



ANNEXES

**To: Road safety study for the interim
evaluation of Policy Orientations on Road
Safety 2011-2020**

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ANNEX 1: The Safe System goal and approach

The *Safe System* goal and strategy represents an ambitious safety performance level and internationally identified best practice. *Safe System* is recommended to all jurisdictions and organisations by the ITF/OECD, World Bank, the International Standards Organisation and several other international organisations concerned with road safety.

The approach has evolved over many years and derives most notably from the Swedish Vision Zero and Dutch Sustainable Safety strategies and the concepts and good practice in other fields. *Safe System* embraces well-established safety principles and builds upon demonstrably effective practice using innovative solutions and new technologies. It is being taken up increasingly in Europe, Australasia and North America at regional, national levels and city levels and represents the new safety culture.

Safe System/Vision Zero goals

Safe System/Vision Zero has as its long-term goal a road traffic system which is eventually free from death and serious injury. It involves an important paradigm shift from trying to prevent all crashes to preventing death and mitigating serious injury in road traffic crashes, a problem which is largely preventable based on current knowledge. It is backed up by interim quantitative targets to reduce numbers of deaths and serious injuries usually over a 10 year period. In *Safe System*, there is much focus on targeting intermediate outcomes that are casually related to death and serious injury e.g. average mean speeds, seat belt use, sober driving, the safety quality of roads and vehicles and emergency medical system response.

Safe System principles

Safe System is based on the underlying principles that:

- human beings make frequent mistakes that lead to road crashes;
- the human body by nature has a limited ability to sustain crash forces with known tolerance to injury thresholds; and
- it is a shared responsibility between stakeholders (road users, road managers, vehicle manufacturers, etc.) to take appropriate actions to ensure that road crashes do not lead to serious or fatal injuries (ITF/OECD, 2008).

Safe System intervention strategies

Safe System requires a systematic, multi-disciplinary and multi-sectoral approach which addresses the safety needs of all users; fatal and serious injury crash prevention, crash protection and mitigation and post-crash care and aligns with other policies for co-benefits such as health, occupational health and safety, sustainable development and poverty reduction. In a *Safe System* approach, mobility is a function of safety rather than vice versa. It involves the implementation of system-wide measures that ensure, in the event of a crash, that the impact energies remain below the threshold likely to produce either death or serious injury. 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 the critical impact speed is 50 km/h (for side impact crashes) and 70 km/h (for head-on crashes).

Safe System requires a proactive approach placing road safety in the mainstream of road traffic system planning, design and operation and use. *Safe System* interventions address common human errors and human tolerance to injury thresholds and in so doing aims to address the road safety needs of motorised as well as non-motorised road users, younger and older users, male and female users. The key demonstrably effective strategies are:

- Encouraging use of safer modes and safer routes
- Safety conscious planning and proactive safety engineering design

- Safe separation or safe integration of mixed road use.
- Managing speeds to crash protection levels.
- Providing crash protective roadsides
- Providing vehicles with crash avoidance and crash injury mitigation and protection
- Deterring dangerous behaviour and ensuring compliance with key safety rules (by social marketing and increased highly visible police enforcement, use of camera technologies and by providing proven driver assistance safety technologies in motor vehicles to help drivers, for example, keep to speed limits, wear seat belts, or avoid excess alcohol).
- Managing risk via driver standards, for example, graduated driver licensing.
- Fast and efficient emergency medical help, diagnosis and care.

Safe System is a shared responsibility

Safe System is a shared responsibility between government agencies at different levels and a range of multi-sectoral agencies and stakeholders (road managers, vehicle manufacturers, emergency medical system providers, safety rule compliance managers, employers, road users) to take appropriate actions to ensure that road crashes do not lead to serious or fatal injuries. Given this complex multi-agency and multi-sectoral context, it requires careful leadership by government and top management of organisations. *Safe System* strategy implementation requires strengthened institutional delivery and identified good practice for all these functions is set out in two international publications produced by the World Bank and the OECD. Road safety management capacity review is recommended as an initial first step to provide a framework for all key agencies to assess strengths and weaknesses of current approaches and to identify next steps.

Safe System demonstration projects

Countries embarking on *Safe System* typically use specially-created demonstration programmes and projects to launch and develop management capacity for the approach. Examples include *En Route to Vision Zero* in Sweden, the Dutch *Start-Up Sustainable Safety* programme, Western Australia's *Towards Zero* booster package and the demonstration projects in place to launch New Zealand's *Safer Journeys* strategy. *Safe System* projects are also being rolled out in a variety of low and middle income countries

Safe Corridor projects:

Given that a large proportion of deaths occur on a relatively small part of the road network where volumes are highest and speed are high, demonstration programmes targeting key urban arterial roads and rural corridors are now being carried out in Sweden, Netherlands, and Australasia towards safe roadsides, safe junctions, safe overtaking and safe villages. The justification for these are based on assessment of longer-term benefits and costs and in co-benefits achieved for other policies. In emerging economies, packages of multi-sectoral interventions to achieve interim targets and towards long-term goals are being put together for selected corridors.

Safe Town or Safe City projects:

Safe Town or Safe City projects also provide opportunities for a wide range of multi-sectoral intervention and working on area-wide speed management, public transport policies, pedestrian and cycle facilities and routes, combined police enforcement and publicity, red-light cameras, emergency medical response and trauma care fleet safety policies for taxis, buses etc. These tend to attract good support.

Safe Commercial and Public Transport Fleet projects:

Pilot projects could be useful to encourage improvements in fleet safety quality through the fitment and use of alcolocks and speed compliance assistance devices. Pilots of the new ISO 39001 standard would be well worth doing under the *Safe System* banner promoted by that standard.

Safe travel and Government procurement pilot projects:

Road safety lead agencies in Sweden and Australia carry out national fast-tracking through Government procurement and in-house travel policies with the aim of creating a market for vehicle safety and leading by example. Useful pilot projects would comprise key agencies requiring 5* Euro NCAP vehicles in these policies, encouraging fast-track fitment of priority driver assistance safety technologies such as devices to assist speed compliance, seat belt reminders in all seating positions, electronic stability control, autonomous emergency braking and alcolocks.

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.

Koornstra MJ, Mathijssen MPM, Mulder JAG, Roszbach R, & Wegman FCM (1992), *Towards sustainable safe road traffic; National road safety outlook for 1992/2010* [In Dutch]. SWOV, Leidschendam

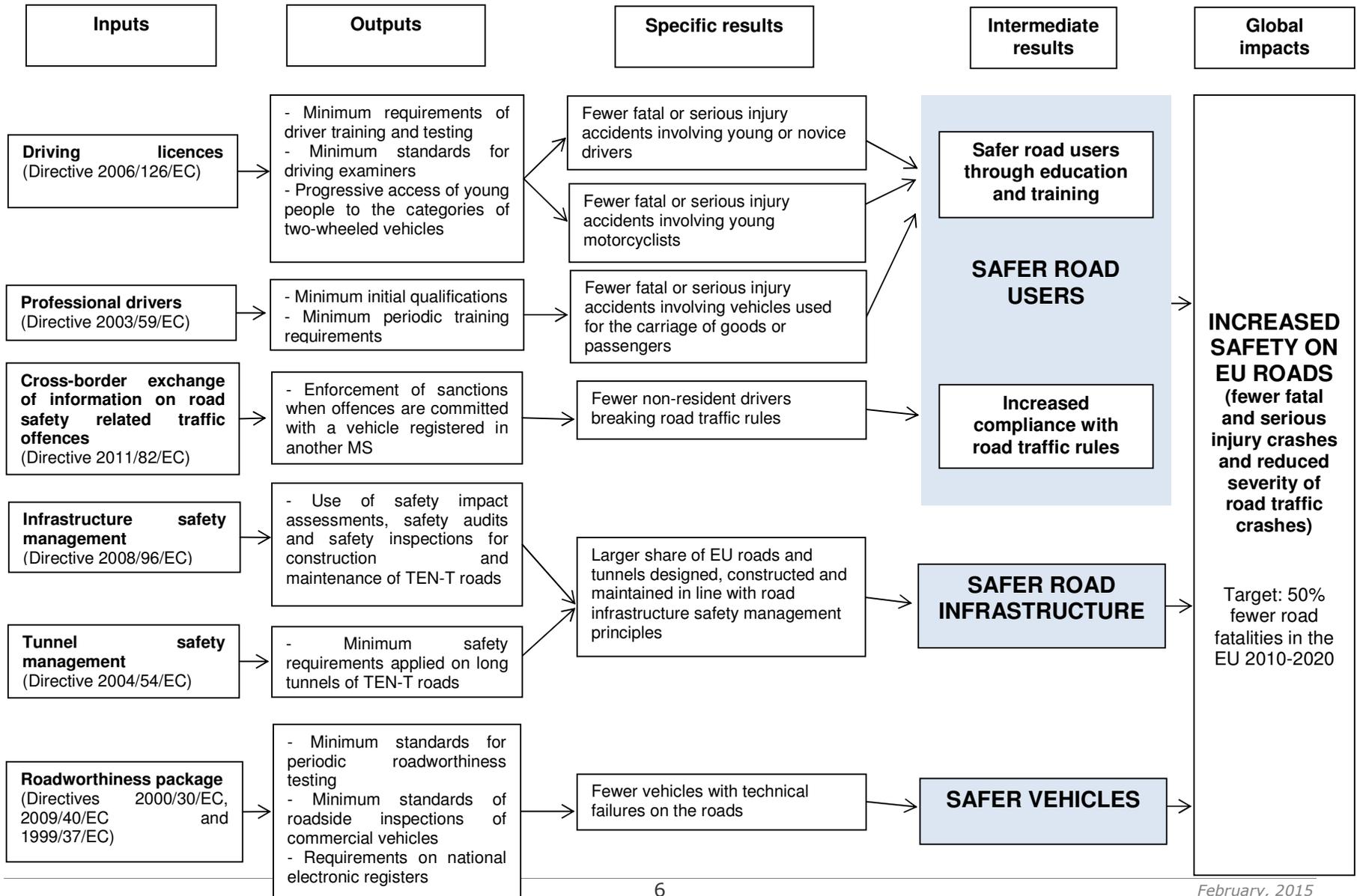
Tingvall C (1995), *The Zero Vision*. In: van Holst, H., Nygren, A., Thord, R., eds *Transportation, traffic safety and health: the new mobility*. Proceedings of the 1st International Conference, Gothenburg, Sweden Berlin, Springer-Verlag, 1995:35-57.

