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**COMMISSION STAFF WORKING DOCUMENT**

# On the implementation of objective 6 of the European Commission's policy orientations on road safety 2011-2020 – First milestone towards an injury strategy

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## 1. INTRODUCTION

Reduction of serious road traffic injuries was one of the seven strategic objectives set by the Commission in 2010 in its road safety policy orientations for the period 2011-2020[1]. 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[2].

According to the policy orientations, 'in collaboration with Member States and other actors involved in road safety, the Commission will propose the setting-up of a global strategy of action on road injuries and first aid'.[3] This involves first of all finding a common understanding of definitions and concepts relating to casualties, and identifying courses of action to improve prevention and intervention. It is expected that, as soon as sufficient progress has been made in this area, the Commission services will consider a common 'injuries reduction target'. This Commission staff working document reports on the first steps taken towards achieving the stated objective.

The document looks at what has been done so far and describes the problem of serious road traffic accidents and the challenges of the current framework. It considers the situation regarding a common definition of serious injuries, data collection methods and a possible future EU-level target. The final part of the document discusses the likely next steps of this process.

## 2. BACKGROUND

Road safety performance has traditionally been measured almost entirely by the reduction of fatalities. However, serious but non-fatal accidents also present a major health problem with huge economic and human costs to society. In 2011, almost 1 500 000 people were reported to have been injured on EU roads. Around one sixth of these reported injuries were estimated to be serious.[4]

Road safety work in the EU has to date been highly successful. During the last strategy period, 2001-2010, the number of fatalities on EU roads was reduced by a total of 43%, coming close to but not completely achieving the strategic objective of 'halving road deaths by 2010'. In 2001, on average 112 persons per million inhabitants died in road accidents every year; in 2011 the fatality rate was down to 60 persons per million. A key factor contributing to this outcome is the results-based approach adopted in two consecutive ten-year road safety strategies. Based on an analysis of the main problems, priority action areas were defined and a target for improvement publicly announced. The campaign for reducing fatalities by half in ten years' time mobilised actors at local, national and European levels and

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1 European Commission Communication, *Towards a European road safety area: policy orientations on road safety 2011-2020*, COM(2010) 389 final

2 *White Paper: Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system*, COM(2011) 144 final

3 European Commission Communication, *Towards a European road safety area: policy orientations on road safety 2011-2020*, COM(2010) 389 final, p.16

4 EU CARE Database

contributed to making road safety a clear priority on the EU political agenda. The fatality reduction target was subsequently renewed for the strategy period 2011-2020.

However, for serious injuries, the reported improvements are not as impressive. The data reported by Member States showed only a 36% decrease between 2001 and 2010. Therefore, based on the experience of the successful targeted work on road fatalities, a similar focus is now to be considered for serious road injuries.

The overall aim of EU road safety work is, in line with the Safe System approach[5], to reduce the total number of accidents resulting in deaths and injuries. A focus on serious injuries does not compete with a focus on fatalities – the objectives complement each other.

### 2.1. What has been done so far?

In 2010, the Council responded to the Commission's policy orientations paper by underlining the urgent need to address serious injuries, supporting the development of a common definition and agreeing to the principle of a specific quantitative target[6]. The European Parliament in 2011 expressed its support for initiatives on serious injuries, calling for a target of 40% reduction in the number of persons seriously injured on roads, and calling on the Commission to establish a common definition of seriously injured in road traffic accidents[7]. A broadened view of road accidents, addressing both fatalities and persons seriously injured, has also clearly been adopted for the on-going United Nations Decade of Action on Road Safety[8].

The first steps towards an EU injury strategy were taken in February 2011. The EU High Level Group on Road Safety[9] discussed the issue, a working group of nationally nominated experts was convened and a public consultation took place. The outlines of a roadmap were then drawn up[10]. An external road safety expert has been consulted for details on the data collection process. Five projects on road injuries and first aid have been selected for grants. The expert group on the CARE[11] database has been involved as regards the technical updating of the database for enabling reporting based on a new common definition of serious injury.

## 3. STATE OF PLAY

The need to address serious injuries is based on two facts: serious injuries sustained in road traffic accidents constitute a real and substantial problem, yet knowledge about these injuries is insufficient and incomplete.

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5 The Safe System philosophy takes a wider perspective of road accidents, recognising that human beings are fallible, that their errors must be anticipated and the risk of serious consequences from these errors minimised. The responsibility for reducing fatalities and serious injuries is therefore not solely placed on the road users but shared also with e.g. vehicle producers, and infrastructure managers. The basic ethical assumption is that it is not acceptable to pay a price in deaths for the mobility the society needs.

6 *Council conclusions on road safety*, 3052th Transport, Telecommunications and Energy Council meeting, Brussels, 2–3 December 2010

7 European Parliament resolution of 27 September 2011: *European road safety 2011-2020*, 2010/2235(INI).

8 UN *Global Plan for the Decade of Action for Road Safety 2011-2020*

9 The Road Safety High Level Group is a forum established by Council Resolution 91/C 178/01 of 21 June 1991 and chaired by the Commission where high level representatives of EU Member States meet twice a year to review policy in the domain of road safety.

10 Minutes of the meeting of the Expert Group on Improving emergency and post-injuries services, Brussels, 16 December 2011

11 Community Road Accident Database, the European centralised database on road accidents which result in death or injury across the EU

### 3.1. What is the magnitude of the problem?

In total, some 1.5 million people are reported to be injured every year on EU roads[12]. For every death on the roads there are an estimated four permanently disabled, ten seriously injured and 40 slightly injured people[13].

