLG discussion was agreement on a new definition for serious injury at MAIS=>3. The background to this decision is summarised below.

The EU-funded *SafetyNet* project highlighted that, currently, the numbers of *fatalities* are the only comparable measurement units available in the CARE system and for international comparisons at EU level. Here, the degree of under-reporting is acceptably small in most EU Member States and there is a commonly derived and accepted definition (30 days) and adjustment protocol.[22] Currently, *serious* injuries, which represent a large part of the public health burden and socio-economic costs of road traffic crashes cannot be compared in different Member States. The definition of *serious injury* differs among Member States and is usually not based on a medically classified standard. The most commonly used definition of *length of stay* at hospital is accepted as a sub-optimal way of defining a serious injury since it is likely to be significantly influenced by clinical practices and the availability and organisation of hospital services rather than by the level of road safety.[23] These differences result in a casualty being recorded in one country but not in another. Equally, a casualty which might be recorded as *seriously* injured in one country might be recorded as *slightly* injured in another. Experts agree that the global and EU picture of road casualties is incomplete and is impeding effective road safety management.[24]

The rationale for a common EU-wide definition therefore is the need to:

- identify the real magnitude of the road safety problem and the scale of long-term impairment and associated socio-economic costs, given the known common problems of *misreporting* [25]and *under-reporting*[26] (the mean reporting level for serious injuries is roughly 70%) under current arrangements;
- allow the identification of effective intervention towards the prevention of serious health loss in road traffic crashes; and
- facilitate monitoring and evaluation of targets and international benchmarking amongst the EU Member States.

Identified effective practice acknowledges that no single database will provide enough information to give a complete picture of road traffic injuries and to fully understand underlying injury mechanisms. Road safety experts agree that 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 and reporting serious injury. [27] [28] A consensus has emerged over adoption of the Maximum Abbreviated Injury Scale equal or greater than three (MAIS=>3) as the EU definition..

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[22] SafetyNet Project, Broughton J, Amoros E, Bos N, Evgenikos P, Hoeglinger S, Holló P, Pérez C, Tecl J (2008), *Estimating the real number of road accident casualties,* Deliverable D.1.15, SafetyNet.www.erso.eu/safetynet/content/safetynet.htm.

[23] Brasel KJ, Lim HJ, Nirula R, Weigelt JA, ( 2007) *Length of stay: An appropriate quality measure?* Archives of Surgery 2007, vol. 142, pp. 461-466.

[24] IRTAD (2011) *Reporting on Serious Road Traffic Casualties: Combining and using different data sources to improve understanding of non-fatal road traffic crashes,* International Traffic Safety Data and Analysis Group, OECD/ITF, Paris

[25] *Misreporting* is where injury severity is under or overestimated by the Police (e.g. serious casualties that are reported as slight or vice-versa.

[26] *Underreporting* is where only a limited proportion of non-fatal hospitalised injuries are recorded by the Police.

[27] IRTAD (2011*) Reporting on Serious Road Traffic Casualties: Combining and using different data sources to improve understanding of non-fatal road traffic crashe*s, International Traffic Safety Data and Analysis Group, OECD/ITF, Paris.

[28] SafetyNet Project, Broughton et al (2008), *Estimating the real number of road accident casualties,* deliverable D.1.15, SafetyNet.www.erso.eu/safetynet/content/safetynet.htm.

The need for establishing/improving definitions in EU road safety work is acknowledged by all the EU institutions including the European Parliament which called on the Commission in their latest road safety report in 2011 to draw up within two years better definitions of injury severity to allow necessary monitoring.[29] Legislative requirements providing for changes to national reporting systems are not anticipated. Nevertheless, several legislative or administrative provisions might be required at national level if countries decide to put in place new data collection arrangement which might, for example, necessitate changes in personal data protection requirements.

Following the decision of the HLG to adopt this new definition the next task is to establish an acceptable timescale for reporting and the next steps needed towards this.

### 3.2 Implementation timescale for the EU and Member States

On the basis of the discussions so far there seems to be strong support for moving as soon as possible towards reporting on a new common definition of serious injury which can provide a solid basis for targeting and monitoring *Injuries Strategy* results. Some Member States are in a position to report in the very near future, others will require time to decide on the method to carry out the necessary recording and reporting procedures and to establish national coefficients based on police and health data linkage. These are technical issues and the national representatives of the CARE expert group are well-placed to play an important role in country management of this process. An opinion from the CARE expert data group on a reasonable timescale for reporting to the EU would be valuable. The length of time needed will depend on what information is required to be reported initially – whether a simple aggregated serious injury total or serious injury totals disaggregated into all the variables currently reported in the CARE system. Less time would be required for the former reporting requirement, which can be achieved through a relatively simple procedure, and would also allow a serious injury target to be set. These issues are further discussed in the next sections.

**<u>Recommendation 4</u> The national representatives of the CARE expert group should play a key role in assisting Member States, where necessary, with country management of the process of preparing for and reporting on the new common definition of serious injury as an additional field to the existing CARE database.**

**<u>Recommendation 5</u> Subject to any further proposals by the CARE expert group, it is recommended that Member States should report on the total number of serious injuries (MAIS=>3) starting with an annual total for 2014 and agree an acceptable timescale for fuller reporting of CARE database variables. In the meantime, it is envisaged that Member States would continue contributing as usual to the CARE database.**

### 3.3 Using police data and MAIS data to report serious injury

Sections 3.4 and 3.5 discuss the means by which Member States can move from their current definition and reporting of serious injury to the commonly agreed definition (if they have not already done so) and outlines (notwithstanding Recommendations 4 and 5) possible next steps. This section provides a brief outline of current practice and key background information.

[29] European Parliament (2011) *European Parliament resolution of 27 September 2011 on European road safety 2011-2020* (2010/2235(INI)).

*Current road traffic injury data recording*

A range of databases contribute data on road crashes and their consequences, the most important being police and health sector databases. An assessment of injury severity may also take place within the judicial process following a road traffic crash which leads to injury and in-depth crash investigation studies.

*Police reporting:* The police complete a road traffic crash data collection form in each country typically assigning a 'serious' or 'slight' injury score for non-fatal road casualties and providing other detailed information about crash circumstances, location, vehicles and users involved. In most EU countries, the police assess the injury severity of road casualties for the national road crash injury database. This is not a medical assessment; it is difficult to assess injury severity and injury consequences at the scene without clinical diagnosis; and a systematic process is usually missing to check police data subsequently against medical sources about non-fatal injury severity. Some countries establish correction factors for this understandable and common *under-reporting* to the national police-reported crash injury database, based on health sector data

*Hospital reporting:* Encouraged by the World Health Organisation and other institutions, medical authorities have established international recording systems, in particular the International Classification of Diseases and related Health Problems (ICD) and the Abbreviated Injury Scale (AIS) coding systems which are outlined in Box 1.