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

Global Road Safety Facility (GRSF) (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*, World Bank, Washington DC.

Breen J (2012), *Managing for Ambitious Road Safety Results*, 23rd Westminster Lecture on Transport Safety, PACTS, London.

ANNEX 2: Commission's Policy Orientations Intervention logic



ANNEX 3: Summary of Actions: Policy Orientations on Road Safety, 2011 – 2014

<i>Objective/action</i>	<i>Type of action? Specific intervention identified?</i>	<i>Fatality reduction intervention implemented within Policy Orientations?</i>	<i>Contribution to 2020 target to date?</i>	<i>Possible future contribution to 2020/2050 targets and relative fatality crash/fatal injury reduction potential?</i>
Objective 1: Improve education and training of road users (Section 4.3)				
Action 1: Developing a common educational and training road safety strategy including notably the integration of apprenticeship in the 'pre-licensing' process as well as common minimum requirements for driving instructors.	Strategy development and study. No specific intervention since 2011.	No	N/A	High potential of car and powered two wheeler licences (applicable from 2013 and (review expected 2018)) if implementing best practice on minimum age limits and graduated licensing schemes.
Objective 2: Increase enforcement of road rules (Section 4.4)				
Action 1: Establishing cross-border exchange of information in the field of road safety.	Specific intervention. Directive 2011/82/EC on cross-border exchange of information for enforcement.	Adoption in 2011 and expected in 2015. Reliant on Member States' decisions on scope and resource.	Not known. Assessment study recently launched to report in 2016.	Medium potential dependent on level and quality of implementation.
Action 2: Developing a common road safety enforcement strategy including the possibility of introducing speed limiters in light commercial vehicles and of making use of alcohol interlock devices obligatory in certain specific cases.	Strategy development and study activities. Specific interventions identified and studied.	No	N/A	Low potential for alcohol interlocks in specific cases if implemented, although fitment to heavy goods vehicles and use in offender schemes offer high BCRs. Medium potential for speed limiters on light commercial vehicles if implemented. High potential if common strategy includes these and other key safety technologies for all vehicles.
Action 3: Establishing national implementation plans for road safety enforcement.	National road safety strategy development activity. Specific strategies/interventions promoted.	Web document, October 2014.	No	Highly useful tool but reliant on Member States' decisions on scope and resource and quality of further development.
Objective 3: Safer road infrastructure (Section 4.5)				
Action 1: Ensuring that European funds are granted only to infrastructure compliant with the road safety and tunnel safety Directives.	Cooperation activity with other actors.	2014. Not known	Not known	Medium-high potential depending on level and quality of implementation.

Action 2: Promoting the application of the relevant principles on infrastructure safety management to secondary roads of Member States, particularly through best practice exchange.	Promotional and educational project activity.	Not known	Not known Assessment study results expected shortly.	Medium-high depending on level and quality of implementation.
Objective 4: Safer vehicles (Section 4.6/7)				
Action 1: Make proposals to encourage progress on the active and passive safety of vehicles, such as motorcycles and electric vehicles.	Specific legislative interventions adopted. Type approval for two- and three- wheeled vehicles.	General Safety Regulation came into force in November 2014. PTW braking – 2016. Pedestrian Safety Regulation -new type approvals from 2015 and new registrations in 2019.	Not known, but fast tracking evident of key measures. e.g. PTW braking, ESC, pedestrian protection.	High potential for road users in general to 2020 if implemented in advance of legislative lead times. Many further measures identified with high potential and positive BCRs. See Table 5.
Action 2: Make proposals in view of the progressive harmonisation and strengthening of roadworthiness tests and technical roadside inspections	Specific legislative interventions adopted. Roadworthiness Package (Directive 2014/45, Directive 2014/46 and Directive 2014/47)	Package comes into force during 2018-2019.	Not known.	Low potential initially but likely to increase with greater fitment of key electronic safety measures.
Action 3: Assess the impact and benefits of co-operative systems to identify most beneficial applications and recommend the relevant measures for their synchronised deployment.	Study and strategy activities. Not known if specific EU interventions identified for adoption.	No	N/A	High post 2020 contribution might be high, depending on systems.
Objective 5: Promote the use of modern technology to increase road safety (Section 4.6)				
Action 1: Evaluate the feasibility of retrofitting commercial vehicles and private cars with Advanced Driver Assistance Systems.	Study activities.	No	N/A	
Action 2: Accelerate the deployment of e-Call and examine its extension to other vehicles.	Specific legislative intervention and study activities. Decision No 585/2014/EU on the deployment of the interoperable EU-wide e-Call service.	No Infrastructure aspects adopted in May 2014. Vehicle aspects not yet adopted.	N/A	Medium to high potential depending on efficient coordination of e-call partners
Objective 6: Improve emergency and post-injuries services (Section 4.7)				
Action 1: Propose the setting-up of a global strategy of action on road injuries and first aid.	Strategy development, reporting and study activities. Specific EU interventions not yet identified for adoption.	No	N/A	

Objective 7: Protect vulnerable road users (Section 4.8)				
Action 1: Monitoring and further developing technical standards for the protection of vulnerable road users.	Study, research and cooperation activities.	No	N/A	See Objective 4/5.
Action 2: Including powered-two wheelers in vehicle inspections.	Specific legislative intervention and study activity. Roadworthiness Package adopted (Directive 2014/45, Directive 2014/46 and Directive 2014/47) covers motorcycles above 125 cc.	No. Package comes into force during 2018-2019 but the extension of the scope to powered two wheelers over 125 cc is from 2022. Member States can reach equivalent road safety enhancement by other measures.	N/A	Low potential post 2020 initially but may increase with greater fitment of key electronic safety measures.
Action 3: Increasing the safety of cycling and other vulnerable road users, e.g. by encouraging the establishment of adequate infrastructure.	Strategic and cooperative activities. Specific EU interventions not identified for adoption.	No	N/A	High potential but dependent on intervention/ implementation in Member States.
Action 4: Assist Member States in developing information, communication and dialogue between road users and with the competent authorities.	Communication activities.	No	N/A	Potential for direct impact in unknown but unlikely.
Other actions (See Section 5)				
Action 1: Promoting twinning and other modes of cooperation to increase the safety level of Member States.	Promotion and knowledge transfer activities.	Not known	Not known	Dependent on intervention set and capacity.
Action 2: Cooperate with the Member States with a view to improving data collection and analysis as regards accidents and developing the role of the European Road Safety Observatory.	Monitoring and evaluation and knowledge transfer activities.	N/A	N/A	Key monitoring and evaluation and knowledge transfer activity.
Action 3: Closely monitor the correct implementation of the European Acquis in the field of road safety.	Compliance/ monitoring and evaluation activities.	N/A	N/A	Key compliance/ monitoring and evaluation activity.
Action 4: Examine the need for common principles for technical road accident investigation.	Monitoring and evaluation/research activities.	N/A	N/A	Key monitoring and evaluation and research activity.