The total number of people reported injured on roads (both slight and serious injuries) decreased by around 26% between 2001 and 2011. The number of people reported as seriously injured decreased by almost 36%[14]. This should be compared to the reduction in road fatalities for the same period, around 43%.[15]

There are large variations between Member States but on average, more than half of all serious injuries occur inside urban areas, especially affecting pedestrians and vulnerable road users.[16]

Road traffic accidents are a major cause of serious *head and brain* injuries. Accidents involving cars and powered two-wheelers are the most dangerous in this respect and according to the World Health Organisation (WHO), some 25% of road accident victims injured seriously enough for hospital admission have traumatic brain injuries[17]. Brain injuries tend also to be severe and have long-term consequences, changing the lives of the victims and their ability to function. *Neck and spine* injuries require on average the longest hospital stays and can cause chronic pain or permanent disability. Injuries to *legs and pelvis* are often not life-threatening, but are very common and 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.

For *car occupants* the head, chest and abdomen are most severely and most frequently injured but injuries to the legs and neck also cause substantial permanent disabilities.

Users of *motorcycles and bicycles* most commonly suffer serious and disabling injuries to the head and neck. 81% of all seriously injured motorcyclists have head injuries[18]. Leg injuries are less severe but are also frequent among motorcyclists.

*Pedestrians* most often suffer injuries to the legs and pelvis but serious head injuries are not uncommon.

Speed is a primary factor determining the severity of an injury. The kinetic energy of a moving vehicle is a function of its mass and velocity squared. This means that increased speed greatly increases the kinetic energy which must be absorbed in a collision – as speed goes up, so does the severity of injury to the human body. This is particularly true for pedestrians and occupants of light vehicles with regard to serious head injuries and especially brain injuries. On average, a 1% increase in speed leads to a 3% higher risk of serious injury.[19]

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12 EU CARE Database

13 M. Mackay, "Quirks of Mass Accident Data Bases", *Journal of Traffic Injury Prevention 6:4*, 2005

14 As reported by the Member States to the CARE database, each Member State using its national definition of "injured" and "seriously injured".

15 EU CARE Database

16 EU CARE Database, see also Annex I

17 WHO, *Global Burden of Disease Report*, 2002.

18 COST 327 *Motorcycle safety helmets*, final report to the European Commission, 2001.

19 For example L. Aarts and I. van Schagen, "Driving speed and the risk of road crashes: a review" in *Accident Analysis and Prevention*, 2006, p. 215-224

Serious injuries cause significant pain and suffering to individuals, but are also costly and problematic for society at large. The cost burden is borne not only by the health sector – i.e. all the associated costs of the medical treatment – but also by the economic sector and employers, amongst others. Serious injuries result in loss of members of the workforce on a temporary or permanent basis. The most productive age group is also the age group most frequently involved in road traffic accidents, which has a significant negative impact in terms of value loss on society as a whole. The health and work capacity of an injured person's family members may also be affected if they need to become carers. Earnings and productivity are thus doubly reduced. Insurance systems, the legal system and social support systems will be faced with increased administrative costs. Homes, workplaces and public spaces will need costly disability adaptations.

Over the last ten years, the annual socio-economic cost of serious road traffic injuries is estimated to be around 2% of Gross Domestic Product in the EU[20], amounting to some EUR 250 billion for 2012. This means that, while road safety measures incur cost, the cost of failing to address the issue is also substantial.

### 3.2. What is known about the serious injuries that people suffer?

The numbers of serious injuries and their associated costs are of course only estimates. It is likely that the total number of people seriously injured in road traffic is substantially higher than currently reported. The reason is that, in the transport databases, relevant and comparable data on serious injuries are lacking. There are two main problems: lack of common definitions and wide-spread underreporting and misreporting.

In road safety data, the severity of an injury is sometimes defined on the basis of medical classifications, sometimes in terms of the long-term effects of the injury. It is often defined by the length of hospitalisation needed. However, different Member States apply different practices and a person with a certain injury would be reported as staying for a different length of time in hospital depending on which country he or she is in. Due to these differences in definitions and reporting methods, the Member States' data are currently not comparable.

Further problems stem from misreporting and underreporting. A large proportion of non-fatal injuries are not reported at all. Some injuries are reported as serious although they are not, or vice-versa. Studies have indicated that only around 70% of all serious injuries are actually reported[21].

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. However, the police are not alerted to every traffic accident and the police cannot be expected to perform a medical assessment; their diagnosis is only a rough on-the-spot estimate. This initial assessment by the police is not always checked against subsequent medical reports about injury severity.

The knowledge gap produced by the lack of a common definition, lack of consistent reporting systems and the understandable but widespread under- and misreporting must be closed. Only with a better understanding of the situation can actions and policies be efficiently designed to reduce the number of serious injuries and minimise their long-term consequences. A better understanding of crash injury trends is also needed for making international comparisons.

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20 WHO, *World report on road traffic injury prevention*, 2004.