The International Classification of Diseases (ICD) is a system designed to promote international comparability in the collection, processing, classification, and presentation of mortality statistics and is developed collaboratively between the World Health Organization (WHO) and 10 international centres. It aims to ensure that medical terms reported on death certificates are internationally comparable and lend themselves to statistical analysis. The ICD is revised approximately every 10 years. These revisions reflect advances in the medical field and changes in our understanding of disease mechanisms and terminology, and are designed to maximise the amount of information and flexibility a code can provide. ICD-10 more closely reflects current medical knowledge than ICD-9.

The Maximum Abbreviated Injury Scale (MAIS) and the Injury Severity Score (ISS) can be derived from these commonly used ICD codes. In some countries, serious injury is already defined based on indices such as the AIS, MAIS and ISS. In The Netherlands, for example, serious injury is defined as "an in-patient, with injury level MAIS=>2 and corrects for under-reporting in the national police-reported crash data systems. Sweden bases its definition of injury severity on health sector data using ISS, corrects for under-reporting and has established an indicator of Long Term Impairment, and targets reduced road injuries.

| ***Box 1: Definition of injury classification and severity indices*** | *Source: IRATD 2011*[30] |
|---|---|

*International Classification of Diseases and related Health Problems (ICD)*

The ICD is published by the World Health Organisation and provides codes to classify diseases as well as signs, symptoms and external causes of injury or disease. Every health condition can be assigned to a unique category and given a code, of up to six characters. In addition to enabling the storage and retrieval of diagnostic information for clinical, epidemiological and quality purposes, these records also provide the basis for the compilation of national mortality and morbidity statistics by WHO Member States. The ICD is revised periodically and is currently in its tenth edition (ICD 10). The 9th edition is still widely used (ICD9). Causes of accidents are classified. Traffic injuries have a specific code in the section "external cause", as well as codes to describe the injury.

*Abbreviated Injury Scale (AIS)*

The AIS is published by the Association for the Advancement of Automotive Medicine and is an internationally agreed tool to describe the severity of injury for each of nine regions of the body: 1 Minor, 2 Moderate, 3 Serious, 4 Severe, 5 Critical, 6 Unsurvivable. The regions are 1 Head, 2 Face, 3 Neck, 4 Thorax, 5 Abdomen, 6 Spine, 7 Upper Extremity, 8 Lower Extremity, 9 External and other. AIS does not reflect the combined effects of multiple injuries. It was initially developed for crash investigation purposes to provide researchers with a simple numerical method for ranking and comparing injuries by severity, and to standardize the terminology used to describe injuries. It is possible to convert ICD9 or ICD10 codes into AIS.

*Maximum Abbreviated Injury Scale (MAIS)*

The severity of road traffic injuries can be assessed on the basis of the universal Maximum Abbreviated Injury Scale) (MAIS) which is an internationally accepted summary measure of injury severity. The MAIS is the maximum AIS severity score of a casualty with several injuries. These scores allow to assess injury severity on the basis of a standardised medical indicator.

*Injury Severity Score (ISS)*

The Injury Severity Scoring is a process by which complex and variable patient data are reduced to a single number. The Injury Severity Score (ISS) is an anatomical scoring system that provides an overall score for patients with multiple injuries. Each injury is assigned an AIS and is allocated to one of six body regions (Head, Face, Chest, Abdomen, Extremities (including Pelvis), External). Only the highest AIS score in each body region is used. The three most severely injured body regions have their score squared and added together to produce the ISS score. ISS was developed to predict mortality.

### *Linking police and health sector data*

Reliable numbers of injuries can be identified by comparing the number of injured road users treated in hospitals to the number recorded by the police. In terms of hospital data, ICD data (either ICD 9 or ICD 10) on road traffic injury can be easily converted by computer software into AIS data to derive an overall injury severity score. In the case of the new EU serious injury definition, this is MAIS=> 3.

This requires a simple cross-reference of overall totals. If the ICD data is computerised, the task can be conducted in minutes. Where ICD data is still in manual form, and this might apply to one or two countries, then these can start with a regional initiative to computerise ICD data, convert to MAIS 3 using computer software and compare against police data

[30] IRTAD (2011) *Reporting on Serious Road Traffic Casualties: Combining and using different data sources to improve understanding of non-fatal road traffic crashes*, International Traffic Safety Data and Analysis Group, OECD/ITF, Paris.

collected for that region. convert a representative  Further disaggregation by road user type and other variables requires further anonymised record linkage. There is good agreement amongst experts about appropriate protocols for anonymised record linkage and these were used in the SafetyNet project (Task 1.5) which reported in 2008.

Here eight countries took part in the project (See Figure 1) and police and hospital records were matched nationally in two (Austria and the Netherlands). France, Greece, Spain and the UK matched data on a regional basis, and the Czech Republic and Hungary more locally. All studies used crash data from national crash injury databases that had been compiled from police crash reports. Most studies used files of medical data compiled by national or regional authorities from hospital records. From these studies, new national coefficients were produced which allowed the estimation of 'true' casualty totals from the numbers recorded in CARE, although not for an EU level estimate.

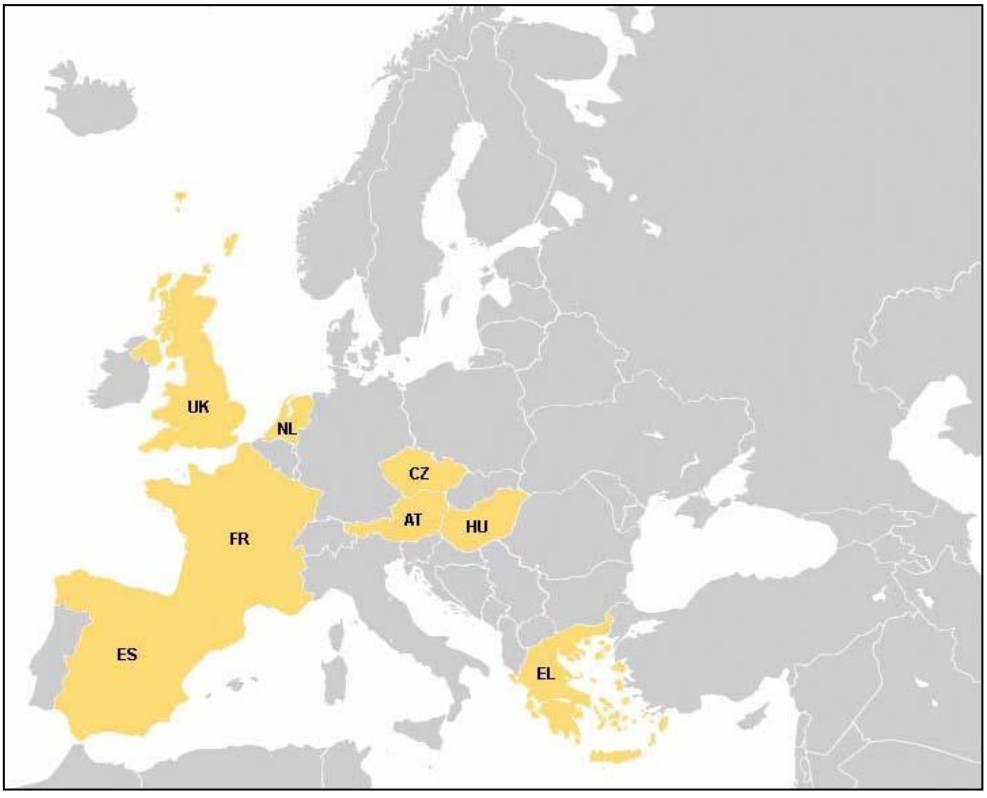
The Safety Net project reported that the pragmatic solution originally envisaged had been to use information provided by Governmental Experts (including the existence of corresponding data or studies in their countries) to:

(i) identify, for each country *without* a national study, which of the countries *with* a national study it most closely resembles in terms of its national accident reporting system; and to

(ii) generalise the coefficients estimated for each country *with* a national study to all analogous countries.

