Preventing Road Accidents and Injuries for the Safety of Employees

Project Handbook

ETSC
European Transport Safety Council

PRAISE
Work-Related Road Safety

Foreword by Siim Kallas
Vice-President for Transport, European Commission

Each year, European roads are the scene of an unacceptable number of fatalities. Within that overall number, a large percentage of people lose their lives while driving as a part of their work, or while commuting to and from their workplace – by car, bicycle or motorcycle.

Although the number of road fatalities has fallen by more than 40% over the last decade, there were still nearly 31,000 people killed on EU roads in 2010: the equivalent of the population of a medium-sized town.

While I remain hopeful that we can fulfil our aim of moving close to zero fatalities in road transport by 2050 and of halving road casualties by 2020, there is clearly a long way to go.

These ambitious targets will only be achieved through the active commitment of all parties involved. That is why I welcome projects such as PRAISE as a way to help employers secure high road safety standards for their employees – because improving work-related road safety also means improving the safety of European roads as a whole. PRAISE sets out to encourage the exchange of information, and to identify and promote best practices to cut down the tragic loss of life occurring every year on Europe's roads. These are worthy actions which the European Commission wholeheartedly supports, in particular its thematic reports which tackle specific problem areas in work-related road transport.

The Commission is already carrying out a great deal of work in this regard, with initiatives on training, education and safety awareness - ways to promote more use of safety equipment such as seatbelts and protective clothes, for example.

In addition, the Commission will soon subject the EU's existing rules on vehicle roadworthiness to an in-depth revision, including an extension of scope as well as measures to improve the efficiency of inspections. This will aim to reduce significantly the number of road accidents which are caused by technical defects. After all, if Europe's roads are to be made safer, then the vehicles which travel on them must also be made safer.

I am also convinced of the importance of making more and better use of intelligent transport systems and new technologies, the need for safer infrastructure and of improvements to the quality of the educational system, especially regarding young drivers.

PRAISE has achieved a great deal by raising awareness, sharing research and knowledge, and identifying and tackling the key risk areas for work-related road transport. I applaud the project's commitment to help us in our shared desire to make Europe's roads a safer place to travel, for everyone.

ETSC
European Transport Safety Council

PRAISE
Work-Related Road Safety

Preventing Road Accidents and Injuries for the Safety of Employees
Praising Best Practice in Road Safety 'At' Work and 'To' Work
"Mobilising knowledge to create work-related road safety leadership"

Objectives:

• Advance the need for work-related Road Safety Management and provide the know-how to employers who have to take on that challenge.

• Discuss and expose the work-related road safety standards of EU Member States and carry out advocacy work at the EU level: work-related road safety is an area of road safety policy that clearly needs renewed political commitment.

• Communicate the message that work-related road safety should include road safety 'at' work (driving on duty) but also road safety 'to' work (commuting).

Background: work-related road crashes…a rising concern

Using the roads is a necessary part of everyone's daily business, often for work-related purposes. **It is therefore unacceptable that an ordinary activity leads to an incredibly high level of injury and death.**

Work-related crashes involve heavy goods vehicles and buses, but also cars and light vans. It must be considered that the service sector often emphasises the importance of travelling to meet clients on site and face-to-face.

This is defined **'mobile working'**, where the car becomes a de facto office for employees. **Employers have a responsibility to provide their employees with a safe environment also on the roads.**

ETSC launched PRAISE, a 3 year project addressing all safety aspects of driving 'at' work and driving 'to' work, that aims to **"praise"** best practices in order to help employers secure high road safety standards for their employees.

What are the benefits?

• Reduced running costs through better driving standards (fuel consumption/vehicle maintenance costs);

• Making informed decisions about matters such as driver training and vehicle purchase;

• Fewer working days lost due to injury;

• Reduced risk of work-related ill health;

• Reduced stress and improved morale;

• Less need for investigation and paperwork;

• Less lost time due to work rescheduling;

• Fewer vehicles off the road for repair;

• Fewer missed orders and business opportunities reduced risk of losing the goodwill of customers;

• Less chance of key employees being banned from driving;

• Promoting sound health and safety driving practices may well spill over into private driving.

"It is estimated that 40% of all road crashes involve people 'on duty' and people driving to work or returning from work."
(ORSA)

"In Europe six out of ten work accidents resulting in death are road crashes, including both crashes while driving for work and commuting crashes."
(Eurogip)

How PRAISE works? What are the Deliverables?

Deliverable: 9 PRAISE Thematic Reports (20-30 pages)

- Thematic Reports: documents prepared by ETSC and its experts. For every thematic report ETSC will organise one expert meeting in Brussels with 3 road safety experts in the theme covered.

- Work Related Road Safety Management Programmes
- In-vehicle safety equipment;
- From Risk Assessment to Training
- Fitness to Drive
- Safer Commuting to Work
- Minimising In-Vehicle Distraction
- Road Safety at Work Zones
- Tackling Fatigue EU Social Rules and HGV Drivers
- Driving for Work: Managing Speed

Deliverable: 9 Fact Sheets presenting employer's 'Success Stories'

Deliverable: 3 PRAISE Seminars and Awards

ETSC organises once a year, a high-level and highly visible event:

the 'PRAISE Seminar' gathers decision makers and employers engaged in work-related road safety. The seminar is a means to publicly launch and present the Thematic Reports.

the PRAISE Award, handed during the PRAISE Brunch to one employer identified for taking on the road safety challenge responsibly.

Deliverable: 6 PRAISE Country Seminars

Every 6 months ETSC organised:

One **Country Seminar** focusing on one EU member state and its road safety standard. These brought together key road safety professionals and national decision-makers.

Seminars were organised in 6 countries:
UK, Spain, France, Germany, Poland and Greece.

Deliverable:1 PRAISE Handbook on Work Related Road Safety Management

The PRAISE Handbook entitled "Road Safety 'at' work and 'to' work - a Handbook". This Handbook brings together all 9 thematic reports.