ANNEX 4: 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 Organization 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 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.

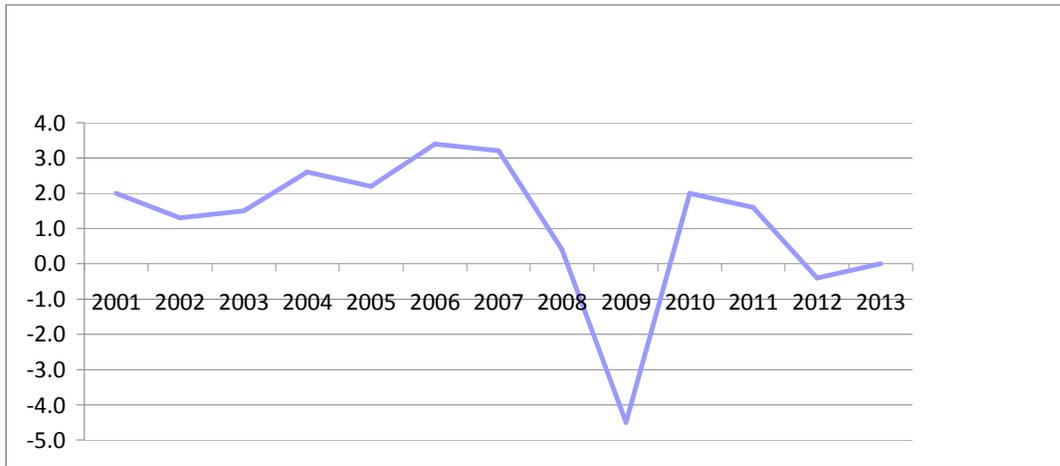
The MAIS is derived from these commonly used ICD codes.

ANNEX 5: National trends in percentage reduction in deaths

	2001 - 2010	2010-2011	2011-2012	2012-2013	2013-2014	2010 -2013	2010-2014
Austria	-42%	-5%	-2%	-6%	-5%	-18%	-22%
Belgium	-43%	2%	-11%	-6%	-1%	-14%	-15%
Bulgaria	-23%	-15%	-9%	-4%	9%	-23%	-16%
Croatia	-34%	-2%	-7%	-5%	-17%	-14%	-29%
Cyprus	-39%	18%	-28%	-6%	2%	-27%	-25%
Czech Republic	-40%	-4%	-4%	-6%	-3%	-18%	-20%
Denmark	-41%	-14	-24%	-7%	-4%	-25%	-28%
Estonia	-60%	28%	-14%	-7%	-4%	3%	-1%
Finland	-37%	7%	-13%	-4%	-14%	-5%	-18%
France	-51%	-1%	-8%	-7%	4%	-18%	-15%
Germany	-48%	10%	-10%	-6%	0%	-8%	-8%
Greece	-33%	-9%	-13%	-6%	-9%	-28%	-34%
Hungary	-40%	-14%	-5%	-6%	3%	-20%	-17%
Ireland	-49%	-12%	-13%	-6%	4%	-10%	-7%
Italy	-42%	-6%	-5%	-6%	-6%	-18%	-23%
Latvia	-61%	-18%	-1%	-9%	18%	-18%	-3%
Lithuania	-58%	-1%	2%	-8%	3%	-14%	-11%
Luxembourg	-54%	-54%	3%	-4%	-20%	41%	13%
Malta	-6%	40%	-57%	1%	-39%	20%	-33%
Netherlands	-46%	2%	3%	-6%	-NA	-11%	-11%
Poland	-29%	7%	-15%	-4%	-5%	-14%	-19%
Portugal	-44%	-7%	-19%	-8%	-7%	-32%	-37%
Romania	-3%	-15%	1%	-2%	-2%	-22%	-23%
Slovakia	-40%	-12%	7%	-7%	15%	-32%	-22%
Slovenia	-50%	2%	-8%	-6%	-14%	-9%	-22%
Spain	-55%	-17%	-8%	-9%	0%	-32%	-32%
Sweden	-54%	20%	-11%	-7%	6%	-2%	3%
United Kingdom	-47%	3%	-8%	-6%	3%	-7%	-4%
EU	-43%	-3%	-9%	-8%	-2%	-18%	-19%

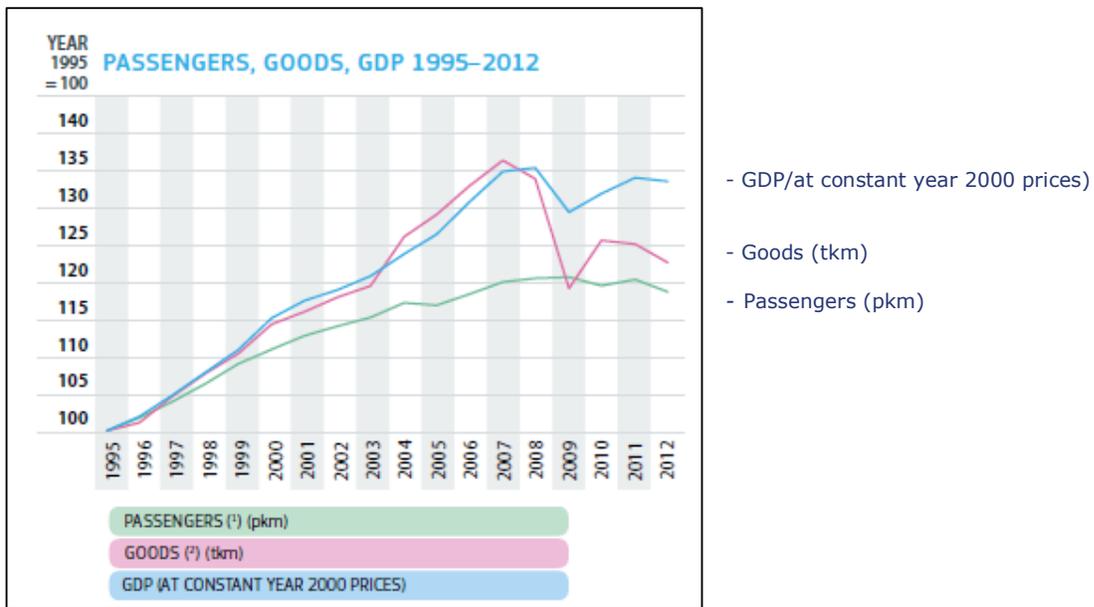
ANNEX 6: GDP, transport and traffic trends EU 28 (Eurostat 2014)

Figure 1: GDP growth in EU 28 2001-2013



Source: Eurostat, 2014¹

Figure 2: EU 28 Transport growth



Source: Eurostat (2014) *EU transport in figures, Statistical Pocketbook 2014*, Brussels.

¹ Eurostat (2014) *EU transport in figures, Statistical Pocketbook 2014*, Brussels.