21 R. Elvik and A. B. Mysen, "Incomplete accident reporting: Meta-analysis of studies made in 13 countries", *Transportation Research Record No 1665*, 1999

## 4. THREE STEPS PRECEDING A STRATEGY OF ACTION

This section outlines three initial steps that must be taken to build a solid foundation for any subsequent action. Firstly, it identifies the need for a common definition of serious injury, in order to enable collection of internationally comparable data within the EU. Secondly, it explores ways for Member States' to improve data collection on road accidents, such as using both police and hospital records for a more complete picture. Thirdly, it considers the need for an EU-level target for reduction of the number of serious injuries.

### 4.1. A common definition

The problems that are due to diverging definitions have already been described. Without a harmonised definition no comparisons are possible, nor can the magnitude and true nature of the problem be fully understood. A common definition is a prerequisite for effective intervention.

The common definition of serious injury needs to be based on an already established medically classified standard. This would avoid arbitrary diagnoses, and not put any extra administrative burden on medical staff, and has the added advantage of being internationally comparable.

An injury strategy was the key topic for the EU High Level Group on Road Safety at its meeting in June 2012. The already existing trauma scale 'Maximum Abbreviated Injury Score' (MAIS[22]) was seen as the preferable option for a common definition. The choice of the MAIS as a basis for the common EU definition was confirmed by the High Level Group at its meeting in January 2013.

The MAIS is a globally accepted trauma scale used by medical professionals. It provides an objective and reliable basis for data collection. 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. These are the types of injuries that cause significant or long-term damage and consequences. This is where efforts should be focused.

The benefit of using this specific classification system is that it has high validity and reliability. The use of a detailed classification key reduces the risk of arbitrary diagnosis and also the risk of misreporting would be substantially reduced. Moreover, it is also internationally comparable. Some Member States have already started to use this method to classify road injuries. The system is well established and widely used by medical staff, so new systems do not have to be developed.

Member States could therefore report data on both slight and serious injuries, indicating the level of severity according to the MAIS.

### 4.2. More reliable data collection

The most common process for data collection has until now been that road accident data are reported from the place of the accident, by the police or other law enforcement authorities. The data collected normally include important pieces of information such as type and number of vehicles involved, type of traffic environment and possibly also indications of the cause of

[22] The European Commission acknowledges that the AIS (in all its versions) is the property of the Association for the Advancement of Automotive Medicine (AAAM), owner of the Copyright. The so-called AIS (Abbreviated Injury Scale) is mentioned in this Commission staff working document for informational purposes only.

the accident. These are all vital and useful aspects and police reports from the scene of accidents can contribute to the understanding of road accident occurrences.

However, on-the-spot assessment by the police has often been the only method used for determining the injury severity grade that is entered into road safety data bases. In some cases, though not all, these preliminary non-medical assessments are followed-up and verified by the hospitals.

Underreporting occurs as the police are not always alerted to all types of accidents. Misreporting occurs as the police are understandably unable to make a fully-fledged medical assessment of the severity of an injury.

In this first phase, the priority as expressed by the High Level Group on Road Safety is to arrive at a more accurate total number of people who are seriously injured in road accidents in the EU. Whereas it is of vital importance that the definition of 'serious injury' be completely harmonised in the reporting of EU road safety data, the Member States can use different methods for arriving at this total number of seriously injured. There is not likely to be a one-size-fits-all solution suitable for all Member States.

The High Level Group on Road Safety identified three main ways Member States might choose to proceed: continue to use the police data but apply a correction coefficient; report the number of injured based on data from hospitals; or create a link between police and hospital data.

The first possibility would be to apply national coefficients to the data currently collected by the police to allow for mis- and underreporting, thereby arriving at a truer estimate of the number of people seriously injured under the common EU definition. Such national coefficients would need to be regularly updated and reviewed to give as accurate an estimate as possible of the road traffic injury situation. The use of national coefficients will not provide as exact and detailed data as full linkage between hospital and police records, but would in the interim improve the reporting situation.

Another possibility for identifying the number of seriously injured persons is to use the hospital data. This would ensure correct assessment of injury severity. Gathering these data should not require the development of new structures or processes as the information normally already exists in hospital data bases. Algorithms for conversion exist for cases where the hospital reports use other codes than the MAIS. While this option is easy to introduce and will give reliable data on number and severity of injuries, the sole use of hospital records will not provide all of the data on causes and characteristics of accidents that can be delivered by police reports.

Instead, by linking the relevant variables of police and hospital records for each individual accident a more complete picture emerges. This is another possibility for Member States. The link between these data sources could take different forms, using various technical or procedural solutions. Manual or automatic systems may be considered to complement the on-the-spot reports by the police with hospital verification regarding injury severity. A link between police and hospital data would reduce the risk of both underreporting and misreporting substantially, as well as provide the most complete set of information, and is therefore seen by the Commission as a preferred solution in the long-term.

As regards linking of data, the principles of integrity and data protection must be kept in mind. The relevant data from hospital records would need to be processed into road traffic databases in anonymised form to prevent sensitive or private health-related data from being improperly handled. Such systems would also require safeguards against abuse.

Development of the technical aspects of these different possibilities will be best managed in close cooperation with the national representatives in the CARE expert group and the relevant Member State authorities.

The time required to decide on and implement the method for carrying out the necessary recording and reporting transitions will differ between Member States. However, the High Level Group on Road Safety concluded that no dramatic changes to current systems are needed and that Member States could therefore be in a position to prepare to collect the more correct data using the common definition of serious injury by 2014, reporting the first data set during 2015.

Serious injury data could in the longer term also be made available in disaggregated form allowing more detailed analysis, as is already the case with road fatalities.