ETSC is using the knowledge gathered in PRAISE to undertake advocacy activities at the European level aiming to integrate road safety into the EU's Occupational Health and Safety legislation.

**Preventing Road Accidents and
Injuries for the
Safety of Employees**

**Work Related Road Safety
Management Programmes**

European Transport Safety Council

PRAISE
Work-Related Road Safety

PRAISE Thematic Reports

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PRAISE is a project co-funded by the European Commission and implemented by ETSC on Preventing Road Accidents and Injuries for the Safety of Employees (PRAISE). The project aims to advance work-related Road Safety Management and provide the know-how to employers who have to take on that challenge. It also aims to present the work-related road safety standards of EU Member States and carry out advocacy work at the EU level: workrelated road safety is an area of road safety policy that clearly needs renewed political commitment

Work Related Road Safety (WRRS) Management Programmes
Contents

European Transport Safety Council

Overview of the report

The report presents the main elements of Work Related Road Safety (WRRS) management as a means of addressing work-related road risks. It commences by outlining why employers should address WRRS and by giving ideas on where to begin within individual organisations. Part of this is making the business case for managing road risk and demonstrating where savings can be made by investing proactively in road safety by employers. The third section looks at the importance of leadership in introducing a WRRS programme and integrating that into a management structure. Different models of management are presented briefly with structures aimed at managing risk. The following section focuses on risk assessment explaining how ultimately this aims to eliminate risk altogether and, if this is not possible, looking at how to minimise it. It presents the approach to risk assessment and then applies it specifically to transport. The report then looks at which indicators should be monitored and evaluated and gives suggestions on how this should be undertaken. The report underlines the need to consider the driver, the journey and the vehicle. Driver management and internal communication is presented alongside an introduction to journey management. The importance of preparing a work-related road safety policy is discussed and a possible sample is included. The report also includes a summary of key measures to tackle common risk areas for WRRS such as speed, alcohol, drugs and medicine, fatigue and distraction. The final part looks at what should be dealt with in the area of vehicle management and maintenance. A recent review stressed the need to raise levels of evaluation of the management approach to work related driver safety to support the interventions at the organisational level[1]. The report refers extensively to the other reports prepared in the context of the PRAISE project[2].

Part 1 Where to start?

Taking responsibility to improve WRRS will improve road safety as a whole in Europe; 31,000 lives were lost on European roads in 2011, of those a large percentage were related to driving for work or commuting. Figures show that road traffic collisions[3] accounted for nearly 40% of incidents at work resulting in death[4]. Furthermore, it makes sound business sense to draw up and implement a WRRS management programme as will be examined in this PRAISE Thematic Report.

Country (data for 2007, except Germany 2006)	Austria	Belgium	France	Germany	Spain
Total deaths	192	175	1,029	1,117	1,167
% of which on the road	54	53	48	61	40
Total deaths at-work	130	96	622	642	826
% of which on the road	32	32	23	34	20
Total deaths commuting accidents	62	79	407	475	341
% of which on the road	100	81	86	97	89

Figure 1: Road collisions while working and commuting[5]

Duty of care, occupational health and safety and road safety compliance are legal necessities in all EU Member States, and are an essential consideration for employers. The European Framework Directive 89/391/EEC on the health and safety of workers[6] requires every employer in Europe to undertake a risk assessment according to the principles of prevention. This should include employees travelling for work. Some Member States have supplementary legislation detailing employers' obligations to eliminate risks related to driving for work. Member States have also developed specific guidance on applying the Framework Directive to WRRS. Employers must ask themselves if they are compliant with this EU and supplementary national level legislation.

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1   Grayson, G. B. and Helman, S. (2011). Work related road safety: a systematic review of the literature on the effectiveness of interventions. Research report 11.3. Institute of Occupational Safety and Health.
2   http://etsc.eu/PRAISE-publications.php
3   European Commission (2005) Causes and Circumstances of Accidents at Work in the EU.
4   This refers to the 'transport branch' and fatal Road Traffic and Transport Accidents in the Statistical Classification of Economic Activities in the European Community. The data do not include commuting nor do they include Ireland or the UK.
5   Eurogip (2009). Le risque routier encouru par les salaries en Europe. Actualisation du rapport Eurogip-05/F publié en 2003 August, Eurogip-40/F, www.eurogip.fr/en/docs/Eurogip_risque_routier_2009_40F.pdf
6   Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work.

A new ISO international standard ISO 39001 for road traffic safety management (due to be published in December 2012) will provide a useful framework for the continual improvement of road safety work. For those looking to begin the process the following steps should be undertaken:

• "identify its role in the road traffic system;

• identify the processes, associated activities and functions of the organisation that can have an impact on road traffic safety;
• determine the sequence and interaction of these processes, activities and functions."[7]

In addition every employer should ask themselves the questions set out in the table below to assess if they need to manage WRRS and what types of transport activities they are engaged in[8]. It is important to identify transport needs, and the level of risk exposure for motorised and non-motorised users[9].

Recommendation to Employers

• Undertake a first needs analysis to manage work related road risk in the organisation.

DOES THE ORGANISATION NEED TO MANAGE FLEET SAFETY?

⬇

Do we operate vehicles for work?

⬇

Do our employees drive for work purposes?

⬇

Do employees or others drive on our premises?

⬇

Do we provide employees with personal vehicles?

⬇

Do we contract transport services?

⬇

If the answer is "yes" to any of the above, executive management are responsible for ensuring appropriate systems and controls are in place and that they are operating effectively

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Part 2 The Business Case

There are convincing economic arguments in preparing and implementing a WRRS management programme. Many employers focus only on fleet safety as a reactive response to being involved in a collision or death. A more holistic approach may bring benefits also in other areas, as safety is closely linked to quality, customer service, efficiency, environmental programmes and becoming more efficient[10]. In terms of efficiency this may lead to better fuel efficiency[11] as well as less downtime due to different scheduling[12]. Another positive effect is

likely to be reduced wear and tear of vehicles[13] and enhanced residual value. Furthermore, an element often forgotten is that, in case of a collision that may result in lost orders, then the reputation of an employer may be affected beyond that one day or week of lost business.