The project concluded that this could not be achieved on the basis of the information provided and that even if such a solution could be identified, any approach which generalises from studies in a minority of EU Member States is not fully satisfactory, and that individual national assessments of levels of under-reporting would be necessary.  This would allow a national coefficient to be devised which would be updated periodically.

**Figure 1: Countries where studies were carried out**



## 3.4 Country next steps to allow reporting of *MAIS=>3* serious injury

This section looks at different scenarios for next steps for Member States depending upon their current arrangements.

### *3.4.1 Member States with MAIS=>3 data with established police and heath data linkage*

Where MAIS=>3 data is already recorded nationally and linkages carried out between police and health sector databases, countries can report the total number of serious injuries defined as MAIS =>3 directly to the CARE database as well as establishing a national coefficient for under-reporting..

**Next steps:**
- ➔ Review availability of health sector data on road traffic injury
- ➔ MAIS =>3 data available and linkages between health and police data
- ➔ Report total serious injuries to CARE database
- ➔ Report on other CARE variables where possible

### *3.4.2 Member States with MAIS=>3 data without established police and heath data linkage*

Where MAIS=>3 data is already recorded is some hospital but not yet linked to police data, linkage procedures can be carried out. The Safety Net project demonstrated that these can be a regional study which is nationally representative which could produce a coefficient to derive a simple national total of serious *MAIS=>3* injuries to be reported to CARE and updated periodically. Where Member States are unable to but wish to report disaggregated data on *MAIS=>3* injuries e.g. by road user type, such studies can be carried out covering the relevant variables.

**Next steps:**
- ➔ Review availability of health sector data on road traffic injury
- ➔ MAIS =>3 data available
- ➔ Carry out linkages between health and police data
- ➔ Report total serious injuries to CARE database
- ➔ Report on other CARE variables where possible

### *3.4.3 Member States without MAIS =>3 data*

A number of options are available to Member States and the selection of a method which is reflects available national capacity and resource is important..

One would be to inform the Commission of the national intention to make necessary changes in the near future and to request its assistance in securing the exchange of expertise a Member State which has carried out the necessary procedures to allow reporting. It is worth noting that in the CODES system in the US, the US Federal Government's National Highway Traffic Safety Administration routinely supports the state-wide linkage of crash and medical records in about 30 States. The Commission could support regular national linkage studies in the Member States which would have benefits in addition to the preparation of conversion factors for use with CARE.

A variety of methods are available to determine AIS and MAIS levels as outlined in the tables below from IRTAD's report on serious injury data in 2011 and the SafetyNet project. The most common method is to transpose ICD data which is routinely collected by countries for public health management purposes. Where countries have computerised coding of ICD 9 or 10 data nationally, available computer software can be used to translate ICD data into MAIS

data to report a national total MAIS =>3 injuries. The two main software packages to map AIS from ICD9-10 have been developed by the European Centre for Injury Prevention (University of Navarra, Spain – Apollo Project) and the Johns Hopkins University.

Table 2.6. **Methods to determine AIS in IRTAD countries**

| | |
|---|---|
| *Czech Rep* | Derived from the diagnosis expressed in ICD-10 classification. |
| *Denmark* | Determined by medical doctors. |
| *France* | The medical diagnosis is directly coded into the Abbreviated Injury Scale (which includes the AIS severity score). This is done by a trained physician; the diagnosis is the result of all text injury descriptions from all hospital departments the person has attended. |
| *Japan* | Determined by medical doctors. The Japan Association for the Surgery of Trauma periodically trained medical doctors and other relevant staff on AIS coding. |
| *Netherlands* | AIS is derived from the ICD-9 by use of ICDmap90 (Johns Hopkins 2002). |
| *Spain* | Software can convert ICD9-CM codes to AIS:<br>- ICDMAP (Johns Hopkins University).<br>- ICDPIC: (Boston College Department of Economics). This is a STATA module to provide methods for translating ICD9-CM diagnosis codes into standard injury categories and/or scores. |
| *United Kingdom* | Mapping from ICD-10 codes using coding developed by University of Navarra (European Centre for Injury Prevention, University of Navarra, Algorithm to transform ICD-10 codes AIS and ISS, version 1 for SPSS. Pamplona, Spain 2006). |
| *United States* | AIS derived either from ICD-9 codes provided by hospitals, or, in the case of NASS-CDS, by forensic analysts reading the case file. |

*Source: IRTAD 2011*[31]

**Table 1: Summary details of studies**

| Country | Study area | Period | Coding of MAIS |
|---|---|---|---|
| Austria | National | 2001 | From ICD10 |
| Czech Republic | Local (Kromeriz, central Moravia) | 2003 - 2005 | From ICD10 |
| France | Regional (Département of the Rhône) | 1996 - 2003 | Coded directly |
| Greece | Regional (Corfu) | 1996 - 2003 | From ICD9 |
| Hungary | Local (part of Budapest) | Aug 2004 - Jan 2006 | Coded directly |
| Netherlands | National | 1997 - 2003 | From ICD9 |
| Spain | Regional (Castilla y Leon) | July - Dec 2005 | From ICD9 |
| United Kingdom | Regional (Scotland) | 1997 - 2005 | From ICD10 |

*Source: SafetyNet 2008*[32]

Where countries have manual data, records can be computerized at regional level, transposed to MAIS using computer software and linked to regional police data. to produce a coefficient to derive a simple national total of serious *MAIS=>3* injuries which can be reported to CARE and updated periodically reported.

**Next steps:**
- ➔ Review availability of health sector data on road traffic injury
- ➔ No data
- ➔ Request Commission assistance to obtain expert help **OR**

[31] IRTAD (2011) *Reporting on Serious Road Traffic Casualties: Combining and using different data sources to improve understanding of non-fatal road traffic crashes*, International Traffic Safety Data and Analysis Group, OECD/ITF, Paris.
[32] SafetyNet Project, Broughton J, Amoros E, Bos N, Evgenikos P, Hoeglinger S, Holló P, Pérez C, Tecl J (2008), *Estimating the real number of road accident casualties*, Deliverable D.1.15.