In order not to risk losing data, consideration could be given to continuing the present data collection method and allowing the old and the new reporting systems to run in parallel for a transitional period.

### 4.3. Setting a target

As has already been mentioned, the success achieved in substantially reducing road fatalities in the EU is closely connected to the adoption of a new results-based approach. The EU has set ambitious targets for drastically decreasing the number of road deaths, thereby both placing the issue clearly on the political agenda and enabling concrete follow-up and evaluation of progress.

Setting targets for improved road safety is recommended as effective practice by several expert organisations, for example the WHO and the Organisation for Economic Cooperation and Development (OECD). By publicly committing to ambitious but realistic targets the likelihood is that programmes will be better designed and public resources effectively used. A long-term strategic outcome target should be supported by interim targets, concrete actions and measures for follow-up and monitoring.

All this is already being done at EU level when it comes to road fatalities. Several Member States have also taken another step, adopting national targets for the reduction of serious injuries.

A strategic and realistically ambitious reduction target with regard to serious injuries could therefore complement the current EU road safety strategy, as envisaged in the Commission's policy orientations 2011-2020. An EU-level target could be complemented by Member States adopting relevant targets at national level. Member States could also set themselves an even more ambitious objective or adopt sub-targets for example for specific road user groups, regions or traffic situations.

## 5. FUTURE DEVELOPMENT OF A STRATEGY OF ACTIONS

This section provides some food for thought with a view to preparing the ground for later discussions on the development of a strategy of action.

A second is all it takes for a collision to happen, but the ensuing consequences may stretch over many years. From the instant when an accident becomes inevitable, some distinct phases follow, and different actions are needed for these different phases. A comprehensive strategy on serious road injuries should therefore address: 1) the collision impact, 2) the first aid and emergency services and 3) the long-term rehabilitation process. Some thoughts on these three phases are set out below. The over-all need for comprehensive accident management, the

backbone to any action in this area, is also discussed. Finally, the need for more knowledge, research and in-depth studies is underlined.

*The collision impact*

Just as with road fatalities, the initial aim is to prevent serious road accidents from ever happening. Much of the present road safety work on fatalities is focused on this, for example: infrastructure design separating vehicles from the vulnerable road users, law enforcement to reduce occurrences of drink-driving and active safety vehicle applications such as lane departure warnings and emergency braking systems. However, in line with the Safe System approach, it must be realised that accidents cannot be completely avoided. The human factor, technical errors and unforeseen events in traffic cause many accidents.

In those cases, we must limit the consequences through what is sometimes referred to as secondary safety or crash protection. When a crash happens, the kinetic energy levels determine the severity of damage. By stepping up efforts to lessen the crash impact, injuries instead of deaths and slight rather than serious injuries may be the outcome.

The starting point for further action in a strategy on injuries, to complement on-going work on accident prevention, ought therefore to be the identification of tools and techniques that reduce the severity of injuries in those accidents that cannot yet be fully avoided.

The use of protective measures is a typical example of an approach to reducing injury severity that is especially relevant to vulnerable road users. With an airbag in place, the likelihood of severe head injury decreases considerably. Failure to wear crash helmets results in serious head injuries for pedal cyclists, moped riders and motorcyclists. Use of motorcycle helmets reduces the number of fatal and serious head injuries by between 20% and 45%[23]. Bicycle helmets reduce by up to 88% the risk of serious head and brain injury[24]. The risk of whiplash injury is related to head restraints and seatback/headrest design. An effective anti-whiplash system has been estimated to reduce average whiplash injury risk by 50%[25].

Generally speaking, the factors determining the severity of a road traffic injury, apart from the presence of protective devices, are the speed of the vehicle(s) involved, the design and characteristics of vehicles and roadsides and swift access to emergency medical systems so that injury consequences can be minimised.

**An example of possible action: infrastructure design and management**

Infrastructure design and management should take into account not only the road but also the roadside environment, as described by Directive 2008/96/EC on road infrastructure safety management. Roadside characteristics such as the presence of fixed obstacles can substantially influence the severity of an accident.

The framework defined by this Directive only applies to the trans-European transport network TEN-T (consisting mostly of motorways), although Member States are also strongly encouraged to apply the provisions over the whole road network. As the vast majority of accidents causing serious injury occur on roads other than motorways, an action in line with an injury strategy could aim to promote road safety audits and inspections also on the secondary road network, as well as in the urban environment.

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23 WHO, *World report on road traffic injury prevention*, 2004; COST 327 *Motorcycle safety helmets*, final report to the European Commission, 2001.

24 WHO, *World report on road traffic injury prevention*, 2004.

25 M. Krafft, A. Kullgren, A. Ydenius, O. Boström, Y. Håland and C. Tingvall, Rear impact neck protection by reducing occupant forward acceleration - a study of cars on Swedish roads equipped with crash recorders and a new anti-whiplash device, Proceedings IRCOBI Conference, 2004

*The first aid and emergency services*

After a crash has happened, the priority is to minimise further damage by initiating rescue and first aid without delay.

The aid received in the first hour after a crash is crucial for reducing the risk of severe consequences. It has been estimated that if the time between crash occurrence and arrival of emergency services is reduced from 25 to 15 minutes, the number of deaths will drop by one third[26]. Delays in detecting the crash and alerting emergency services or in the arrival of emergency services are therefore important risk factors.