The benefits can be reflected in different ways:

• Reduced running costs through better driving standards (fuel consumption/vehicle maintenance costs);

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7 ISO 39001 Draft International Standard 39001.
8 Shaw, K., Global Road Safety Partnership (2009) Draft Fleet Safety Manual Part 1.
9 ISO 39001 Draft International Standard 39001.
10 Murray, W. CARRS-Q, Evaluating and improving Fleet safety in Australia (2002).
11 See PRAISE Thematic Report 8 on Speed including the section on Eco driving. http://etsc.eu/documents/PRAISE%20Thematic%20Report%208%20Driving%20for%20Work%20Managing%20Speed.pdf.
12 See Thematic Report 8 on Speed and also Thematic Report 7 on Fatigue, Section on Journey Planning.
13 See section of this report on vehicle procurement and maintenance.

- Fewer working days lost due to injury;
- Reduced risk of work-related ill health;
- Reduced stress and improved morale/job satisfaction;
- Less need for investigation and paperwork;
- Less lost time due to work rescheduling;
- Fewer vehicles off the road for repair;
- Fewer missed orders and business opportunities, reduced risk of losing the goodwill of customers;
- Less chance of key employees being banned from driving[14].

Most employers may look at the cost of their insurance premium and any excess but the far bigger financial implications are the hidden costs associated with every work related incident/collision. Research shows that typically workplace injury costs are met 40% by the employee, 30% by the employer and 30% by the community as a whole[15]. The International Loss Control Institute (ILCI) states that for every 1 euro paid out by an insurance company there are 8-53 euros in uninsured losses, depending on the severity of the collision[16]. Research undertaken by the UK Health and Safety Executive[17] identified that the 'below the water line' 'iceberg' costs can be 8 to 36 times greater than the visible 'above the water' 'iceberg' costs.

Collisions most often have financial implications on a business that stretch well beyond reported costs. This can be illustrated by the following model of a collision's costs[18]:

Item of cost	Sample data
Own damage costs	€1,200 (£1,000)
Third party vehicle damage costs	€1,200 (£1,000)
Third party injury costs (eg Whiplash)	€1,200 (£1,000)
Reported cost of collision	€3,600 (£3,000)
Total cost of collision (including hidden costs at 2 times reported costs)	€7,200 (£6,000)
Revenue required to fund a single collision at 10% return on Sales	€72,000 (£60,000)
Product sales (at 50p) required to fund fleet safety costs	€144,000 (£120,000)

For this one incident a conservative decision to multiply by 2 the € 3,600 figure to identify hidden costs was taken. To cover a €3,600 collision cost, €72,000 of revenue would be required, equating to sales of 120,000 units of this hypothetical company's product. The company therefore needs to ask itself: "is it easier to sell 120,000 units of our product or be more proactive in preventing this collision" In the current economic climate, such models are needed to justify up-front investments in safety programs. They can also be used to project long-term costs and potential returns on investment from adopting a proactive fleet safety policy.

Some organisations have worked out how many of their main product or service they have to sell in order to be able to fund these uninsured losses associated with the collisions they are having. According to Nestlé, in order to fund the uninsured losses that are associated with their European fleet's annual (2006) collisions, they have to sell 235,000,000 Kitkats.

Targeting risk through the business case is also a new development detailed in "Why is motor fleet safety important?[19]". Risk financing means looking at funding from:

- Detailed, costed, internal business case to the board.
- Asking insurer, leasing company or vehicle supplier to provide joint funding support for risk management.

14   Murray, W (2010) Sustaining work-related road safety in hard times: understanding collision costs. Unpublished guidance on fleet safety costs. Interactive Driving Systems.

15   Murray, W et al (2003) Evaluating and improving fleet safety in Australia. Canberra: ATSB.

16   ILCI cited in Zurich Risk Engineering Managing Work Related Risks (2008).

17   HSE (1993) The costs of accidents at work, Health and Safety Executive Publications, Sheffield.

18   Murray, W (2010) Sustaining work-related road safety in hard times: understanding collision costs. Unpublished guidance on fleet safety costs. Interactive Driving Systems.

19   Murray,W. (2011) The Work-Related road safety business case: Societal, business, legal and cost factors", http://www.drivingforbetterbusiness.com/pool/business-case-w-murray-070109.pdf

- Focusing attention on uninsured loss recoveries and using the money's clawed back from third parties to invest in risk programmes[20].

This approach is covered in more detail below in the risk insurance management model in Part 3.

Having a WRRS programme can also boost staff morale and avoid having a high turnover of staff. See also PRAISE Report 3 on Fitness to Drive[21] that explains the benefits, financial and otherwise, of 'Workplace Health Promotion'. For example, research shows investment in WHP yields a return on investment of one to 2.5 – 4.8 in reduced absenteeism costs.

2.1 Competitive Advantage – "Standing Above the Rest"

Private companies also cite high standards in road safety management as an area that can give them a competitive advantage over others offering the same services in their sector. Road safety procedures should be included in other management areas such as quality certification, marketing promotions and thus a commercial benefit can also be accrued from them[22]. This is especially important in the case of a smaller company providing a transport service to a larger contractor that is specifically citing road safety as criteria for choosing a sub-contractor. Especially in a tough business climate companies are looking for ways to stand out from the rest and offer supplementary standards including safety approaches. A proactive road risk program can also keep organisations ahead of and protected from regulations and legal requirements and gain a competitive advantage compared to more 'reactive' competitors. Some companies have even used safety as part of their business development process and helped them diversify by promoting their safety systems to others[23]. Others explain that a strong standard of safety also gives customers reassurance[24].