Figure: 3 New passenger and commercial vehicle registrations: EU 28

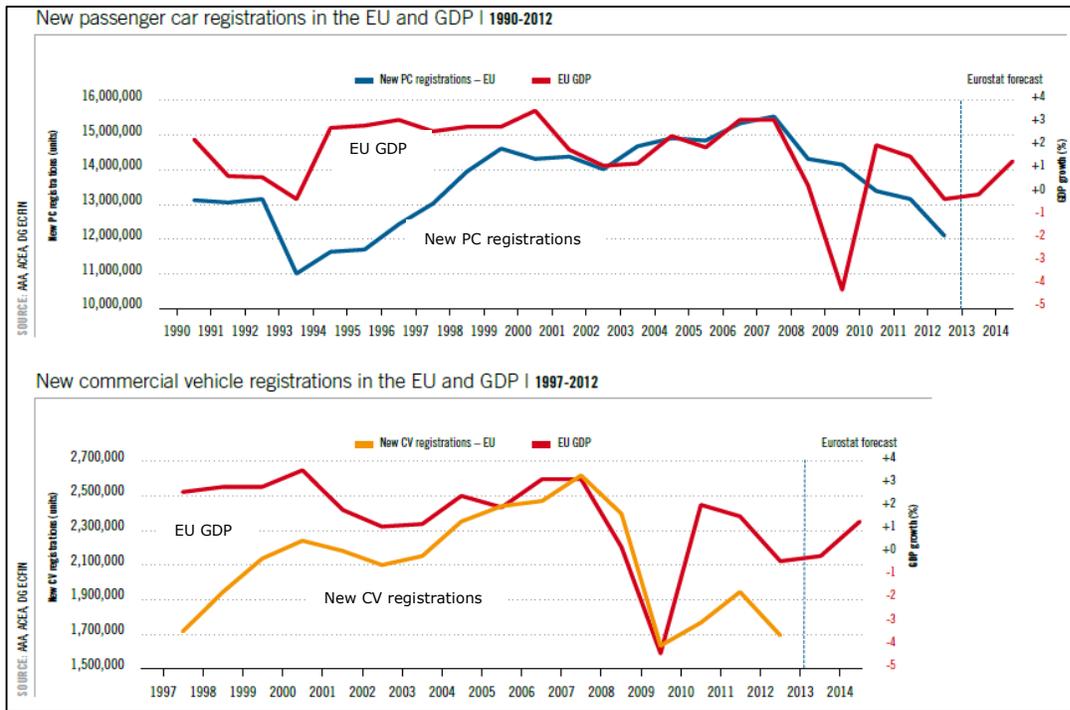
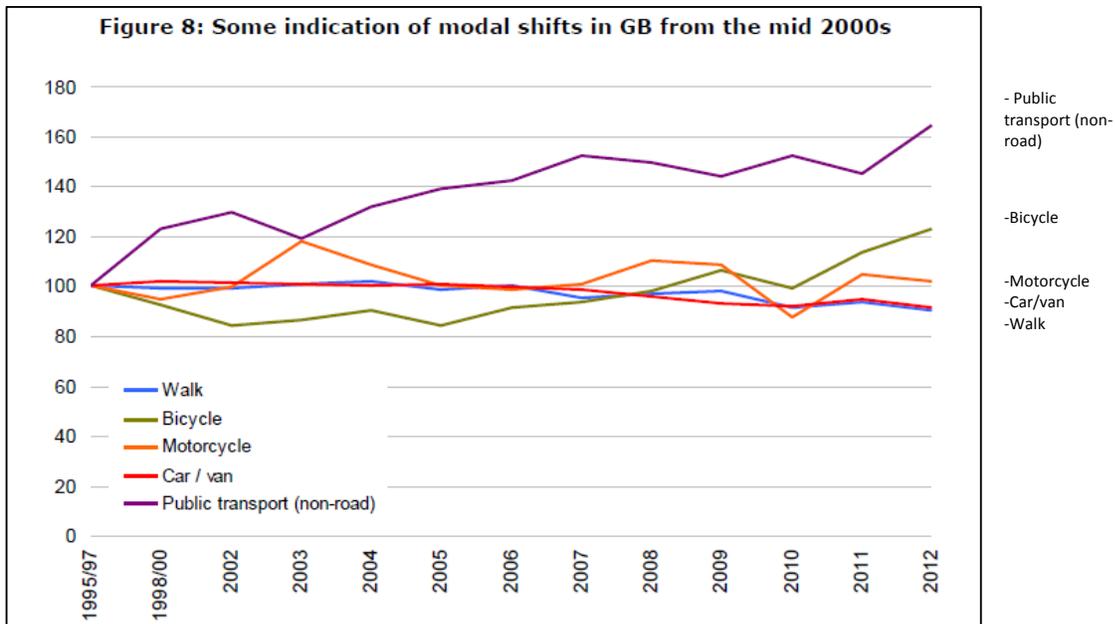


Figure 4: Example of trends in modal shift in one Member State



Source: OECD/ITF (2015 in print), Road safety and economic development, Paris. Paper by Noble B, Lloyd D, Fletcher J, Lloyd L, Reeves C, Broughton J and J Scoons, Fatal Road Casualties In Great Britain: Two Studies Relating Patterns To Wide Ranging Exposure Factors.

ANNEX 7: Unemployment trends and road deaths

Extract from Eurostat Unemployment Statistics (2014)

“At the beginning of 2005 a period of steadily declining unemployment started, lasting until the first quarter 2008. At that time, EU-28 unemployment hit a low of 16.2 million persons (equivalent to a rate of 6.8 %) before rising sharply in the wake of the economic crisis. Between the second quarter 2008 and mid-2010 the unemployment level went up by more than 7 million, taking the rate up to 9.6 %, at that time the highest value recorded since the start of the series in 2000. The decline of unemployment in the following three quarters was a deceptive sign of an end of the crisis and of a stable improvement in labour market conditions in the EU-28. In fact, since the second quarter 2011 and until the first quarter of 2013 unemployment steadily and markedly increased taking it to the record level of 26.6 million, corresponding to a record rate of 10.9 %. Since then, the rate has started to decrease, reaching 10.7 % at the end of the year. ”

During 2014 the lowest unemployment rates amongst Member States were recorded in Austria (4.9 %) and Germany (5.0 %), and the highest in Greece (25.7 % in September 2014) and Spain (23.9 %). As indicated in Figure 1 the economic crisis severely hit young people. The youth unemployment rate in the EU-28 was more than double the overall unemployment rate in 2013. ²

Table 1: Unemployment rate 2002-2013 (%)

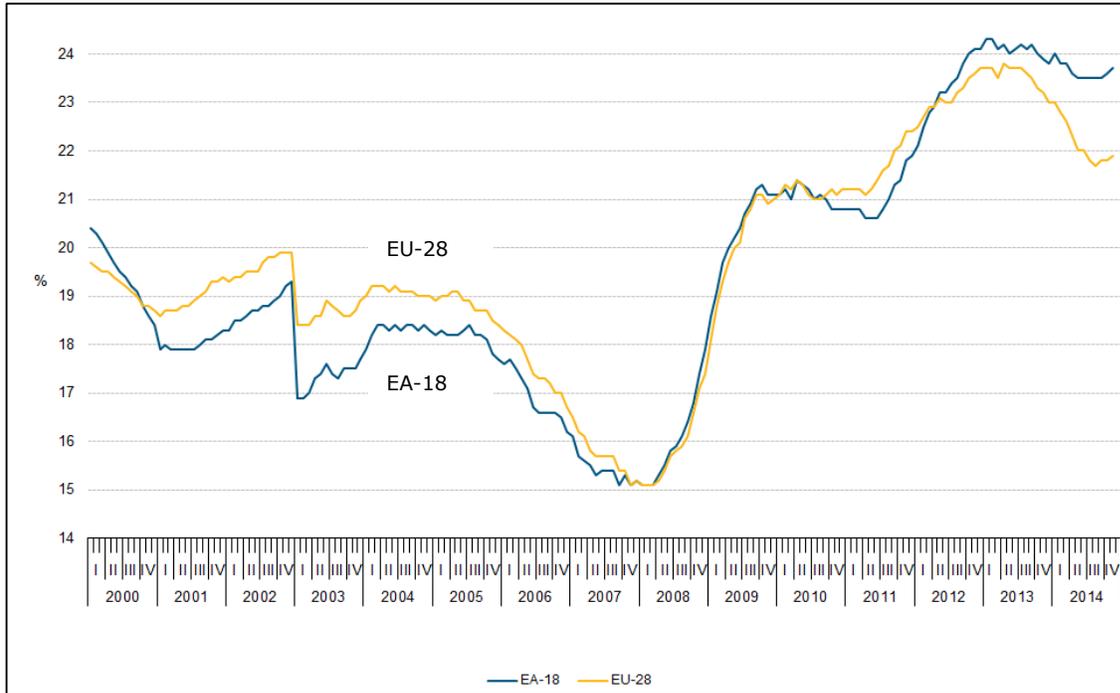
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
EU-28	9.0	9.1	9.3	9.0	8.2	7.2	7.0	9.0	9.6	9.6	10.4	10.8
Euro area	8.5	9.0	9.2	9.1	8.4	7.5	7.6	9.5	10.1	10.1	11.3	12.0
Belgium	7.5	8.2	8.4	8.5	8.3	7.5	7.0	7.9	8.3	7.2	7.6	8.4
Bulgaria	18.2	13.7	12.1	10.1	9.0	6.9	5.6	6.8	10.3	11.3	12.3	13.0
Czech Republic	7.3	7.8	8.3	7.9	7.1	5.3	4.4	6.7	7.3	6.7	7.0	7.0
Denmark	4.6	5.4	5.5	4.8	3.9	3.8	3.5	6.0	7.5	7.6	7.5	7.0
Germany	8.7	9.8	10.5	11.3	10.3	8.7	7.5	7.8	7.1	5.9	5.5	5.3
Estonia	11.2	10.3	10.1	8.0	5.9	4.6	5.5	13.5	16.7	12.3	10.0	8.6
Ireland	4.5	4.6	4.5	4.4	4.5	4.7	6.4	12.0	13.9	14.7	14.7	13.1
Greece	10.3	9.7	10.5	9.9	8.9	8.3	7.7	9.5	12.6	17.7	24.3	27.3
Spain	11.5	11.5	11.0	9.2	8.5	8.2	11.3	17.9	19.9	21.4	24.8	26.1
France	8.3	8.6	8.9	8.9	8.9	8.0	7.5	9.1	9.3	9.2	9.8	10.3
Croatia	15.1	14.1	13.8	12.8	11.4	9.6	8.4	9.1	11.8	13.5	15.9	17.2
Italy	8.5	8.4	8.0	7.7	6.8	6.1	6.7	7.8	8.4	8.4	10.7	12.2
Cyprus	3.5	4.1	4.6	5.3	4.6	3.9	3.7	5.4	6.3	7.9	11.9	15.9
Latvia	12.5	11.6	11.7	10.0	7.0	6.1	7.7	17.5	19.5	16.2	15.0	11.9
Lithuania	13.9	12.6	11.6	8.5	5.8	4.3	5.8	13.8	17.8	15.4	13.4	11.8
Luxembourg	2.6	3.8	5.0	4.6	4.6	4.2	4.9	5.1	4.6	4.8	5.1	5.8
Hungary	5.6	5.8	6.1	7.2	7.5	7.4	7.8	10.0	11.2	10.9	10.9	10.2
Malta	7.4	7.7	7.2	6.9	6.9	6.5	6.0	6.9	6.9	6.5	6.4	6.5
Netherlands	3.1	4.2	5.1	5.3	4.4	3.6	3.1	3.7	4.5	4.4	5.3	6.7
Austria	4.2	4.3	4.9	5.2	4.8	4.4	3.8	4.8	4.4	4.2	4.3	4.9
Poland	20.0	19.8	19.1	17.9	13.9	9.6	7.1	8.1	9.7	9.7	10.1	10.3
Portugal	5.7	7.1	7.5	8.6	8.6	8.9	8.5	10.6	12.0	12.9	15.9	16.5
Romania	7.5	6.8	8.0	7.2	7.3	6.4	5.8	6.9	7.3	7.4	7.0	7.3
Slovenia	6.3	6.7	6.3	6.5	6.0	4.9	4.4	5.9	7.3	8.2	8.9	10.1
Slovakia	18.8	17.7	18.4	16.4	13.5	11.2	9.6	12.1	14.5	13.7	14.0	14.2
Finland	9.1	9.0	8.8	8.4	7.7	6.9	6.4	8.2	8.4	7.8	7.7	8.2
Sweden	6.0	6.6	7.4	7.7	7.1	6.1	6.2	8.3	8.6	7.8	8.0	8.0
United Kingdom	5.1	5.0	4.7	4.8	5.4	5.3	5.6	7.6	7.8	8.0	7.9	7.5
Turkey	:	:	:	9.2	8.7	8.8	9.7	12.5	10.7	8.8	8.1	8.7
Norway	3.7	4.2	4.3	4.5	3.4	2.5	2.5	3.2	3.6	3.3	3.2	3.5
Japan	5.4	5.3	4.7	4.4	4.1	3.9	4.0	5.1	5.1	4.6	4.3	4.0
United States	5.8	6.0	5.5	5.1	4.6	4.6	5.8	9.3	9.6	8.9	8.1	7.4