**An example of possible action: ITS deployment**

Intelligent Transport Systems (ITS) and in-vehicle technologies for improved road safety can help both prevent accidents and reduce their impact. Cooperative systems such as eCall bring substantial post-crash added value, by reducing the time taken to alert accident and emergency services; they can also play an important role in accident management, e.g. avoiding secondary accidents. Further deployment of the eCall service functionalities as well as of other relevant ITS and in-vehicle safety devices could therefore be an area of specific interest for a comprehensive injury strategy.

Pre-hospital care, in-hospital care and rehabilitation form a chain in which all links are important. A determining factor is therefore also the efficiency, competence and resources of the emergency medical system. Organising reliable and efficient rescue services is a different challenge for different Member States.

*The long-term rehabilitation process*

Rehabilitation involves the medical services, post-hospital care, social support systems and society's adaptation to the needs of people with different types of disabilities. It could include prosthetic support, psychological support and support for reintegration into society. The aim must be for society to enhance the quality of life of those affected.

While some information concerning the typical trauma caused by a road accident is available, there is a lack of data on the long-term consequences of car accidents. A better understanding of these correlations is therefore needed.

*Accident management*

Road safety in general and a focus on serious injuries in particular is by nature *cross-sectoral.* For good results, a multitude of policy areas and services must become interlinked. A system-wide approach to accident management is needed.

Also an *inclusive approach* is necessary. Civil society, the manufacturing sector, public authorities, law enforcement bodies, the health care sector, the insurance sector and road infrastructure managers must be active stakeholders. Actors at all levels, from local to European, will have a role to play. Exchange platforms such as the European Road Safety Charter or the European eCall Implementation Platform can be useful in bringing various actors together to share best practices.

No less important are the urban area municipalities, considering that so many vulnerable road users are injured within towns and cities. Urban mobility planning should take road safety aspects into account.

**An example of possible action: Sustainable urban mobility planning**

[26] Rocío Sánchez-Mangas, Antonio García-Ferrrer, Aranzazu de Juan, Antonio Martín Arroyo, *The probability of death in road traffic accidents. How important is a quick medical response?*, 2010

Unlike fatalities, serious road injuries occur more often within urban areas than on rural roads (see Annex I). Vulnerable road users are particularly at risk. Pedestrians and cyclists together make up 50 % of all urban road fatalities and the majority of serious injuries to pedestrians are caused by accidents within urban areas. Therefore, tackling the problem of serious injuries among vulnerable road users is primarily a matter of addressing urban area road safety. Road safety should be an important consideration for city authorities when planning local transport. One tool for improving urban road safety is sustainable urban mobility planning, helping towns and cities to take a holistic and efficient approach to local challenges such as congestion, environmental impacts and road safety.

Efforts directed towards serious injury reduction must be planned and prepared from a *long-term perspective*. The problem cannot be solved within a few years and research projects will by necessity take time to yield high-quality in-depth study results.

Finally, actions and policies adopted with a view to reducing serious injuries must be *evidence-based* and the approach should tie in with the Safe System philosophy. Performance indicators and, where relevant, outcome output targets should be clearly identified to facilitate follow-up and monitoring.

*The need for research and in-depth studies*

Most road safety measures and applications promoted today have been selected because of their clear cost-benefit when it comes to avoiding fatalities. They are promoted because it has been proven that they can make the difference between life and death in a given situation. When it comes to fatalities, a lot of data are available and much research has been performed. However, there might well be other tools and instruments which, though less obviously life-saving, can still be of great assistance in reducing certain types of serious injuries, for example headrest positioning to minimise whiplash injury or the design of seatbelts to take into account the greater frailty of the elderly human body.

One aim of the initiative on serious injuries is therefore to learn more about the scope and causes of the problem, to support the best possible design of actions and policies in the EU – and to better evaluate the efficiency of actions, monitoring and following up results.

This means it is essential to complement the basic data reporting with in-depth crash injury research in order to support the development of new safety measures and to better understand the complex causation of serious injuries and their long-term impact on individuals and society. In this regard, a common taxonomy for classifying causal factors to facilitate analysis, as is already the case in the aviation, maritime and railway sectors, could be discussed.

**An example of possible action: crash test methodologies**

There may be knowledge gaps related to traditional methodology, e.g. the use of crash test dummies primarily with the characteristics and size of the average male body. Road safety must be for everyone including those of different bodily make-up. It might therefore be worthwhile diversifying collision impact studies to cover different kinds of bodies (size, age, gender) for a deeper understanding of the biomechanics that come into play in accidents.

## 6. CONCLUSIONS

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. It should not be assumed that all areas of such a strategy

require EU-level legislation. Rather, as with all road safety measures, the responsibility will be shared and requires buy-in from a multitude of stakeholders, in accordance with the principles of subsidiarity and proportionality. An appropriate mix of legislation, awareness-raising, enforcement, engineering, cooperation and knowledge transfer among relevant stakeholders, for example through the European Road Safety Observatory, plus research support will be needed.

Taking into account the complex and cross-disciplinary character of the problem, this process will closely involve several Commission services and EU policy areas. Beyond transport policy, the strategy will require the involvement of areas such as research, public health and health sector management, vehicle type approval, the digital agenda and intelligent technical solutions. It may link to other on-going work for example regarding mobility and accessibility of people with disabilities or regarding cross-border cooperation within the health sector.