2.2 Corporate Social Responsibility

An increasing number of European companies are promoting Corporate Social Responsibility (CSR) as a response to a variety of social, environmental and economic pressures and in doing so, companies are investing in their future and they expect that the voluntary commitment they adopt will help to increase their profitability. For businesses there is a clear link between safety, quality, customer service, efficiency and the environment. As a result CSR also takes on the issue of occupational health and safety including road safety. Some employers involved in transport specifically reported that their stakeholders were interested in road safety performance indicators being included in CSR reporting[25]. Being socially responsible means going beyond legal compliance and investing 'more' into human capital, the environment and relations with stakeholders. Road safety has a massive impact on society, and for this reason can play a major role in improving – or damaging - organisations' CSR. One high profile collision involving a company owned vehicle bearing a company logo can have a long lasting negative impact on a company's image. The reputation of a company is hard to generate and easy to lose. At the other end of the scale being recognised externally for performing well in fleet safety can be an effective marketing tool.

2.3 Procurement

Incentives to raise safety as criteria for contracts should also be included in public procurement. Liability responsibility for WRRS and appropriate risk management and preventative measures must be extended through the supply chain[26]. Transport services can be subcontracted but responsibility for this cannot be outsourced. This principle is already included in legislation governing driving and resting hours and must not result in lower levels of safety. It states that consignors, principal contractors, sub-contractors and driver employment agencies must ensure that transport time schedules comply with the provisions on drivers' hours. Sweden has set up a system to promote safety and sustainability in transport contracting[27].

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20 ibid
21 http://etsc.eu/documents/PRAISE%20Report%203.pdf
22 EU OSHA FACTS 18 Preventing Road Accidents Involving Heavy Goods.
23 Murray,W. (2011) The Work-Related road safety business case: Societal, business, legal and cost factors", http://www.drivingforbetterbusiness.com/pool/business-case-w-murray-070109.pdf
24 http://etsc.eu/documents/PRAISE%20Fact%20Sheet1.pdf
25 http://etsc.eu/documents/FACTSHEET7.pdf
26 This is covered in PRAISE Thematic Report on social rules and fatigue.
27 This is covered in more detail in our PRAISE Thematic Report on Speed Management. http://etsc.eu/documents/PRAISE%20Thematic%20Report%20 8%20Driving%20for%20Work%20Managing%20Speed.pdf

2.4 Partnership Working

Engagement and partnership should go beyond drivers and employees and include looking for support and ideas from insurers, peers, Health and Safety organisations, the enforcement community including the Police and road safety organisations[28]. Organisations should consult claims data from their insurers, Police reports and information from trade union organisations. Some trade unions have developed guidance material to manage work related road risk[29].

2.5 Peer to Peer Exchange

Although competition is a big incentive, proactive employers taking a dedicated interest in improving their work related road risk can also benefit from exchanging their experiences with their peers. At a national level there are some fleet forums that are run with this aim. A good example from the UK

is the Driving for Better Business Programme[30]. It uses advocates drawn from these communities to promote the business benefits of managing road risk effectively. Business champions, some of whom are featured in the PRAISE project, constitute the central element of the Driving for Better Business campaign. They are those firms that are prepared to step forward to champion good practice in WRRS by taking a business message to business. Each Champion makes public a case study to demonstrate how driving on business is managed.

2.6 Business Case Examples

British Telecommunications (BT)[31]

A culture of safe driving has been developed within the workforce with a beneficial impact on long term statistics and costs, with claims reducing from 59 to 31 per 1,000 vehicles and annual costs by over £12 million during the period 2001-11.

Year	Claims	Costs	Vehicles	Claims/1k vehs	Cost/ claim	Cost/ vehicle
2001-2	32,610	25,583,981	46,028	59	785	556
2002-3	28,142	20,889,596	45,608	51	742	458
2003-4	26,556	17,173,742	45,188	51	647	380
2004-5	17,001	11,682,083	44,768	32	687	261
2005-6	17,170	18,227,418	44,280	32	1062	412
2006-7	19,017	19,261,503	43,800	36	1013	440
2007-8	15,626	15,362,492	43,320	30	983	355
2008-9	15,449	12,980,332	41,616	31	840	312
2009-10	14,706	14,562,135	37,488	33	990	388
2010-11	12,623	11,706,037	34,558	30	927	339

BT Collision and cost reductions 2001-2011

Suckling Transport

Suckling Transport[32] specialises in the transport of fuel by road. It launched its Zero Incident Project (ZIP) in 2008 which aims to eliminate collisions, or crashes, completely. The three main areas examined

by the project were technological developments, driver training and procedures. The graph below shows an 80% reduction in the severity of collisions. The average cost of motor vehicle insurance claims amounted to £180,850 per annum in the 4 years prior to 2009. Claims fell to just £34,437 in 2009.
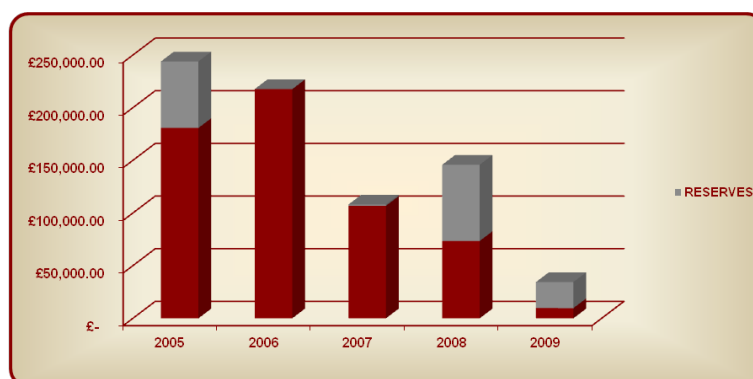
28   EU OSHA Delivering the message – Programmes, initiatives and opportunities to reach drivers and SMEs in the road transport sector (2011).
29   A good example is the Work Related Road Safety Guidance developed by the TUC in the UK. http://www.tuc.org.uk/extras/roadsafety.pdf
30   http://www.drivingforbetterbusiness.com/
31   Wallington D, Murray W, Darby P, Raeside R & Ison S. Work-Related Road Safety: Case Study of British Telecommunications (12-1196). Paper presented at the 91st Annual Meeting of the Transportation Research Board, Washington, D.C., January 22-26, 2012.
32   http://etsc.eu/documents/PRAISE%20Fact%20Sheet%202.pdf

TNT Express

TNT Express has had obvious economic benefits as the direct and indirect costs of collisions are well documented and understood. Improved management of road safety risks has led to reduced vehicle damage costs, reduced repair and maintenance costs and reduced insurance premiums. It has also led to other associated benefits such as reduced fuel costs and improvements in operational efficiency. TNT UK & Ireland provides a very good example - between 2007 and 2010 they were able to demonstrate the following performance improvements: 20% reduction in collision rate and 25% or £730,000 reduction in paid and estimated cost[33].