**Next steps:**
- ➔ Review availability of health sector data on road traffic injury
- ➔ No data
- ➔ Collect and code computerised ICD data
- ➔ Carry out simple conversion from ICD to AIS and obtain total MAIS =>3

### 3.5 European Commission steps to support the reporting of MAIS=>3 serious injury

A range of steps will also be need to be carried out by the European Commission in support of reporting the new definition of serious injury:

**Next steps:**

- ➔ determine the values of the new MAIS field following consultation with the CARE group experts and conclude steps to produce an updated CARE database structure to including the new MAIS field;
- ➔ consult with the CARE expert group on a reasonable o timeline for the reporting of serious injury to the new definition on a disaggregated basis;
- ➔ produce some transformation rules in cooperation with each Member State who chooses to derive a national coefficient from sample data to complete the new data field, as for the 30 day definition of fatality in a road traffic crash;
- ➔ update the data on the CARE database using the new definition for those Member States who are able to report;
- ➔ produce reports with the new definition for all countries ( for the year 2014)

## 4 Identifying system-wide interventions

While the priority is to first address the issues raised in sections 2 and 3, a key aim of the *Injuries Strategy* is to identify specific priority interventions on the basis of effective international practice and EU-funded research to date. Such action would necessarily need to be based on the subsidiarity principle and be in line with Treaty obligations with due consideration to effectiveness, cost, practicality and public acceptability.

Presentation of various options was made in the last Working Document and the text therein has been updated in this draft. Although there was little time for discussion of these during the last HLG meeting it was agreed that the focus of the next meeting would extend to intervention and include discussion of in-vehicle technologies.

### 4.1 A systematic, multi-disciplinary and multi-sectoral approach

The road safety public consultation carried out by the Commission in the preparation of the Policy Orientations paper [33], indicated wide acknowledgement that serious and fatal injuries in road crashes are preventable and need to be addressed by *system-wide intervention.* EU, national and local policies should focus on the *implementation of evidence-based approaches* to reduce exposure to the risk of death and serious in-jury; the prevention of death and serious injury; mitigating the severity of injury when a crash occurs and reducing the consequences of injury. Interventions needed to better address the safety of all users and take account of future demographics, notably the physical vulnerability of an ageing society. The need to address *excess and inappropriate speed, reducing impaired driving, insufficient seat belt wearing and*

[33] COWI (2010) *Final Report: Technical Assistance in support of the Preparation of the European Road Safety Action Programme 2011-2020 prepared for the European Commission* DG-TREN February 2010.

*crash helmet use, high novice driver and rider risk, improved safety quality of vehicles and road infrastructure for all users* and *improved emergency medical response* was cited throughout the consultation.

Measures proposed at EU level can often seem ad hoc or fragmentary, overly focused on legislative change, insufficiently related to the key problems and the needs of all Member States and insufficiently engaged with other Commission Directorate to achieve a range of policy co-benefits. The *Injuries Strategy* provides an opportunity to adopt an holistic approach to EU activity,, as envisaged in the Policy Orientations paper, to embark upon packages of effective programme measures which address the key road safety problems and provide the rationale for engaging with health, environment and employment sectors to build stronger business cases and support for implementation..

## 4.2 *Safe System* intervention

The rationale of the recommended *Safe System* approach is to ensure that in the event of a crash, the impact energies remain below the threshold likely to produce either death or serious injury. This will vary from one crash scenario to the next, depending upon the level of protection offered to the road users involved. For example, the chances of survival for an unprotected pedestrian hit by a vehicle diminish rapidly at speeds greater than 30 km/h, whereas for a properly restrained motor vehicle occupant in the best designed vehicle the critical threshold for severe and fatal injury is 50 km/h in typical side impact crashes and 70 km/h for head-on crashes.[34]

All elements in the road traffic system are interconnected and affect one another. For example, the available crash protection in vehicles will be of little help if unsafe road speeds are posted in the road network; the fitment of seat belts will be of no use unless compliance with seat belt use legislation is achieved; lane departure warning system in vehicles will have little value without roads authority intervention to ensure quality road marking; eCALL systems rely on effective emergency medical response. In fact, the many potential benefits from leading EU vehicle safety technologies will not be realised without attention to and integration with other system elements.

The general scope of effective intervention strategy is set out in Box 2. These comprise evidence-based strategies which are supported by the substantial body of road safety research carried out over the last 50 years.[35] [36]

[34] Tingvall C and N Haworth (1999) *Vision Zero - An ethical approach to safety and mobility*, Paper presented to the 6th ITE International Conference Road Safety & Traffic Enforcement: Beyond 2000, Melbourne, 6-7 September 1999.
[35] Eds Peden M, Scurfield R, Sleet D, Mohan D, Hyder A, Jarawan E, Mathers C (2004). *World Report on Road Traffic Injury Prevention*, World Health Organization and World Bank (Washington), Geneva.
[36] OECD (2008) *Towards Zero: Achieving Ambitious Road Safety Targets through a Safe System Approach.*OECD, Paris
[36]Kopits E, Cropper M. *Traffic fatalities and economic growth*. Accid Anal Prev 2005 January;37(1):169-78.

***Box 2: A summary of Safe System intervention principles***

The key intervention, evidence-based strategies which can reduce deaths and serious injuries in road traffic crashes comprise:

- Separation of or safe integration of dangerous mixed road use
- Managing vehicle speeds to crash protection levels in roads and vehicles
- Providing crash protective roadsides and vehicles
- Deterring dangerous road user behaviour (e.g. through combined police enforcement and publicity and also through in-vehicle driver assistance systems)
- Managing risk through driver and rider licensing and testing standards
- Managing risk through vehicle safety standards /designs and their compliance
- Fast and efficient emergency medical help, diagnosis and care

***Box 3: Safe System engineering in practice*** [37]

***Sweden's rollout of median barriers, roadside barriers and roundabouts:*** Against the background of over 70% of deaths occurring in single vehicle crashes and head-on collisions, Sweden commenced a *Vision Zero* investment program in innovative safety engineering targeting an increased proportion of total traffic volume to be travelled on roads with new median and roadside crash protection. Since 2003, the percentage of total traffic volume travelling on roads with speed limits of more than 80 km/h and fitted with median barriers has risen from 50% to 67% in 2010, against a 2020 target of 75%. The 2+1 median barrier treatments have reduced deaths by 80% and deaths and serious injuries by 50-60%. Improved junction safety has also been targeted and 80-90% fewer deaths have occurred at sites where roundabouts have been implemented.[38]

***Sustainable safety engineering measures in The Netherlands:*** The aim of the Dutch *Sustainable Safety* policy is to re-engineer and manage the road network to provide compatibility between road functions, speed limits and road layouts in order to encourage safe use and substantially reduce crash deaths and serious injuries. Many of the measures in the Start-Up Program of *Sustainable Safety* in 1998 were targeted at safer road infrastructure. During the period 1998-2007 nearly all road authorities drew up a plan for the re-classification of their roads into *Sustainable Safety* categories. Substantial reductions in crash deaths were achieved on newly classified 30km/h and 60km/h roads in the period 1998-2008. During this time more than 2,300 roundabouts were constructed and a study of those provided between 1999 and 2005 showed a 76% reduction in fatalities.[39]

## 4.3 Programme measures: identifying future options

It is clear from the previous sections that the *Injuries Strategy* could address and support a range of useful, specific, evidence-based intervention at EU, national, regional and local levels. Some have already been foreseen in the Transport White Paper, the Road Safety Action Programme and following the Council discussion in November 2010. The European Parliament has also indicated very broad support for a wide range of actions.