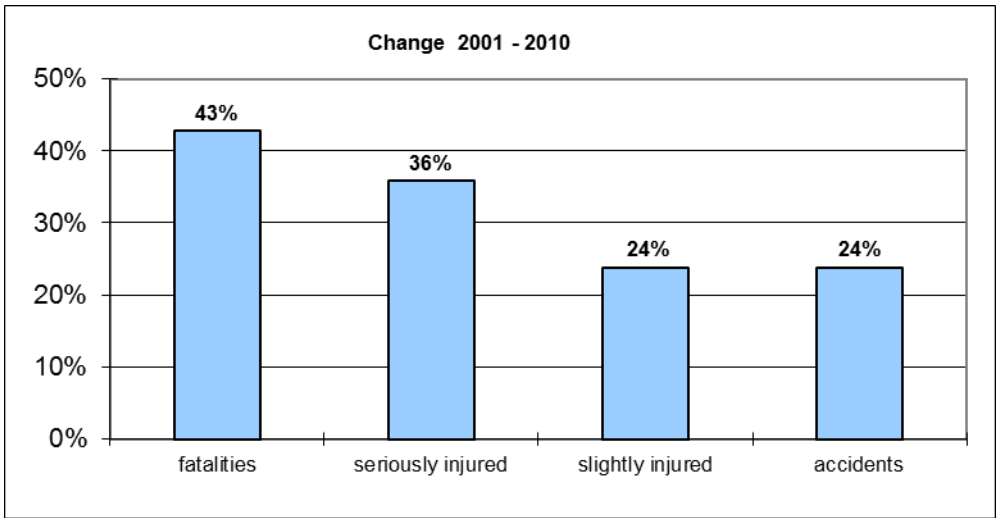
A future strategy on serious injuries also ties in closely with the on-going work on urban mobility planning in the EU, considering the high number of casualties among vulnerable road users that occur in urban areas.

This report represents the first milestone in a lengthy process. The European Commission has already expressed its firm commitment, through its policy orientations on road safety for the period 2010-2020, to undertaking further work on serious injuries. The Commission services think that by working on a common EU definition of serious road injuries and developing mechanisms for data gathering and reporting, data can be made available to help monitor and eventually tackle the problem more seriously across the EU, preferably having data available for the year 2014. Using more comparable and relevant data will help focus future action in the most efficient way and on prioritised areas. Finally, an aspirational EU target for injury reduction also needs to be considered. Setting an aspirational target may be expected to add the right amount of dynamism to the pursuit of more effective emergency and post-injury services.

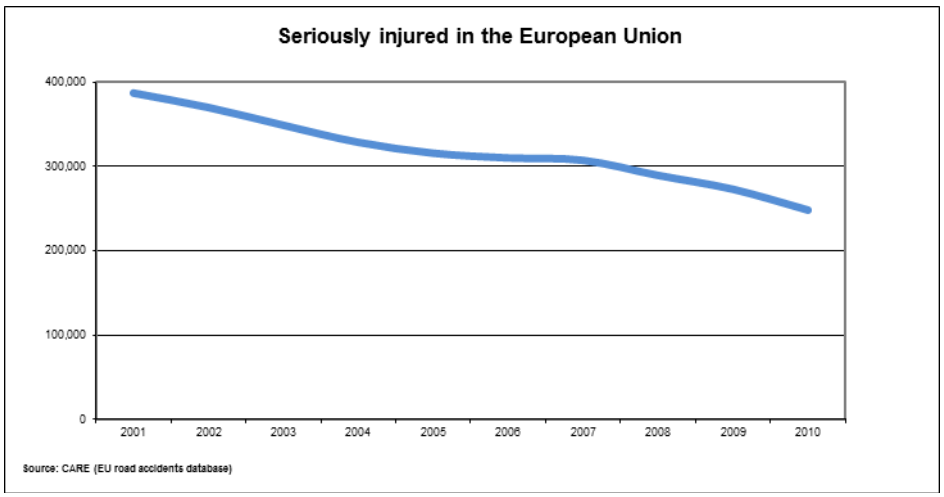
## ANNEX I: Some statistics

### 1. TREND OVER TIME

During the period 2001-2010, the total number of yearly reported road traffic injuries fell by 26% to around one and a half million people. In the same period, the number of people reported seriously injured fell by 36% and the number of road fatalities by 43%.[27]



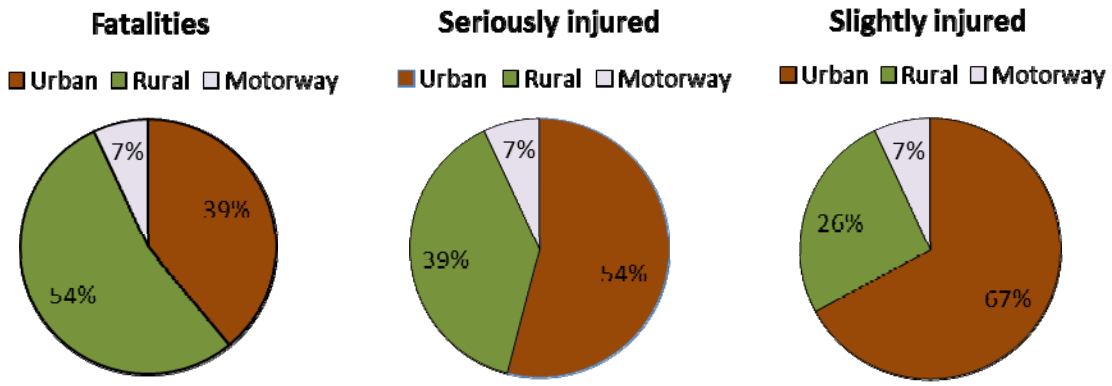

For the seriously injured, this means a reduction from almost 400 000 to around 250 000 reported cases per year in the EU.