KTL

KTL which operates in the telecom, renewable, transmission and power sectors within Ireland employs 170 staff[34]. KTL has set out and implemented a number of safety initiatives, processes and measures to tackle WRRS issues. The economic improvements for KTL have been a reduction in insurance premium due to fewer insurance claims, reduced fuel consumption and CO_2 emissions, increased fuel efficiency, longer life span of vehicles due to a rigorous maintenance programme, depreciation of vehicles reduced due to good maintenance and new vehicles being bought to replace old high mileage vehicles and less collisions which reduces the number of lost days, reduced medical expenses. These improvements have led to KTL becoming more efficient which has allowed them to win new contracts and, as a result, has increased the volume of work.

Recommendations to Employers

- Calculate the business case of investing in a WRRS programme for your organisation.
- Look to seek support from others such as their peers, Health and Safety organisations, Trade Unions and the enforcement community.
- Look to include safety as criteria for public procurement contracts and apply this throughout the supply chain.
- Recognise the benefits of a WRRS programme for CSR and that it can give a competitive advantage.

Part 3 Management and Leadership

3.1 Leadership

Commitment of leadership (top management) is crucial for the successful introduction and implementation of a WRRS management programme by an employer. The level of their involvement depends on the size of the organisation. The CEO must be convinced of the added value and involved in the process. This shows that the issue is being taken seriously and can help smooth away resistance[35]. "Lead by example[36]" and "Lead from the Top[37]" are catch phrases of many employers who have introduced successful WRRS programmes. Additionally, research has also considered that effective supervisory safety practices have been found to be associated with an increase in group-level safety climate perceptions (i.e., the priority given to safety over competing task demands) and a reduction in injury rates[38]. Those with leadership responsibility need to be kept updated of progress at regular intervals. It is suggested that the CEO must assume overall responsibility for managing fleet safety and driving at work and delegate this to a specific individual not more than one level down the organisation[39]. This will provide for the appropriate authority for the approval of plans and allocation of resources for action[40]. Depending on the size of the organisation the CEO can also be involved in some of the frontline behavioural and safety assessment to demonstrate this commitment[41].

Demonstrating leadership can be shown by:

- motivating and empowering persons to contribute to the effectiveness of the WRRS management system
- establishing and supporting unity of the WRRS purpose and direction for the organisation
- reinforcing organisational accountability for WRRS results
- creating and maintaining the internal environment in which persons can become fully involved in
- achieving the organisation's WRRS objectives
- leading by example. [42]

33 http://etsc.eu/documents/FACTSHEET7.pdf
34 http://etsc.eu/documents/PRAISE_Fact_Sheet_8_KTL.pdf
35 Price, A., et al, Building work-related road safety into organisational DNA: Case study of Vauxhall. Draft paper, currently in review process for Journal of the Australasian College of Road Safety.
36 http://etsc.eu/documents/FACTSHEET7.pdf
37 http://etsc.eu/documents/PRAISE_Fact_Sheet_8_KTL.pdf
38 Zohar 2002 in Newnam et al Occupational driver safety: Conceptualising a leadership based intervention to improve safe driving performance, 2011.
39 Shaw, K., Global Road Safety Partnership (2009) Draft Fleet Safety Manual Part 1.
40 Ibid
41 See PRAISE Fact Sheets: KTL and Suckling Transport.
42 Adapted from ISO 39001 Draft International Standard 39001.

3.2 Work Related Road Safety (WRRS) – Whose Responsibility?

Commitment to managing WRRS must be carried out from the leadership (top management) level and be linked in throughout the organisation's management chain. Committed management champions at all levels have been important in overcoming the many potential barriers that exist to improving safety[43]. Size of the organisation of course is a clear point in deciding how this is managed. The roles and responsibilities for implementing the WRRS policy have to be clear to all involved. One question that often comes up is at whether the responsibility for the issue sits with a dedicated health and safety manager or with the fleet manager. The recommended approach is for responsibility for road safety to be by the operational or executive line within an organisation. The health and safety function provides the necessary advice and may very well set out the policy, standards and requirements for fleet safety; however this should be executed through the executive line via accountable operational management. The dedicated person accountable for fleet safety needs to ensure that the subject is included in the organisation's mission statement, and that key performance indicators are in place and included on the agenda at all regular board meetings[44]. Another point to be taken into account is to make sure that the WRRS programme does not depend too much on one key personality. This becomes especially important if that key person leaves the organisation and their commitment is lost.

Another important part is making sure that the dedicated person has the skills to carry out the job. If they do not have them then resources must be earmarked to coach and support the person and upgrade them for this additional task. A key element is so called 'ownership' of the WRRS issue. Research of organisational practices related to this shows that "greater sharing of safety ownership is associated with greater development of WRRS practices"[45]. Furthermore this research recommends that employees and managers should be educated about workplace health and safety responsibilities and that these tasks should be stated in the relevant job description[46].

3.3 Safety Culture

As well as an engaged leadership, safety culture should also be diffused throughout the organisation. Safety culture 'characteristics' include safety policies and procedures issued by senior management, the commitment to implementing safety policy shown by line management and the willingness to comply with safety rules shown by the workforce[47]. Safety culture can also be defined as shared attitudes, values, beliefs and behaviours related to safety. The adoption of a safety culture also involves a proactive rather than reactive approach to safety. The approach is data-driven with procedures for collecting and analysing data which is then used as a basis for managing risk[48]. The use of data and base line analysis and evaluation and review is looked at in more detail later in this report.