While identifying specific program measures and their potential impact in detail is beyond the scope of this working document, some examples are provided in Boxes 3 of key areas which might be addressed by a range of EU, national and local intervention. In an EU-wide opinion survey people driving under the influence of alcohol were considered to be a major safety problem by 94% of respondents, followed by drivers exceeding speed limits (78%) and drivers/passengers not wearing seatbelts (74%).[40]

[37] Bliss T and Breen J (2012(, *Unpublished World Bank road safety resource pape.r*
[38] Lie A*: 2+1 - Roads with Cable Barrier -a Swedish Success Story,* Swedish Transport Administration.
[39] SWOV (2009) Sustainable Safety effect, Leidschendam.
[40] http://ec.europa.eu/public_opinion/flash/fl_301_en.pdf 2010

In light of the next forthcoming discussion on road safety ITS technologies planned for the next HLG meeting, Section 4.4. looks at the role of in-vehicle driver assistance technologies in addressing these problems and possible next steps for the EU and Member States in taking these forward.

***Box 4: Examples of possible areas for targeting and intervention in the Injuries Strategy***

- *Reducing inappropriate or excessive speed* Excessive and inappropriate speed is a primary factor in about one third of fatal crashes and contributes to increased crash severity.[41] It is estimated that speed violations are still up to 70% on rural roads and as many as 80% on urban roads. More than 2,200 road deaths could be prevented each year if average speeds were reduced by 1 km/h on all roads across the EU - 1,100 on urban roads, 1,000 on rural roads and 100 on motorways.[42]
- *Reducing driving under the influence of alcohol* it is estimated that alcohol-related deaths contribute up to 25% of all road deaths.[43] At least 7,500 deaths could be prevented each year if crash-involved drivers reported to be exceeding the limit had been sober. [42]
- *Increasing the use of front and rear seat belts* Research studies indicate that the risk of dying in a crash could be reduced by about 60% by using the seat belt and by more, when belts and air bags are combined [44] Despite compulsory use requirements, the level of seat belt use in the front seat varies widely is insufficiently high and wearing rates remain low in rear seats in many EU countries.[42] Around 12,400 car occupants survived serious crashes in 2009 because they wore a seat belt. Another 2,500 deaths could have been prevented if 99% of occupants had been wearing a front seat belt.[42]
- *Improving the safety quality of vehicles e.g*. Research shows that 5-star rated Euro NCAP cars have a 68% lower risk of fatal injury and a 23% lower risk of serious injury compared to 2-star rated cars.[45]
- *Improving the safety quality of the road network:* See Box 3 for examples.
- *Improving emergency medical response* Reducing the time between crash occurrence and arrival of emergency services from 25 to 15 minutes reduces deaths by one third.[46]

## 4.4 The role of in-vehicle technologies in addressing key road safety problems

In-vehicle technologies play a key role in a *Safe System* approach. They can reducing the risk of serious and fatal crash involvement, mitigate the severity of injuries sustained before the crash, help to protect during the crash and to reduce post-crash consequences. [47] Increasingly, vehicle systems which integrate these objectives are being pursued. *Safe System* approaches also aim to inter-link vehicle safety measures with other system measures e.g. separated facilities in the road network, crash protective medians and roadsides and speed management to ensure tolerable kinetic energy in the event of a serious and fatal crash.

Substantial and evidence-based improvements have been made in the last 20 years. Improvements to vehicle safety result from type approval legislation (much of which is now agreed in the European Union and within the UN ECE process) consumer information e.g. Euro NCAP, product liability considerations as well as specific initiatives of the car

[41] OECD/ECMT (2006*) Speed management,* Paris.
[42] ETSC (2010) *PIN Flash n.16 Tackling the three main killers on the roads,* Brussels.
[43] European Road Safety Observatory (ERSO) (2012 in preparation ) ERSO (2012) *Alcohol web text.*
[44] Peden M, Scurfield R, Sleet D, Mohan D, Hyder A, Jarawan E, Mathers C eds. (2004). *World Report on Road Traffic Injury Prevention*, World Health Organization and World Bank (Washington), Geneva.
[45] Kullgren A, Lie A, Tingvall C. (2010) *Comparison between Euro NCAP test results and real-world crash data*. Traffic Injury Prevention. 2010 Dec 11(6):587-93.
[46] Sánchez-Mangas R,García-Ferrer A, De Juan A, Arroyo A M (2010). *The probability of death in road traffic accidents. How important is a quick medical response?* Accident Analysis and Prevention 42 (2010) 1048*).*
[47] European Road Safety Observatory (ERSO) (2012 in preparation ) ERSO (2012) *eSafety web text*

manufacturing industry. EU legislation aims for a minimum but high level of protection across the product line; consumer information aims to encourage the highest possible levels of safety performance based on state of the art testing; and car industry policies increasingly promote safety as a marketable commodity. The interaction of these processes has led to substantial improvements in vehicle safety design, particularly in the field of passive safety/crash protection and the risk of death and serious injury for car occupants by 50% or more.[48] Through these, EU- registered vehicle production leads the world in the provision of life-saving vehicle safety technologies both to EU and global markets..

At the same time, further improvements have been identified. UN ECE and EU legislation in important areas fall well behind the state of the art and manufacturing practice. Key issues for vehicle safety design and policy to 2020 and beyond will be 1) adapting existing type approval standards to technical progress in line with EEVC and Euro NCAP recommendations and protocols, especially for front and side impact crash protection in cars; 2) achieving safe compatibility through new and improved standards between different types and sizes of motor vehicles, between vehicles and non-motorised vehicles (improvements in vehicle safety design and equipment for pedestrians and motorcyclists are expected) and 3) implementing in-vehicle technologies as an efficient and relatively low-cost route to securing user compliance with the most important road safety rules. In this area, a range of driver assistance/in-vehicle enforcement technologies are available for deployment to follow the successful deployment of measures such as electronic stability control (being phased in from 2012, with all new cars being equipped by 2014). These are the principal focus of these next sections, given the forthcoming HLG discussion..

It has also been noted that the safety levels of vehicle fleets are notably lower in some European countries than others in relation to vehicle age (varying from 7 years in the UK to around 15 years in Latvia [49]). This means that without further initiatives, such as fast-tracking the fitment of equipment nationally through governmental procurement and in-house travel policies, new vehicle safety technologies will take longer to come through into new vehicle fleets and the used car market.