: Data not available

Source: Eurostat, 2014. Unemployment Statistics.

² Eurostat (2014) Unemployment Statistics.

Figure 1: Youth unemployment rates, EU-28 and EA-18, seasonally adjusted, Jan 2000 - Nov 2014 (%)

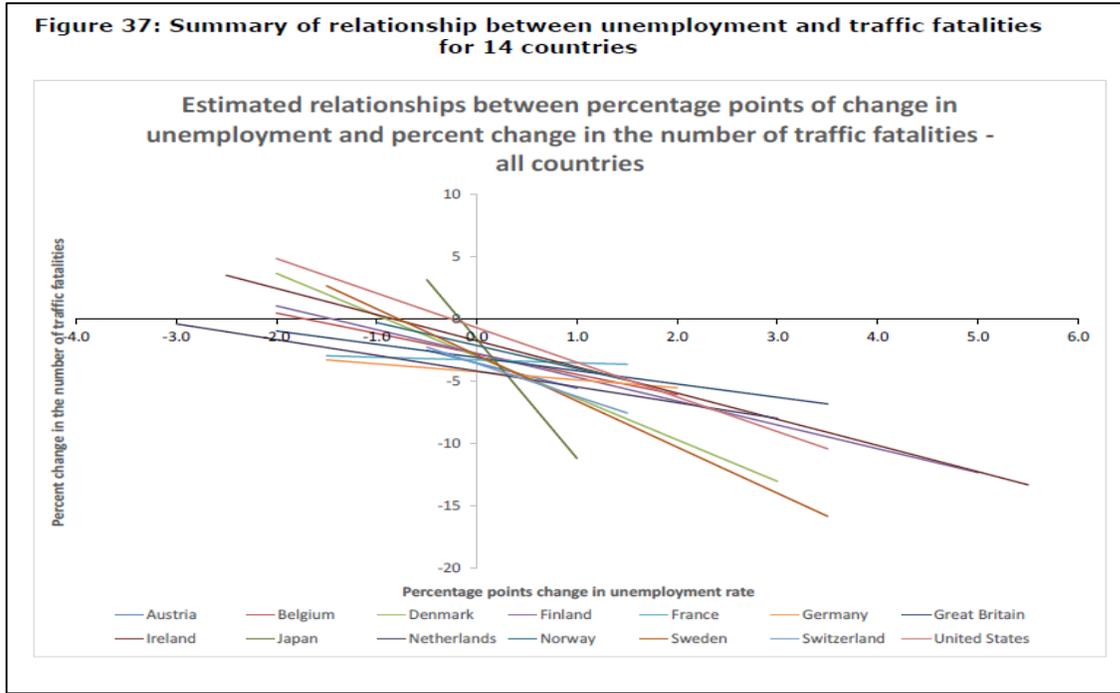


Source: Eurostat, 2014. Unemployment Statistics.

An analysis of 14 countries of the relationship between unemployment and road deaths indicated that the number of traffic fatalities declined from 59117 in 2008 to 51650 in 2010, a reduction of 7467 or almost 13%. By applying model coefficients derived for each country in the study, it is estimated that a reduction of 4847 fatalities, nearly 65% of the total reduction, can be attributed to the increase in unemployment from 2008 to 2010.³ See Figure 2.

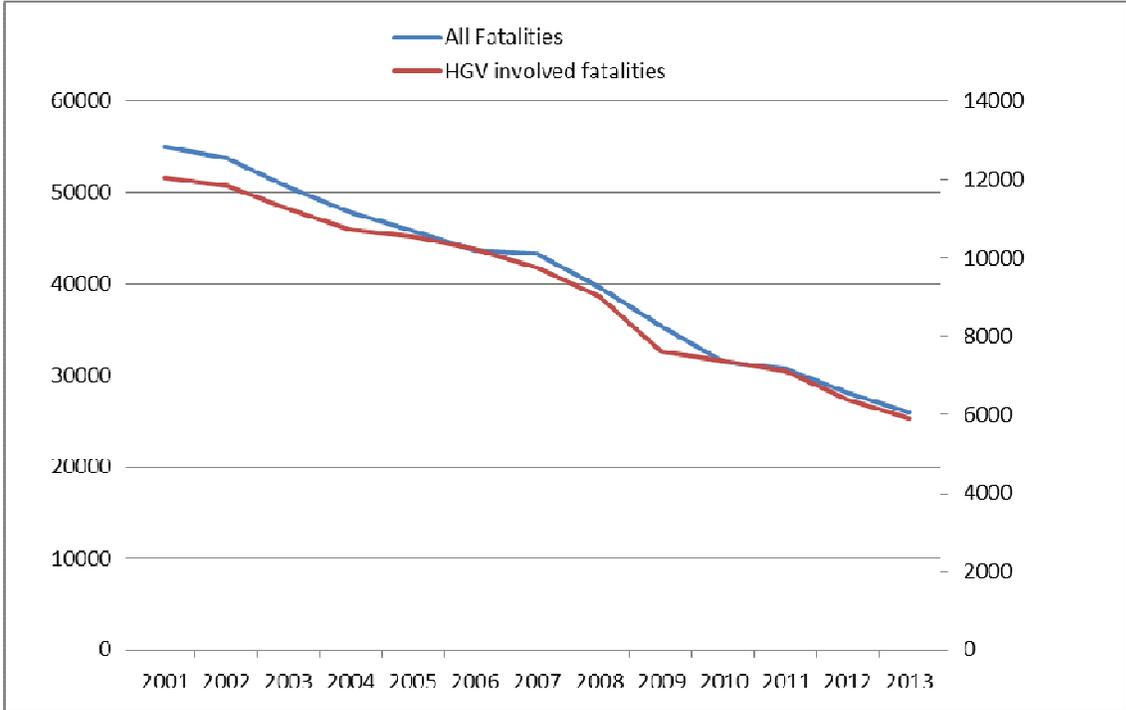
³ OECD/ITF (2015 in print), *Road safety and economic development*, Paris. Paper by Rune Elvik: *An analysis of the relationship between economic performance and the development of road safety*

Figure 2: Summary of relationship between unemployment and traffic fatalities for 14 countries



Source: ITF/OECD 2015 in print, *Road safety and economic development*, Paris. Paper by Rune Elvik: *An analysis of the relationship between economic performance and the development of road safety*.