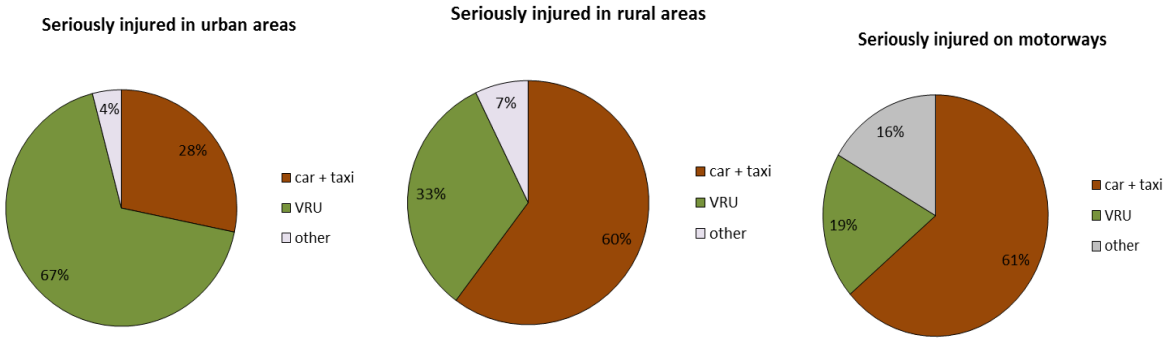

### 2. TYPES OF ACCIDENTS

Most fatal accidents occur outside urban areas but for slight and serious injuries the figures are reversed. More than half of all serious injuries and almost 70% of all slight injury accidents happen inside built-up areas.

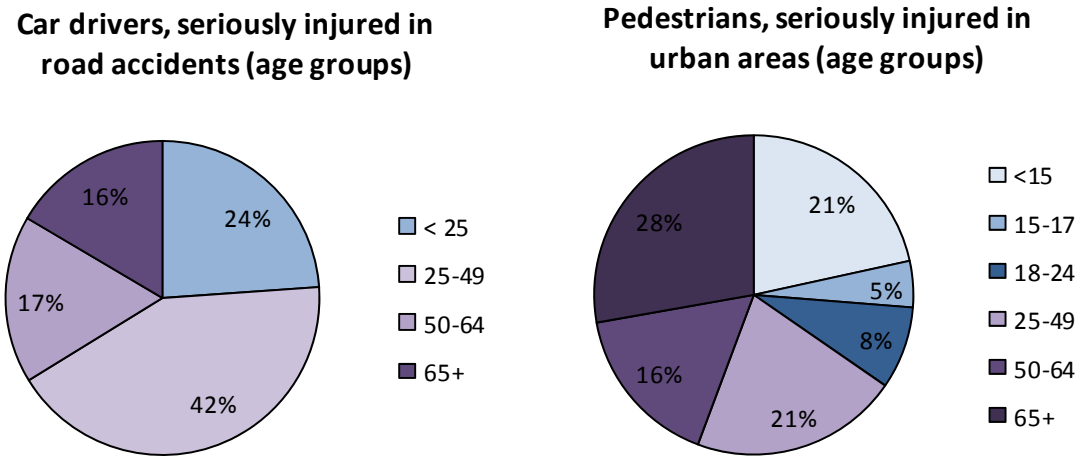
[27] Source for all numbers and charts in this chapter: the CARE Database.




45% of all seriously injured persons are vulnerable road users (pedestrians, cyclists, powered two-wheeler drivers). However, within urban areas the vulnerable road users make up 67% of the seriously injured total.




The young and the elderly are over-represented among those who are seriously injured in road accidents, This is especially the case with car drivers, where the young (18-24 years) account for around 24% of all accident victims in the EU, although they only make up around one tenth of the total population. Among pedestrians it is the elderly who make up the largest relative share.



## ANNEX II: Public Consultation Report

### CONCLUSIONS OF THE PUBLIC CONSULTATION ON AN EU STRATEGY TO REDUCE INJURIES RESULTING FROM ROAD TRAFFIC ACCIDENTS[28]

The consultation attracted 154 responses, mainly from citizens, road safety experts, research bodies, universities and road users or victim associations interested in road safety.

The findings of the public consultation clearly indicate that road safety is regarded as a priority on the political agenda. Moreover, the added value of an EU initiative that addresses traffic-related injuries has been acknowledged. Target setting and exchange of best practices are seen as the two areas with the highest EU added value, followed closely by research and project funding, legislation and data analysis.

Despite the fact that an overwhelming majority of respondents are broadly in favour of a target to reduce the number of persons injured in road traffic accidents, a clear 'feature' of how this target should be shaped does not emerge. Several contributors have suggested that specific targets should be set for cyclists, motorcyclists and urban areas, at European or at national level, and – where possible – combined with a general target.