EU type approval legislation, supported by Euro NCAP and national initiatives such as fast-tracking and financial incentives through fiscal and insurance regimes, are needed to improve vehicle safety performance and create new demand and markets for safety products supplied by the car manufacturing industry.

[48] European Road Safety Observatory (ERSO) (2012 in preparation ) *Vehicles* web text
[49] ACEA, European Car Manufacturers Association, http://www.acea.be/news/news_detail/vehicles_in_use/

***Box 5: Swedish Transport Administration's Safety Requirements for Vehicles*** [50]

Sweden legislation (2009) sets a high vehicle safety requirement standards for government fleets. Recommended minimum traffic safety requirements have been developed, not only for government owned vehicles but also for lease vehicles, short-term rental vehicles and private vehicles used for work purposes. The legislation requires all government bodies to buy or rent only 5-star Euro NCAP cars for occupant protection ("government specification" as is the case for environment standards). The levels of safety requirements increase with length of time a vehicle is used for. It is recognised that the highest Euro NCAP standards should be aimed for and this is a moving target with room for continual technological improvements. Due to the requirement to rent only 5-star Euro NCAP cars for occupant protection ("government specification" as is the case for environment standards), this has had another overspill effect as rental companies, such as Hertz, Avis and Europcar, are upgrading their whole fleet to offer 'SRA recommended cars' to all their customers

***Box 6: What can a country/organisation/company do to promote safer vehicles?*** [51]

- Use travel policies
- Look at management systems (ISO 39001)
- Include vehicle safety in traffic safety work
- Support Euro NCAP and actively use the results
- Support every organisation that wants to focus on safety
- Be the market
- Get occupational health and safety on-board
- Follow up new technologies

## 4.5 Driver assistance technologies

There is large future promise of casualty reduction from crash avoidance and active driver assistance safety technologies where development and implementation is prioritised to maximise casualty reduction.

The EU institutions support new attention to this area and various initiatives are underway by the European Commission in more than one Directorate, Euro NCAP and individual Member States to advance the deployment of in-vehicle technologies which have received substantial research framework support over the last decades.

For example, EC Regulation 661/2009 on Type Approval requirements for the general safety of motor vehicles, the ITS Directive (2010) and the launch of its implementation plan - the ITS Action Plan adopted in 2008 – brings new attention to road safety aspects, albeit with limited coverage of the range of measures deemed as priorities by road safety experts to date.

***Box 7: EU ITS Action Plan Area 3: Road safety and security***

1. Promotion of in-vehicle safety systems
2. Introduction of Europe-wide eCall
3. Regulatory framework on safe human-machine interfaces including nomadic devices
4. Best-practice guidelines: impact of ITS on vulnerable road users
5. Best-practice guidelines: secure parking places for trucks (ITS support

[50] European Road Safety Observatory (ERSO (2012) (in preparation) *Integrated road safety* web text
[51] LIE A. (2010) *Vehicle safety policy – Swedish Transport Administration*, PRAISE Seminar, 12.5.2010, ETSC, Brussels

The European Commission's Cars 21 strategy envisages an EU automotive industry that is leading in technology producing new vehicles purchased by EU consumers, which are clean in terms of regulated pollutants, more fuel-efficient, quiet, safe and connected. In terms of driver assistance, CARS 21 supports the consideration of selective use of alcohol interlock devices, the extension of seat belt reminders (to cover additional seats), the use of speed management devices and systematic monitoring through crash injury research .

The European New Car Assessment Programme has developed a new role in assessing the safety quality of key in-vehicle technologies through *Advanced Euro NCAP* and a new road map is underway to allow emerging crash avoidance technologies to be included into the assessment scheme by 2015

A summary of development and future needs which address key safety problems found on roads in EU countries is presented below.

### *4.5.1 Driver assistance – ISA*

A range of ISA technologies are available to assist drivers in complying with speed limits. ISA is a well-proven technology that informs drivers when they are exceeding the road speed limit either by a warning signal as in Speed Alert Systems, (advisory) or where the accelerator either vibrates or offers resistance which is possible for the driver to set and override (voluntary) or by increasingly interventionist systems which do not allow driver override (mandatory). Research indicates that the more the system intervenes the more significant are the benefits as shown in Table 1..

***Table 1: Expected road safety results from a range of ISA options*** [52]

| | Advisory % reduction | Voluntary % reduction | Mandatory % reduction |
|---|---|---|---|
| Fatal crashes | 5% | 21% | 46% |
| Serious injury crashes | 3% | 14% | 34% |

The importance of intelligent speed assistance systems has been acknowledged by the European Parliament, the European Commission and the Council of Ministers. The European Parliament Report on Road Safety called on the Commission to 'draw up a proposal to fit vehicles with 'intelligent speed assistance systems' which incorporate a timetable, details of an approval procedure and a description of the requisite road infrastructure'. The European Commission's Transport White Paper states the intention of harmonising and deploying road safety technologies which include smart speed limiters.. Towards this end the ITS Directive and Action Plan includes definition of procedures for accurate public data for digital maps of speed limits on the network - an important prerequisite for the implementation of ISA but falls short of mandatory requirement either for speed limit mapping or for fitment of ISA driver assistance systems. A Euro NCAP protocol for speed assist systems has recently been published and will be used in the rating system in 2013.[53]

*Road casualty groups affected*: All road users
*Crash types*:: All crash types
*Estimated EU casualty savings*: See Table 1.

[52]Carsten O (2012) Personal communication of additional results to study Lai F, Carsten O and Tate F, *How much benefit does Intelligent Speed Adaptation deliver: An analysis of its potential contribution to safety and environment*, Accident Analysis and Prevention 48 (2012) 63– 72
[53] Euro NCAP (2012) *Speed Assist Protocol*, August 2012, Brussels

| | |
|---|---|
| *Estimated benefit to cost ratio:* | 3.4 (voluntary), 7.4 (mandatory) |
| C*o-benefits*: | Public health, occupational health and safety gains, emissions reduction, trade gains,. |

***Possible actions by the EU and Member States***:

- The EU could adopt legislation to require that speed limits are mapped in every Member State.
- The EU could adopt legislation to require that every new vehicle has as a driver-set speed limiter as standard equipment.
- The EU and Member States could carry out surveys to determine excess speeding, target its reduction and monitor results.
- The EU and Member States could lead by example and contribute to the fast-tracking of the fitment of ISA in procurement and in-house governmental safe fleet and travel policies.

### *4.5.2 Driver assistance - Seat belt reminders*

Seat belt reminders are intelligent, visual and audible devices that detect whether seat belts are in use in various seating positions and give out increasingly urgent warning signals until the belts are used.