ANNEX 8: Trends in HGV involvement in fatal road crashes 2001-2013



Source: CARE data (2015)

ANNEX 9: Safe System engineering

Targeting the main crash types with evidence-based engineering intervention	
<p><i>Fatal and serious vulnerable road user crashes</i> Based on <i>Safe System</i> principles, to minimize the likelihood of fatal outcomes from any vehicle-pedestrian crash, impact speed should not exceed 30 km/h. Intervention options which could assist in achieving fatality reductions include:</p> <ul style="list-style-type: none"> ▪ Separating vulnerable users and vehicles physically by fencing or other barriers. ▪ Lowering the travel speeds of vehicles by reducing and enforcing speed limits \geq 30 km/h. ▪ Providing adequate traffic light controlled road crossings in areas of high pedestrian activity in order to encourage use of these crossings and pedestrian compliance with signals. 	<p><i>Fatal and serious injury crashes at intersections</i> Based on <i>Safe System</i> principles, the impact speed in a side impact crash should not exceed 50 km/h. Options to reduce impact speeds include:</p> <ul style="list-style-type: none"> ▪ Lowering speed limits, especially in the vicinity of intersections on 60, 70 km/h and 80 km/h arterials. ▪ Improving intersection controls with roundabouts, traffic signals, platforms or other treatments. ▪ Applying skid resistance pavement treatments to improve braking performance. ▪ Modifying traffic signals to allow fully controlled turning movements.
<p><i>Fatal and serious injury run-off-road crashes</i> These can be reduced by ensuring that roads include some of the following features:</p> <ul style="list-style-type: none"> ▪ Wide paved shoulders. ▪ Tactile edge lining. ▪ Clear roadsides for 10 to 15 metres or roadsides with objects shielded by flexible barriers. ▪ Lower speed limits/crash protective roadsides 	<p><i>Fatal and serious injury head on crashes</i> These can be addressed by:</p> <ul style="list-style-type: none"> ▪ Lowering speed limits on two lane two way roads to 70 km/h or less. ▪ Constructing a divided carriageway. ▪ Installing a centre median between the two opposing lanes of traffic. ▪ Safe speeds in general.
<p>Examples of effective Safe System engineering approaches and measures⁴</p> <p><i>Sweden's rollout of median barriers, roadside barriers and roundabouts</i> With over 70% of deaths occurring in single vehicle and head-on collisions Sweden's <i>Vision Zero</i> investment programme in safety engineering targets 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 reduced deaths by 80% and deaths and serious injuries by 50-60%. Trials of the 2+1 road standard for single carriageways indicated a safety level as good as, or better than, achieved on motorways and further safety upgrading on key single carriageway roads is underway.⁵ Improved junction safety has also been targeted with 80-90% fewer deaths occurring at sites where roundabouts have been implemented.⁶</p> <p><i>Sustainable safety engineering measures in The Netherlands</i> The aim of the Dutch <i>Sustainable Safety</i> policy is to re-engineer and manage the road network to provide compatibility between road functions, speed limits and road layouts in order towards safe use and a substantially reduction in crash deaths and injuries. The Start-up Program of <i>Sustainable Safety</i> in 1998 was primarily targeted at safer infrastructure. Between 1998-2007 nearly all road authorities drew up a plan to re-classify their roads into <i>Sustainable Safety</i> categories. Large reductions in crash deaths were achieved on newly classified 30 km/h and 60 km/h roads in the period 1998-2008.⁷ The introduction of 30 km/h zones led to a 10% reduction in deaths per km road length and 60% fewer in-patients per km of road.⁸ Between 1998-2008, more than 2,300 roundabouts were constructed. Those provided between 1999-2005 resulted in a 76% reduction in deaths and a 46% reduction in serious injuries. A meta-analysis of studies on roundabouts at cross roads indicates a benefit to cost of 2.50 and of 2.00 at T junctions</p>	

⁴ Bliss T and Breen J (2011), *Improving Road Safety Performance: Lessons From International Experience* a Resource paper prepared for the World Bank for the NTDP, Government of India, Delhi.

⁵ European Road Assessment Programme (Euro RAP (2011) *How safe are you on Europe's Trade Routes? Measuring and mapping the safety of the TEN-T road network*, Basingstoke.

⁶ Swedish Transport Administration (2010) *Lie A 2+1 Roads with Cable Barriers-a Swedish Success Story*.

⁷ SWOV (2009), *Sustainable Safety effects*, Leidschendam

⁸ Wegman, FCM. Dijkstra A, Schermers, G. and Van Vliet P (2005). *Sustainable safety in the Netherlands; Evaluation of a national Road Safety Programme*. 85th Annual Meeting TRB, Washington DC

ANNEX 10: Safety Helmet Assessment and Rating Programme (SHARP)



Overview

SHARP is a consumer information initiative that was launched by the Department for Transport (DfT) in 2007 following research that revealed real differences in the safety performance of motorcycle helmets available in the UK. SHARP's objective is to provide:

- clear advice on how to select a helmet that fits correctly and is comfortable, and secondly
- consumers with clear, impartial and objective information about the relative safety of motorcycle helmets available to riders in the UK.

Why was SHARP introduced?

Motorcyclists represent one of the most vulnerable road user groups. Typically in the UK they represent 1% of traffic but 20% of the casualties. Significantly, around 80% of all motorcyclist fatalities and 70% of those with serious injuries, sustain head injuries. Research shows that, statistically, head impacts are distributed uniformly around the circumference of the helmet.

Research has also highlighted that helmet detachment can occur during the accident sequence with reports indicating a frequency varying from 10% to 14% of casualties. Separately, motorcyclist groups had expressed concern that there was poor knowledge concerning the best practice when choosing a properly fitting helmet. They were concerned that this lack of expertise exists not only with riders but also within retail stores.

Research and Evidence base

The SHARP programme is based upon the findings of the European Research activity "COST 327" which reported in 2001. Two significant recommendations from this study were that:

- The temporal fossa (temple) is particularly vulnerable to injury and helmet design should provide more protection, and
- An increase in helmet energy absorbing capabilities of 30% would reduce 50% of the critical/unsurvivable casualties (AIS 5/6) to moderate/severe (AIS 2 - 4).

Building upon this work, the DfT commissioned the Transport Research Laboratory to consider the potential to improve helmets to deliver this higher level of protection. The DfT also undertook a survey of helmets to understand the differences in protection that were available at that time. This revealed variances of up to 70% in the protective capability of different helmets at selected impact sites; reinforcing the need for a scheme, like SHARP, to provide consumers with objective advice.

SHARP impact tests

Each model of motorcycle helmet undergoes 30 linear and 2 oblique impact tests in order to achieve a SHARP rating. To complete these 32 tests, a minimum of 7 individual helmet samples, in a range of sizes, are subjected to impacts at three speeds (6, 7.5 and 8.5 m/s).

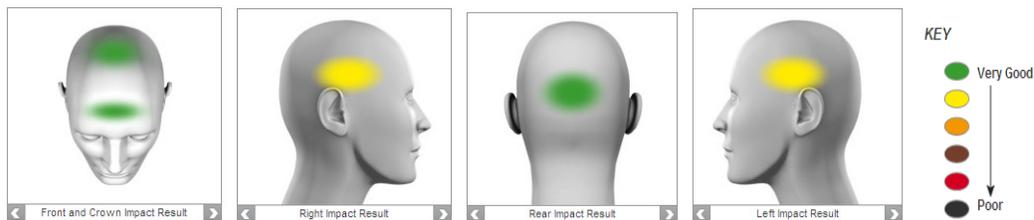
Given the COST 327 recommendations concerning the benefits of improved energy absorption, SHARP tests at a higher impact velocity than required by regulation (8.5m/s). This represents approximately 30% more energy input than required by UN ECE Regulation 22.05.