As regards statistics and the evaluation of injuries, the majority of respondents felt that a common EU definition of serious injuries was needed. Any definition of a serious/slight injury should be based on the medical severity score of the injury rather than on other methodologies. This approach would lead to a systematic improvement in the current statistics and provide systematic in-depth analysis across the EU. In order to resolve the problem of underreporting and misreporting, respondents stated that their preferred solution was to complete the link between police and hospital records, following each individual accident, which could have a significant spill-over effect on the industry.

Those who participated in the consultation have clearly stated that the data collected should be made available to all stakeholders, in particular the car manufacturing industry and infrastructure managers, in order to develop new devices, procedures and solutions, and to take any necessary steps to prevent accidents and to mitigate the consequences.

The public consultation was launched as part of an initiative to reduce the number and the severity of road traffic injuries. This is one of the strategic objectives outlined in policy orientations on road safety 2011-2020, and a priority for EU action.

The purpose of the consultation was to provide input into the drafting of a strategy to reduce the severity of injuries resulting from road traffic accidents. The questionnaire addressed both general issues related to road safety and more specific issues on how to improve the data available on victims of accidents and the collection of such data at EU level, as well as how to target some specific groups of road users. Its aim was to arrive at a common understanding of definitions and concepts relating to casualties (in particular, the definition of serious and slight injuries), to improve the collection of data and to identify courses of action to improve prevention and intervention, including their socio-economic impact.

The consultation lasted ten weeks, from 17 April 2012 to 22 July 2012.

[28] European Commission, DG MOVE: "Report of the public consultation on an EU strategy to reduce injuries resulting from road traffic accident", July 2012. The full report on the public consultation is available on the Commission website: ec.europa.eu/roadsafety.

## ANNEX III: Maximum Abbreviated Injury Scale

The Maximum Abbreviated Injury Scale (MAIS) is a globally accepted trauma scale used by medical professionals which provides an objective and reliable basis for data collection. The injury score is determined at the hospital with the help of a detailed classification key. The scale ranges from 1 to 6, with 6 being the most serious injuries. The most common interpretation is that MAIS 3-6 should be considered as serious injuries and 1-2 as slight.

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.

The 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 Organisation (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 MAIS is derived from these commonly used ICD codes.

### 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 provide the basis for 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 ninth edition is still widely used (ICD-9). Causes of accidents are classified. Traffic injuries have a specific code in the 'external cause' section, and there are also codes to describe the injury.

### Abbreviated Injury Scale (AIS[29])

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. The AIS is protected by copyright.

The level of severity is classed as: 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.

The 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

[29] The European Commission acknowledges that the AIS (in all its versions) is the property of the Association for the Advancement of Automotive Medicine (AAAM), owner of the Copyright. The so-called AIS (Abbreviated Injury Scale) is mentioned in this Commission staff working document for informational purposes only.

ranking and comparing injuries by severity, and to standardise the terminology used to describe injuries. It is possible to convert ICD-9 or ICD-10 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 injury severity to be assessed on the basis of a standardised medical indicator.

(Source: IRTAD 2011)

## ANNEX IV: Current definitions of serious injury in the road accident database

The definition of serious injury as currently reported for inclusion in the Commission's road accident database differs between the EU Member States. There is not yet any confirmed compilation of the definitions used in all Member States' hospital records, but it is indicated that the most common definitions used in those records are the ICD-9 or ICD-10 and the AIS/MAIS[30].

| Country | Seriously Injured |
|---|---|
| AT | >24 days health impairment |
| BE | > 24 hours in hospital |
| BG | As defined in penal code |
| CH | >= 24hours inability to perform normal activities or in hospital >=24hours |
| CY | Hospitalised |
| CZ | As decided by medical doctor or >=24h hospital |
| DE | >=24h in hospital |
| DK | According to national definition[31] |
| EE | Not defined |
| ES | >=24 hours in hospital |
| FI | Not defined |
| FR | >=24 hours in hospital |
| GB | Hospitalised or according to national definition[32] |
| GR | Police records; presumed >=24h in hospital |
| HR | Definition unknown |
| HU | Injuries needing hospital care or >8 days to heal |
| IE | Hospitalised or according to national definition[33] |
| IS | According to national definition[34] |
| IT | Not defined |
| LU | >=24 hours in hospital |
| LV | >=24 hours in hospital |
| MT | Health department/Police definition |
| NI | Fractures/concussion/internal injury/severe cuts/lacerations/severe shock |

[30] At the present time and to the knowledge of DG MOVE, Austria, the Czech Republic and the Netherlands are using the MAIS definition of serious road traffic injury in hospital records on a national scale. Denmark and the UK use the MAIS definition in hospital records for some regions. Spain and Germany are currently working on the use of the MAIS definition for road traffic injuries. Other Member States may be in the same processes.

[31] 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.

[32] 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. An injured casualty is recorded as seriously or slightly injured by the police on the basis of information available within a short time of the accident. Hospitalisation procedures will vary regionally.

[33] 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.

[34] Fractures, concussion, internal lesions, crushing, severe cuts and laceration, severe general shock requiring medical treatment and any other serious lesions entailing detention in hospital.

| | |
|---|---|
| NL | >=24 hours in hospital |
| NO | Life-threatening, permanent or major injuries |
| PL | According to national definition[35] |
| PT | >=24 hours in hospital |
| RO | Hospitalised or according to national definition[36] |
| SE | Injuries expected to result in hospitalisation |
| SI | >=24 hours in hospital |
| SK | Doctor's opinion + change of state between 1 and 30 days |

Source: CARE Database

[35] 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.

[36] 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.