Regulation EC 661/2009) adopts an existing UN ECE regulation which foresees the compliance with the provision of visual and audible seat belt reminders for the driver's seat by 1st November 2012. The regulation does not exclude provision for fitting seat belt reminders to front seat and rear seat passenger seats but further EU initiative is required to put these latter provisions into effect such that all seating positions are protected. Euro NCAP has also developed guidelines for seat belt reminders .

| | |
|---|---|
| *Road casualty groups affected*: | Vehicle occupants |
| *Crash types*:: | Head-on, intersection and run-off crashes |
| *Estimated casualty savings:* | In a country with relatively high seat belt wearing rates fitment in all cars and seating positions estimated to contribute to a reduction of 20% of car occupant deaths[54] |
| *Estimated benefit to cost ratio*: | 6 to 1 [55] |
| C*o-benefits*: | Public health, occupational health and safety, trade gains |

***Possible actions by the EU and Member States***:

- The EU could adopt legislation to ensure that every new vehicle has as standard equipment an enhanced seat belt reminder system with audible and visual warnings for all occupants.
- The EU, in its research programme, could support the further development of restraint systems that adapt to the biomechanical needs of users and crash severity.
- The EU and Member States could carry out surveys to determine seat belt use in all seating positions, target their increased fitment in road injury reduction strategies and monitor results periodically.
- The EU and Member States could lead by example and contribute to the fast-tracking of the fitment of seat belt reminders in procurement and in-house governmental safe fleet and travel policies.

### *4.5.3 Driver assistance - Alcolocks*

[54] .Kullgren et al ed (2005*) In Car Enforcement Technologies Today*, ETSC, Brussels
[55] Janitzek, J and Achterberg, F. (2006), *Seat belt reminders.* ETSC, Brussels.

Alcolocks or alcohol interlock systems are automatic control systems which are designed to prevent driving with excess alcohol by requiring the driver to blow into an in-car breathalyser before starting the ignition. The alcohol interlock can be set at different levels and limits. The fitment of alcolocks is a well-established feature of rehabilitation schemes for excess alcohol offenders. Several Member States as well as road transport operators are now promoting and including the fitment of alcolocks in passenger cars and in commercial and passenger transport operations.

The results of cost benefit analyses for implementing alcolocks for drivers caught twice with a BAC between 0.5g/l and 1.3g/l and for drivers caught with a BAC above 1.3g/l in several countries are shown below.[56]

***Box 8: Benefits to cost of alcolocks in different countries*** [42]

- For the *Netherlands*, the reduction of 35 traffic fatalities annually is valued at 4.8 million per death, leading to a benefit of 168 million Euros.Benefit/cost ratio =4.1
- For the *Czech Republic*, the 8 fatalities prevented are counted at 1.1 million Euro/death, leading to estimated benefits of 9 million Euro/year. Benefit/cost ratio = 1.6
- For Norway, the benefits are calculated as 5.5 deaths less per year a rate of 5.9 million Euro per death, or at 32.5 million Euro /year. Benefit/cost ratio = 4.5
- For Spain, the reduction with 86.5 deaths/year at 800.000 Euro per death would imply benefits of 69 million Euro/year. Benefit/cost ratio = 0.7

The European Parliament Report on Road Safety recommends the fitment of alcolocks to the vehicles of road users who already have more than one drink-driving conviction and to all new types of commercial passenger and goods transport vehicles and called on the Commission to prepare by 2013 a proposal for a Directive for the fitting of alcolocks, including the relevant specifications for its technical implementation..

The ETSC has called for making the use of alcohol interlock devices obligatory in certain specific cases, in particular for professional transport and for this to be extended to cover the rehabilitation of recidivists as well. The gradual introduction of alcolocks starting with target groups (commercial vehicles and public transport vehicles including buses especially transporting children, dangerous good trucks and repeat drink driving offenders) could reduce the high toll of drink driving casualties every year in the EU.

| | |
|---|---|
| *Road casualty groups affected*: | All road users |
| *Crash types*:: | All crash types |
| *Estimated EU benefits:* | 28% - 65% reduction in the rate of repeat excess alcohol offences (DfT, 2005). |
| *Estimated benefit to cost ratio:* | See above for country estimates |
| C*o-benefits*: | Public health, occupational health and safety, trade gains |

[56] EU IMMORTAL Project (2005), European Commission, Brussels

***Possible actions by the EU and Member States***:

- The EU could introduce a specification for alcolocks and mandate their use for professional and commercial transport and for excess alcohol recidivists.
- The EU and Member States could lead by example and contribute to the fast-tracking of the fitment of alcolocks in procurement and in-house governmental safe fleet and travel policies.
- The EU, in its research programme, could support the further development of alcolock systems for use in cars and light vehicles.
- The EU and Member States could carry out surveys to determine the level of drinking and driving in normal traffic, target reductions and monitor results periodically.
- The EU and Member States could lead by example and contribute to the fast-tracking of the fitment of alcolocks in procurement policies.

### *4.5.4 Driver assistance - Autonomous Emergency Braking Systems*

Autonomous Emergency Braking (AEB) systems can help to avoid crashes or to mitigate their severity by warning the drivers and supporting their braking response and/or by applying the brakes independently. All EU heavy commercial vehicles have to be fitted with autonomous emergency braking (AEB) technology by November 2013, though a requirement is not in place for other vehicle types. According to Euro NCAP real world performance data suggests that these systems can reduce car crashes by up to 27% and some car models are attracting Euro NCAP Advanced rewards. [57] Euro NCAP has grouped systems into three main categories: City, Inter-Urban and Pedestrian. Systems may fall into more than one category, or may meet the requirements of all three. A recent survey undertaken by Euro NCAP reveals that AEB is unavailable on 79% of the car models on sale in Europe and that 66% of manufacturers do not offer an AEB system on any of their new car models.[44] Consequently, Euro NCAP will include AEB assessments as part of the overall star rating from 2014 onwards and is promoting the need for AEB to be mandatory on all new vehicle types..

| | |
|---|---|
| *Road casualty groups affected*: | All users involved in motor vehicle crashes |
| *Crash types*:: | All crash types |
| *Estimated EU casualty savings:* | 27% reduction in crashes |
| *Estimated benefits to cost:* | Mixed results found |
| C*o-benefits*: | Public health, occupational health and safety, trade gains |

***Possible actions by the EU and Member States***:

- The EU could include Autonomous Emergency Braking Systems in vehicle type approval.
- The EU could extend eCall to other vehicle types such as PTWs
- The EU and Member States could lead by example and contribute to the fast-tracking of the fitment of Autonomous Emergency Braking Systems in- house safety travel and procurement policies.

### *4.5.5 Driver assistance - eCAll*

The eCall technology aims to generate, either manually or automatically, a call from a crashed vehicle immediately after the impact. Basic data on the crash, including its location is transmitted to an eCall operator and simultaneously a voice communication will be established between an emergency centre and the vehicle occupants. The efficiency of the emergency medical system (EMS), however, is essential to the success of this in-vehicle system which makes this probably one of the most complex of the driver assistance

[57] http://www.euroncap.com/Content-Web-Article/c79b2bdc-f914-4ad0-8d49-54254cda0ddc/euro-ncap-to-drive-availability-of-autonomous-emer.aspx

technologies to implement. Given a well-functioning EMS, the European Commission has adopted an estimate that eCall could save up to 2,500 lives annually in EU countries and prevent 15% of all injury crashes.[58]

The CARS 21 strategy[59] recommends that the European Commission should include eCall in vehicle type approval, consider extending eCall to other vehicle types such as powered two wheelers and ensure that eCall works in all 27 EU countries and in new cars of all makes and models and countries of origin by 2014.