3.4 Management Models

There are different models which are useful to aid employers start off with introducing a management framework for road safety, a number of which are presented briefly here. All of them stress that WRRS is a core activity and cannot be seen in isolation from business overall[49].

ISO International Standard 39001 Road Traffic Safety Management System

A new ISO international standard 39001 for road safety management (due to be published in December 2012) will provide a useful framework on continual improvement in road safety work. Any player with an influence on road safety should be able to use the standard as a complementary guidance in its efforts of contributing to safe road traffic. ISO management systems are based on the Plan-Do-Check-Act methodology which is a cyclical approach involving several steps and requires strong leadership and commitment from top management[50]. A management system is defined as "a set of integrated or interacting elements of

43   Wallington D, Murray W, Darby P, Raeside R & Ison S. Work-Related Road Safety: Case Study of British Telecommunications (12-1196). Paper presented at the 91st Annual Meeting of the Transportation Research Board, Washington, D.C., January 22-26, 2012.
44   ibid
45   Banks, T. et al (2010) Ownership of Safety Responsibilities is Associated with Work Related Road Safety Practices
46   ibid
47   ERSO (2007). http://ec.europa.eu/transport/wcm/road_safety/erso/knowledge/Fixed/60_work/work_related_road_safety.pdf
48   See also PRAISE Thematic Report 7 on Fatigue Part 4. http://etsc.eu/documents/Report7_final.pdf
49   Murray, W. (2011) The Work-Related road safety business case: Societal, business, legal and cost factors".
50   ISO 39001 Draft International Standard 39001.

an organisation to establish policies and objectives and processes to achieve those objectives"[51]. The diagram below shows this approach and makes references to the difference clauses in the ISO standard.
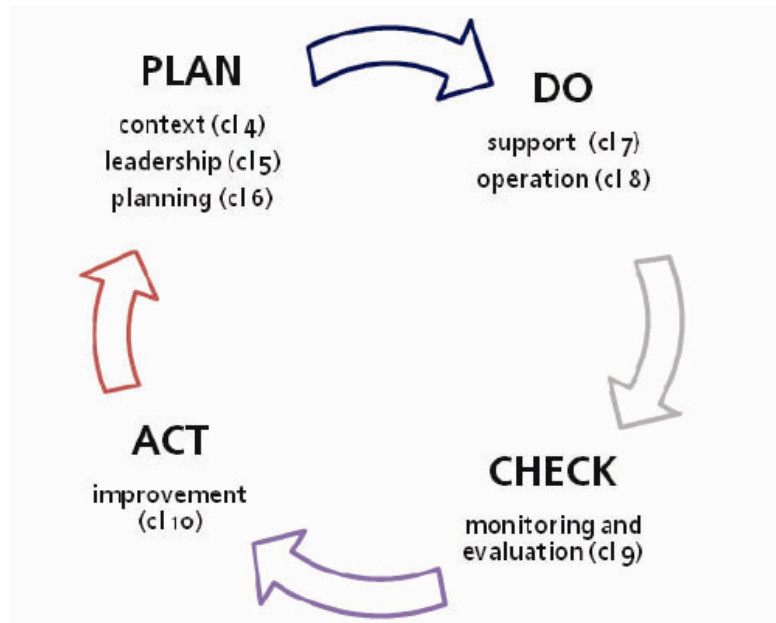
The first step covers planning and includes identifying the impact of the organisation (clause 4). Part of this also includes establishing leadership commitment and setting up a WRRS policy (clause 5). The WRRS policy should include measurable targets and objectives (clause 6). The next step "do" covers implementing the system which relies on coordination, budget, competent human resources, awareness-raising including internal and external communication (clause 7).

Monitoring is under "check" and should ensure regular analysis and evaluation of performance against the set objectives and targets (clause 9). "Act" is improving the management system on a continual basis (clause 10).

Risk Insurance Model

Insurance and driver risk based models, including one elaborated by Zurich Risk Engineering/ Zurich Financial Services,[52] recommend three phases.

The first is to assess, analyse and understand the risks faced by the organisation. This would cover organisational risks, proven risks and theoretical risks, the latter covering the three areas of work-related road safety: the driver, the journeys they make and the vehicle. It suggests through an assessment of the driver's core competencies that the company will come up with a comprehensive risk profile of all employees who make work related journeys. The second phase points to implementing selected control measures linked to the risk profile and the risk areas of particular concern as well as the role and exposure of that particular employee. They stress that interventions

51   ibid
52   Zurich Risk Engineering Managing Work Related Risks (2008)

should be taken at an appropriate management or individual level. Also that management interventions should be given preference as these are more likely to give a sustainable reduction in the risk profile and hence the collision rate. The last part of the insurance approach is to maintain, monitor and review. Monitoring the process involves measuring key performance indicators. Reviewing makes sure that any changes that have been introduced are keeping up with other changes for example in technology, legislation or in operating practices of the employer.

The Haddon Matrix

The Haddon Matrix is particularly useful as a framework for undertaking an overall review of the organisational safety context. Haddon provides an all-encompassing pre-crash, at-scene and post-crash systems-based framework for fleet safety. As well as classifying improvement interventions to be piloted, implemented and embedded, it can be used as a gap analysis and investigation tool[53]. A safety project plan[54] has also been developed

which is flexible and can be adapted to different needs: it includes a timetable that stretches 24 months and approximately 5 phases. It starts with safety gap analysis under phase one which looks at safety culture and covers identifying which criteria are being met and which not. The second covers risk assessment with then is followed by phase 3 of performance management. The next phase looks at risk reduction and interventions and culminates in risk review and planning under phase 5.

The starting point lies firmly at the top of the Management culture column of the matrix, as follows:

- Identify, obtain and analyse available data (e.g. insurance, licence & telemetry) on the extent of the problem.
- Use this to make a business case to relevant senior managers in the organisation.
- Focus on the other areas shown under Management culture first to ensure appropriate systems are in place.