Calculation and dissemination of the SHARP safety ratings

In order to derive the safety rating, the test results are weighted according to the best motorcycle accident data available. This weights the likelihood of impacts occurring to different regions of the helmet, of impacts occurring at different speeds, and of impacts with different surfaces, based upon the accident studies carried out as part of the COST 327 study. This found the side and rear of the helmet to be commonly impacted and a strong correlation between impact location on the helmet and injury. The side of the head was also found to be particularly vulnerable to injury. The weighting of test results during the calculation of the SHARP safety ratings to real world accident data aims to highlight those helmets that will make the most difference to motorcyclist safety.

Calculation of the safety rating is complex so to enable motorcyclists to quickly and easily determine those helmets likely to offer the highest level of protection, the ratings are expressed as a simple star rating with 5-stars being the highest and 1-star the lowest.

The Safety Ratings are published on the SHARP website which includes additional information for consumers; including a series of graphics for each helmet model. An example of the graphics is shown below. These give an indication of how the helmet performed at each of the five impact locations on the helmet during the 8.5m/s linear impact tests against the flat anvil.



Awards

In 2013 SHARP was presented with two separate awards in recognition of its contribution to improving the road safety of motorcyclists. SHARP received a Prince Michael International Road Safety Award in November 2013 and was also awarded the FIM (Fédération Internationale de Motocyclisme) annual road safety award in December 2013.

Further information

More information about the SHARP programme, including guidance on how to select a helmet that fits correctly is available from the SHARP website at www.direct.gov.uk/sharp. Enquiries can be also be made to SHARP@dft.gsi.gov.uk.

ANNEX 11: Studies and evaluations commissioned by DG MOVE since 2011

2014	Road safety for elderly vulnerable road users (available 2016)
	Cross Border Enforcement - Assessment of the application of Directive 2011/82/EU by Member States
	Study on distracted road users and road safety (available late 2015)
	Interim assessment of the Policy Orientations on Road Safety 2011-2020 (available 2015)
	Accident causation of powered two-wheeler and cyclists (available early 2018)
2013	Study on the installation of event data recorders on certain types of vehicles
	Study on adoption of EU measures concerning the use of winter tyres
	Evaluation study on the impact of Directive 2008/96/EC on Road infrastructure safety management
	Study on the implementation of current legislation on minimum safety requirements for tunnels in the Trans European Networks and future challenges.
	Study on the effectiveness and improvement of the EU legislative framework on driving licences and training of professional drivers
2012	Study on prevention of drink driving by the use of alcohol interlock devices and evaluating the benefits of speed limiters to professional vehicles.
	Study on a new performance test for electronic safety components (ESC, ABS, EBS) at roadworthiness tests.
	Feasibility study on the "Vehicle Administrative Platform" (VAP):
	Ex-post evaluation study of Directive 92/6/EEC on the installation and use of speed limitation devices for certain categories of motor vehicles
2011	Blind Spot Mirrors
	Analysis of the interaction and coherence between railway and dangerous goods legislation in the European Union
	Evaluation DRUID (FP6 IP, 3rd annual review)

ANNEX 12: Summary of Recommendations

INSTITUTIONAL FRAMEWORK
<p>The strategy period coincides with particularly uncertain and uneven economic developments across EU 28 which inhibits meaningful predictions about the level of future fatal outcomes in road traffic crashes. A strong influence on trends in road deaths is being exerted by external factors and a significant slowing of annual progress below that needed to reach the 2020 target can be expected in the event of stronger economic development, sustained lower fuel prices and a less than urgent approach to new, appropriately targeted intervention at EU and national levels. These challenges, together with the preparation needed for post 2020 actions towards the 2050 goal require some strengthening of institutional delivery at EU level to ensure that every opportunity is explored to implement affordable, effective activity.</p>
<p>Results Focus</p>
<ul style="list-style-type: none"> ▪ A sharp focus is needed to address road fatality reduction goals to ensure that interventions to improve road safety appropriately address these goals and targets.
<ul style="list-style-type: none"> ▪ The casualty groups which determine future priorities to reduce targeted numbers of road deaths in EU countries are <i>car occupants</i> and <i>powered two-wheeler users (non built-up areas)</i> and <i>pedestrians (built-up areas)</i>.
<ul style="list-style-type: none"> ▪ The casualty groups which determine future priorities for reductions in the risk of road death (number of deaths per 100,000 of population) groups in EU countries are <i>young novice drivers</i>, <i>powered two-wheeler users (non-built up areas)</i> and <i>pedestrians</i> and <i>cyclists (built-up areas)</i>.
<ul style="list-style-type: none"> ▪ In most EU countries, road traffic injury is the 1st or 2nd cause of death for <i>school age children and young people (5-24 age groups)</i>, and amongst the first three leading causes for <i>5-49 age groups</i> (2010). An increasingly ageing society and the physical vulnerability of older road users also need more attention.
<ul style="list-style-type: none"> ▪ The current focus on preventing and reducing the number of deaths via 2020 and 2050 targets now needs to be expanded to include serious injury. New focus on serious injury is warranted given its prevalence, the slower improvement achieved for serious injury as opposed to fatal injury and the opportunities presented by new reporting for MAIS ≥ 3 serious injury expected in 2015. The main life-threatening injuries to be addressed are <i>head and spinal injuries</i>. The proposal for a 35% reduction in serious injuries by 2020 compared with 2014 seems an appropriate and challenging strategic target.
<ul style="list-style-type: none"> ▪ It is suggested that the framework for the future development of <i>Policy Orientations</i> is provided by the evolving <i>Road Injuries Strategy</i> addressing both fatal and serious injuries. Consistent with good practice road safety management, future road safety strategy needs to establish a clear road safety performance framework with specific objectives to allow targeting and monitoring and evaluation.
<ul style="list-style-type: none"> ▪ The identified crash types which need to be addressed are <i>head-on crashes</i>, <i>run-off-road crashes</i>, <i>intersection crashes</i> and <i>pedestrian and other vulnerable road user crashes</i>.
<ul style="list-style-type: none"> ▪ The key factors causally related to the risk and number of fatal (and serious) injuries are <i>levels of speeding</i>, <i>drinking and driving</i>, <i>non-use of protective equipment</i>, <i>the safety quality of vehicles and roads</i>, and <i>emergency medical response</i>.
<ul style="list-style-type: none"> ▪ Consideration should be given to setting targets to 2020 to increase seat belt use and crash helmet use; reduce average speeds and speeding over the limit; reduce levels and drinking and driving and fatal injury outcomes; improving the safety quality of the new vehicle fleet through use of Euro NCAP star ratings or for the road infrastructure (at least for TEN-T) using road assessment programme ratings Euro RAP.
<ul style="list-style-type: none"> ▪ The scope of <i>Policy Orientations</i> might be extended to include activity towards reducing work-related road deaths and serious injuries.
<ul style="list-style-type: none"> ▪ A road safety management capacity review is recommended to assist the development of a post-2020 <i>Towards Zero</i> strategy, involving key Commission Directorates and road safety partners who can deliver road safety results.
<ul style="list-style-type: none"> ▪ In view of the challenges to 2020 and beyond, road safety lead unit capacity needs strengthening in DG MOVE, particularly in the further development of its road safety strategy and coordination, monitoring and evaluation functions, as well as in technical support for <i>Safe System</i> intervention.