The EU ITS action plan includes as priority development action the harmonised provision for an interoperable EU-wide eCall; i.e. the definition of the necessary measures for the harmonised provision of an interoperable EU-wide eCall.[60]

| | |
|---|---|
| *Road casualty groups affected*: | All users involved in motor vehicle crashes |
| *Crash types*:: | All crash types |
| *Estimated EU casualty savings:* | 2,500 lives and 15% reduction in injury crashes |
| *Estimated benefits to cost:* | Mixed results found |
| C*o-benefits*: | Public health, occupational health and safety, trade gains |

***Possible actions by the EU and Member States***:

- The EU could include eCall in vehicle type approval.
- The EU could extend eCall to other vehicle types such as PTWs
- The EU and Member States could lead by example and contribute to the fast-tracking of the fitment of eCall in in- hous**e** safety travel and procurement policies.

### *4.5.6 Monitoring the effectiveness of vehicle safety technologies*

- ***CARE data supplemented by reporting on serious injuries MAIS=>3***

Better reporting of serious injury will play a key role in evaluating the potential effect of vehicle safety technologies and their cost-effectiveness in reducing serious and fatal injuries in road crashes.

- ***Pan-European in-depth crash injury investigation system***

In-depth crash injury research is essential to complement CARE data when conducting impact assessments of existing or future safety policies and plays a key role when developing and evaluating vehicle safety technology interventions. It supports the development of new safety measures and provides a direct link between injuries, their causes and the long-term impact to individuals and to society. Currently across Europe the collection and use of in-depth data is largely on an individual member state basis with few countries conducting systematic data collection. There is no in-depth data available to describe the causes of crashes and injuries for Europe as a whole, though protocols have been developed. *CARS 21* has highlighted the need for EU-wide crash research as a routine activity to identify measures which are most cost-effective in reducing crashes and fatalities and to monitor their effectiveness. The DaCoTA project has established a framework for a pan-EU road crash injury investigation

[58] Bouler Y. (2005) *Clarification Paper – BC 1 Overview of available studies on proven or assessed benefits of e-Call, Renaul*t, 27 August 2005

[59] CARS 21 (2012) High Level Group on the Competitiveness and Sustainable Growth of the Automotive Industry in the European Union, Final Report, June 2012, DG Enterprise and Industry, Brussels

[60] Commission Decision of 15 February 2011 Concerning the adoption of the working programme on the implementation of Directive 2010/40/EU, Brussels, 15.2.2011 c(2011) 289 final

system.[61] for an on-going crash injury information programme which can be followed through in the further development of the *Injuries Strategy.*

- ***Naturalistic driving studies***

Naturalistic driving studies which are being used increasingly in EU-funded research also provide a useful monitoring tool for driver assistance technologies and are expected to provide greater insight into how and when hazardous situations occur. [62] Naturalistic Driving is a relatively new research method for the observation of everyday driving behaviour of road users. A SWOV fact sheet explains that for this purpose systems are installed in subjects' own vehicles that unobtrusively register vehicle manoeuvres, driver behaviour (such as eye, head and hand manoeuvres) and external conditions. In a Naturalistic Driving study, the subjects drive the way they would normally do, in their own car and without specific instructions or interventions. This provides key information about the relationship between driver, road, vehicle, weather and traffic conditions, not only under normal driving conditions, but also in the case of near misses. Compared to conventional research methods, this new method is expected to provide greater insight into how and when hazardous situations occur and the possibilities it offers to make the traffic system safer. [63]

**<u>Recommendation 6</u> It is recommended that the High Level Group considers the range actions on driver assistance technologies actions by the EU and Member States which have been identified above and which are broadly consistent with the CARS 21 strategy and the stated aims of the EU institutions. These include recommendations on EU type approval as well as good practice national actions to promote the take-up of effective new technologies.**

**<u>Recommendation 7</u> It is recommended that monitoring the effectiveness of vehicle safety technologies is included in this discussion, particularly in relation to the establishment of a Pan-European in-depth crash injury investigation system.**

## 5 Strategy development – next steps

The vehicle safety measures and recommendations outlines in the previous section are highlighted to provide background for the HLG's forthcoming discussion. A range if issues will need to be worked through to define further intervention needs in addition to the possibilities outlined in Section 4.5 and implementation arrangements for the development of a successful *Injuries Strategy* which can meet existing and new EU long-term goals and interim targets. This activity will require further technical and policy expert inputs.

Key evidence-based intervention will include:

- a range of Single Market vehicle safety measures briefly mentioned in section 4.4 which address provide improvement in safety in vehicles as well as to those outside, as recommended in the CARS 21 strategy;
- further attention to EU-funded road safety infrastructure measures; the importance of the International Road Assessment Programme as a tool to bring *Safe System* approaches into

[61] Hagstroem, L., Fagerlind, H., Danton, R., Reed, S., Hill, J., Martensen, H., Margaritis, D., Jahi, H, Morris, A. & Thomas P. (2010). *Report on purpose of in-depth data and the shape of the new EU-infrastructure*, Deliverable 2.1 of the EC FP7 project DaCoTA contract no: 233659.
[62] SWOV (2010) Naturalistic Driving: observing everyday driving behaviour: Fact sheet, Leideschendam.
[63] SWOV (2010) *Naturalistic Driving: observing everyday driving behaviour*: Fact sheet, Leidschendam.

the mainstream of road engineering and injury-reducing crash-protective roadsides and medians; the importance of managing vehicle speeds;
- further improvements to managing exposure to risk in the EU framework for driver licensing standards;
- identifying potential improvements in the emergency medical assistance and trauma care to improve post crash road injury outcomes.

Implementation issues will include:

- In line with international recommended practice, the strategy should cite the results to be achieved for the long-term and interim, set out the leadership and roles of the EU and Member States, and consider any supporting institutional arrangements e.g. the capacity of the Commission's road safety unit, possible new task forces/ study groups.
- The Strategy would highlight the importance of cross-governmental and cross-sectoral coordination (important roles of the HLG and inter-service consultation and coordination).
- Other issues will include a road map for any further harmonisation, the urgent need to secure sustainable funding for road safety; monitoring and evaluation (e.g. establishing simple safety performance indicators, road safety management capacity review), promoting and supporting international best practice and knowledge transfer (e.g. via ERSO and other mechanisms such as twinning, professional exchange), and research and development through the framework programme and bilateral arrangements.

**<u>Recommendation 8</u> It is recommended that the next meeting determines whether a small HLG *Injuries Strategy* working group comprising road safety policy leaders, supported by technical experts, should be established to assist the Commission in determining the scope and further development of the strategy.**

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