	Management Culture	Journey	Road / Site Environment	People - Drivers & Managers	Vehicle	External / Societal / Community / Brand
Pre-Collision or Pre-Drive	Business case Legal compliance Safety audit, claims analysis & focus group discussions Benchmarking Board level champion Pilot studies & trials Goals, policies & procedures Safety culture / climate Management structure Fleet safety committee Safety leadership by example and commitment Communications programme Contractor standards Grey fleet (own vehicle) policy	Travel survey Travel policy Purpose Need to travel Modal choice Journey planning and route selection Route risk assessment Journey scheduling Emergency plan Shifts / working time Fatigue management	Risk assess Observation Guidelines & rules Site layouts & signs Work permits Delivery & collection procedures Road improvement Black-spot mapping and hazard assessments Engage local and national agencies	Select Recruit Contract Induct Licensed & qualified Handbook Risk assess Train Work instructions Engage & encourage Equip e.g. high viz Communicate Driving pledge/ Code of Conduct/ Risk Foundation Health & wellbeing Monitor Correct	Risk assessment Selection Specification Active and passive safety features Standards Servicing Maintenance Checking Use policy and legal compliance e.g. loading Mobile communication and navigation policy Telematics to monitor Wear and tear policy Grey fleet standards	Regulator / policy engagement Insurer engagement CSR External benchmarking External communications Family members programme Community involvement Engaging other road users Road safety weeks / days Safety / ECO groups European Road Safety Charter Road safety conference presentations Media / outreach / PR Safety & environmental achievement awards

53 Murray, W., Pratt, S., Hingston, J. & Dubens, E. (2009). Promoting Global Initiatives for Occupational Road Safety: Review of Occupational Road Safety Worldwide (Draft).
54 Virtual Risk Manager (2011) Safety Project Plan.

	Management Culture	Journey	Road / Site Environment	People - Drivers & Managers	Vehicle	External / Societal / Community / Brand
At Scene	Emergency support to driver	Engage local investigators	Manage scene	Known process and 'crash pack / bumpcard' to manage scene	Reactive safety features Crashworthy Telemetry data capture	Escalation process
Post-Collision	Policy and process to report, record & investigate incidents Change management process Ongoing claims data analysis Data warehousing & linkages Evaluation, KPI benchmarking & programme development	Debrief and review Review journey elements of collision data Ongoing journey management review	Investigate and improve Review site / road elements of collision data	Reporting and investigation process Driver debrief and corrective action Review people elements of collision data Counselling, trauma management & support Reassess / train	Strong open able doors Investigate telemetry data Vehicle inspection & repair Review vehicle elements of collision data Review vehicle selection & use	Manage reputation and community learning process

WIPE Fleet Safety Process Model

The WIPE[55] fleet safety process model was included in the NIOSH report integrating occupational health and safety, fleet management and road safety research[56]. The first stage is to investigate the reason for focusing on fleet safety taking into account the impact on society and business, legal considerations and costs. The second stage involves undertaking an initial and continuous status review and gaining understanding of the current situation of the organisation. The next stage involves piloting, implementing and managing the initiatives. The final stage is evaluating the programme by monitoring key performance indicators.

Managing Occupational Road Risk (MORR)

A risk management cycle within managing occupational road risk (MORR[57]) has been proposed to manage work-related road safety by the Royal Society for the Prevention of Accidents (RoSPA). The cycle is suggested to incorporate continuous improvement for occupational road risk. AN initial status review is undertaken to develop an

Why focus on fleet safety?
Societal, business, legal and financial

Initial and continuing status revtus review
Safety audit GAP analysis
Data analysis
Focus groups
Employee safety climate surveys
Risk assessments

Pilot, implement and change-manage countermeasures

Evaluation
Crash data KPIs
Cost KPIs
Qualitative KPIs
Proactive KPIs
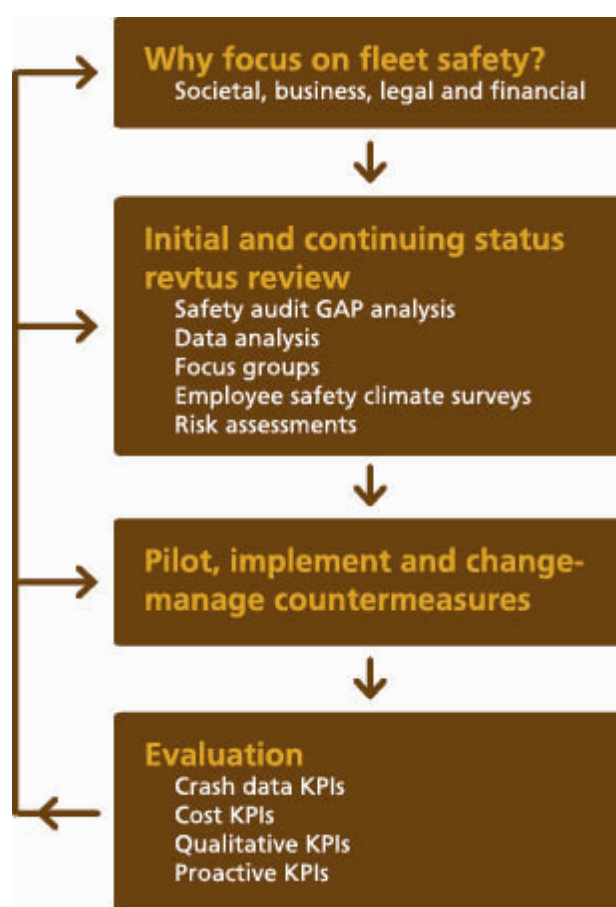
55 First proposed in, Murray, W., Newnam, S., Watson, B., Davey, J. & Schonfeld, C. (2003). Evaluating and improving fleet safety in Australia. Canberra: ATSB. www.infrastructure.gov.au/roads/safety/publications/2003/eval_fleetsafe.aspx

56 Murray, W., Pratt, S. & Dubens, E. (2011) Occupational Road Safety: Review of Work related Road Safety Research, Policy and Practice Worldwide (Draft) in Husband, P. Work Related Drivers 2011 http://www.devon.gov.uk/workrelateddriversfinal.pdf

57 RoSPA Managing Occupational Road Risk the RoSPA Guide 2003, in Husband, P. (2011) Work Related Drivers http://www.devon.gov.uk/workrelateddriversfinal.pdf

understanding of the current performance and collision risk associated with the organisation. Recommendations are developed through this consultation period to reduce the number of collisions and associated costs for the organisation. A management system approach considers a proactive rather than reactive approach to managing risks.