Coordination
<ul style="list-style-type: none"> ▪ Some further expansion of inter-Directorate coordination is recommended to ensure multi-sectoral, day-to-day ownership of road safety goals, targets and strategy. It is recommended that DG MOVE creates at least one full-time staff position dedicated to coordinating the future development and implementation of <i>Policy Orientations</i> and post-2020 strategy.
<ul style="list-style-type: none"> ▪ DG MOVE should consider setting up and chairing a <i>Policy Orientations</i> Steering Group (and subsequently a <i>Towards Zero</i> group) bringing together all Directorates with <i>day-to-day</i> responsibilities relating to road safety, including reporting to Directors.
<ul style="list-style-type: none"> ▪ It is recommended that the Commission builds on this cooperation with the High Level Group towards further annual reporting of important road safety outcomes to allow closer monitoring and management of road safety strategy.
Legislation
<ul style="list-style-type: none"> ▪ Large scope exists for further legislation to address the road safety task to 2020, particularly within the framework of the General Safety Regulation, driver licensing and TEN-T initiatives. Suggestions for future priority initiatives have been outlined in previous sections.
<ul style="list-style-type: none"> ▪ Guidance of impact assessments of road safety legislation needs to include common protocols for assessing costs and benefits and the use of updated annual values for the prevention of a fatality (See next section).
Funding and Resource Allocation
<ul style="list-style-type: none"> ▪ Despite the increasingly ambitious goals and targets sought, identified risks and demonstrated benefit to cost ratios of publicly acceptable measures, investment in preventing serious health loss in road crashes is not commensurate with the high socio-economic value of its prevention either at EU or national levels.
<ul style="list-style-type: none"> ▪ It is recommended that Commission Directorates adopt the standard methodology for assessing the costs and benefits of road safety measures as presented in the updated handbook for the evaluation of external costs (2014), updated to reflect annual values for the prevention of a fatality.
<ul style="list-style-type: none"> ▪ Determining priorities for resource allocation and harmonisation should not always rely upon cost-benefit analysis, since measures which provide the largest number of road deaths and serious injuries many have a lower BCR than measures with higher BCRs which address a smaller number of casualties.
Promotion
<ul style="list-style-type: none"> ▪ Promote the <i>Safe System</i> goal and approach as the new safety culture, interim targets and the shared responsibility for reaching them in all communication activities including the European Road Safety Charter.
Monitoring and Evaluation
<ul style="list-style-type: none"> ▪ While information on traffic volume by road user type in several Member States is collected, traffic volume data is not available for EU 28. Traffic volume is an essential exposure indicator and this important data deficit needs to be addressed urgently by Member States, DG MOVE and Eurostat.
<ul style="list-style-type: none"> ▪ Extension of the current EU road safety performance framework is recommended and suggestions are made for a range of indicators for adoption to 2020 and beyond.
<ul style="list-style-type: none"> ▪ Annual reporting on EU road safety performance could be undertaken within the High Level Group on Road Safety and CARE expert groups.
<ul style="list-style-type: none"> ▪ The European Road Safety Observatory is a valuable source of road safety information. Country profiles and other statistical information need to be updated annually..
<ul style="list-style-type: none"> ▪ The development of an EU-wide in-depth crash injury investigation system is recommended
<ul style="list-style-type: none"> ▪ The European Road Safety Charter should be reviewed regularly to encourage high quality road safety contributions.
Research and Development and Knowledge Transfer
<ul style="list-style-type: none"> ▪ The EU plays a crucial role in research and development which has underpinned much of the successful life-saving intervention and tools implemented at EU level and in Member States. New focus is needed on <i>Safe System</i> intervention and 2050 goals

<ul style="list-style-type: none"> ▪ The knowledge transfer role is also vital and there is large scope for EU best practice guidance has emerged in the last 10 years.
<ul style="list-style-type: none"> ▪ As recommended previously, the funding of <i>Safe System</i> demonstration projects in corridors, cities and areas is needed to accelerate knowledge transfer and to encourage roll out and inclusion of <i>Safe System</i> into the mainstream of road safety activity in EU 28.
<ul style="list-style-type: none"> ▪ The European Road Safety Observatory is a valuable tool for policymakers and professional and web texts and other information should be regularly updated.
<p>INTERVENTIONS</p>
<p>New, effective action is needed by the EU and Member States between now and 2020 towards achieving existing targets. In terms of meeting the 2020 target and encouraged by the EU institutions, national priorities should focus on making further progress in securing compliance with the key road safety rules. More or less immediate results can be achieved in the short-term through combined publicity and policy enforcement, particularly to address speeding. Suggestions are made here for priority EU intervention to 2020 and beyond for a wide range intervention in support of a <i>Safe System</i> approach to road safety.</p>
<p><i>Planning, design, operation of road network</i></p>
<ul style="list-style-type: none"> ▪ Encourage knowledge transfer and the adoption of the <i>Safe System</i> approach to road safety engineering on TEN-T and the secondary network.
<ul style="list-style-type: none"> ▪ Establish a safety performance framework for the TEN-T network, require measurement of safety indicators e.g. Euro RAP ratings and mean speed levels.
<ul style="list-style-type: none"> ▪ Target a percentage increase in Euro RAP star rating of TEN-T roads to 2020 and beyond.
<ul style="list-style-type: none"> ▪ Update TEN-T guidelines to ensure that all EU-funded infrastructure conforms to EC Directives 2004/54/EC and 2008/96.
<ul style="list-style-type: none"> ▪ Set a maximum speed limit or lower of 120 km/h on TEN-T roads.
<ul style="list-style-type: none"> ▪ Promote and fund <i>Safe Corridor</i> and <i>Safe City/Safe Town</i> projects on the TEN-T and secondary network comprising road safety engineering and multi-sectoral intervention to intervention to achieve results and develop road safety management capacity.
<p><i>Enforcement of key road safety rules</i></p>
<ul style="list-style-type: none"> ▪ Set up/support annual surveys of levels of compliance with speed limits, excess alcohol legislation and levels of front and rear seat belt use and report on findings.
<ul style="list-style-type: none"> ▪ Set targets to 2020 at EU and national levels for improved compliance with speed limits, excess alcohol limits and seat belt use legislation and request annual reporting by the High Level Group on Road Safety and CARE.
<ul style="list-style-type: none"> ▪ Provide new guidance on best practice enforcement of key road safety rules.
<ul style="list-style-type: none"> ▪ Promote and fund enforcement activity and other intervention in <i>Safe Corridor</i> and <i>Safe City/Safe Town</i> projects on the TEN-T and secondary network.
<ul style="list-style-type: none"> ▪ Mandate EU fitment of speed assistance systems and seat belt reminders in all seating positions in all motor vehicles at the earliest opportunity and take a variety of actions in the short-term to encourage the fitment and use of alcolocks e.g. in cross-border enforcement and in best practice guidance on their use in alcohol user rehabilitation.
<p><i>Vehicle and equipment safety standards</i></p>
<ul style="list-style-type: none"> ▪ Ensure that EU vehicle safety standards need to provide a high level of protection.
<ul style="list-style-type: none"> ▪ Propose a range of new EU vehicle safety legislation to reduce the number and risk of serious and fatal injury including the following priorities: Autonomous Emergency Braking Systems (AEBS) in cars, Speed Assist (advisory and voluntary systems); seat belt reminders for front and rear seat passengers; fitment of adaptive restraints in cars, protection of far-side car occupants in side impacts; improved heavy goods vehicle front end design to protect other users, rear underrun protection and side underrun protection; and lane keeping assist.
<ul style="list-style-type: none"> ▪ Promote and fund a Euro SHARP consumer information programme on powered two-wheeler use crash helmets in cooperation with the UK SHARP programme.
<ul style="list-style-type: none"> ▪ Monitor the usage levels of helmets by powered two-wheeler riders and cyclists across the EU and promote/propose mandatory cycle helmet use legislation for school-aged children across the EU and target increased levels of use; establish a European cycle helmet consumer information programme.
<ul style="list-style-type: none"> ▪ Promote zero-rated Value Added Tax for cyclist and motorcyclist helmets.

<ul style="list-style-type: none"> ▪ Revise EC Directive 2014/24/EU on public procurement to include road safety, alongside existing provisions covering environmental and social aspects.
<ul style="list-style-type: none"> ▪ Invite the High Level Group on Road Safety to consider national incentives to fast-track proven technologies via procurement, safe travel policies, and tax and insurance incentives.
<ul style="list-style-type: none"> ▪ Through the EU Health and Safety at Work agency, devise safe travel policies for the European Commission as well as promoting take up of ISO 39001 on road safety management systems for organisations.
<p><i>Driver and rider standards</i></p>
<ul style="list-style-type: none"> ▪ Review Directive 2006/126/EC towards the introduction of a package of effective Graduated Driver Licensing measures for car drivers and powered two-wheeler riders.
<ul style="list-style-type: none"> ▪ Review Directive 2003/59/EC with a view to introducing new provisions/guidance on demonstrably effective training schemes for professional drivers.
<p><i>Post-impact care</i></p>
<ul style="list-style-type: none"> ▪ Commission a study to review the scope of post impact care in reducing deaths and serious injuries in road collisions.
<ul style="list-style-type: none"> ▪ Include first responder training in commercial and public transport driver training and emergency services personnel.
<ul style="list-style-type: none"> ▪ Monitor and rank annually through EU databases the role of road traffic injury as cause of death and disability compared with other mortality and morbidity.