Recommendations to Employers

- Demonstrate leadership in taking on the responsibility of WRRS programme at level of CEO.
- Identify clear roles for implementing the WRRS programme within the organisation.
- Promote a 'safety culture' as an integral part of the WRRS programme.
- Introduce a model for the WRRS programme.

Part 4 Risk Assessment, Monitoring and Evaluation

All of the aforementioned models include conducting a risk assessment; this is also required by law. The European Framework Directive 89/391/EEC[58] requires every employer in Europe to undertake a risk assessment according to the principles of prevention of the safety and health of their workers. This Directive provides a minimum requirement and has also been supplemented by national legislation. It is also supported by a number of other Directives on workplace safety[59]. Risk assessment can be defined as:

"The process of evaluating risks to workers' safety and health from workplace hazards. It is a systematic examination of all aspects of work that considers:

- what could cause injury or harm
- whether the hazards could be eliminated and, if not,
- what preventive or protective measures are, or should be, in place to control the risks[60]."

The European Commission together with the Advisory Council of Health and Safety at Work has also prepared a Guidance document[61] on applying the Directive 89/391/EEC. This covers key definitions of risk assessment and methodology on how and where to revise and review the risk assessment. The Guidance includes a section dedicated to risk assessment steps for SMEs including a step by step approach summary in the Annex. Specific Guidance for Reducing Work Related Vehicle Risk is due for development in the coming years.

Risk assessment aims to identify potential hazards, prevent occupational risks, provide information and training to workers and provide the organisation with the means to implement the necessary measures[62]. Moreover, where elimination of risks is not possible, the risks should be reduced and the residual risk controlled. At a later stage, as part of a review programme, such residual risk will be reassessed and the possibility of elimination of the risk, perhaps in the light of new knowledge, can be reconsidered[63]. The European Guidance document stresses that there is no right way of going about risk assessment and that different approaches are required in different circumstances. Factors to be taken into account when deciding on how and what to risk assess depend on the nature of the workplace (fixed or moving), the type of process and the task performed and its frequency and technical complexity. The document lists a ten step process[64] that can also be simplified into 5 simpler steps.

These include:

Step 1. Identifying hazards and those at risk – look for those things at work that have the potential to cause harm, and identify workers who may be exposed to the hazards.
For transport this may include use of the road.

Step 2. Evaluating and prioritising risks -Estimating the existing risks (the severity and probability of possible harm…) and prioritising them in order of importance.
For transport this may include identifying fatigue for long distance or high mileage/kms drivers.

Step 3. Deciding on preventive action -Identifying the appropriate measures to eliminate or control the risks.
For transport this may include undertaking a journey planning exercise resulting in planning rest stops.

58   Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work.
59   Overview of Occupational Health and Safety Legislation http://osha.europa.eu/en/legislation/index_html/directives
60   http://osha.europa.eu/en/topics/riskassessment/definitions
61   http://osha.europa.eu/en/topics/riskassessment/guidance.pdf
62   http://osha.europa.eu/en/topics/riskassessment/purpose
63   ibid
64   For the full unabridged 10 Steps see http://osha.europa.eu/en/topics/riskassessment/carry_out

Step 4. Taking action-Putting in place the preventive and protective measures through a prioritisation plan.
For transport this may include implementing a different driving and resting regime.

Step 5. Monitoring and reviewing -The assessment should be reviewed at regular intervals to ensure that it remains up to date[65].
For transport this may include looking at the outcome of the changed journey times and impact and add still additional changes.

4.1 Risk Assessment of Transport

Specific to transport is the risk assessment of three key elements: the road user, the journey and the vehicle. Occupational road risk has been divided into four areas by a report looking at 'Causes and Circumstances of Accidents at Work in the EU'. These include firstly, road travel management and planning. One of the first questions here is, "Is the trip necessary?" and "Is it possible to use other means of transport?" Secondly, if the trip is necessary, then it should be asked "What can be done to reduce the exposure to risk while driving?" – this means, for example, setting limits on time spent on the road. Thirdly, organisations should look at implementing a new organisation of work such as for example integrating safety considerations into defining deadlines for delivery[66]. Finally introducing a policy looking at vehicle use, procurement and maintenance is needed. This will be covered in more detail in section 9.

Specific to the road transport aspects of risk assessment Murray & Dubens[67] and Murray[68] suggested a following 6 step approach to implement an assessment, monitoring and improvement program which has been adapted to reflect the legal requirements under the Directive 89/391/EEC:

1. Review existing transport needs in the organisation using a detailed framework such as the Haddon Matrix, a fleet gap analysis or the forthcoming ISO 39001. This should also be in line with the general principles of prevention as set out in Directive 89/391/EEC Article 6.3.
2. As a result of the assessment of the occupational

risks, managers, supervisors, driver assessors, work schedulers, shop stewards and any other potential users must undertake the assessment themselves including assessing the tasks they must carry out as well as the skills they possess. This shows their commitment to safe driving and helps to sell the concept to the rest of the workforce, as well as learning how to use the system and the data outputs from it. Actually this phase should be more than just "showing their commitments". The assessment should contain also "organisational level". This organisational level is the most important one in safety as also set out in Directive 89/391/EEC Article 6.3a.
3. All existing drivers should then undertake the assessment again covering their tasks, possibly at one site initially, to build up a benchmarking database of existing company norms and standards.
4. The output must be used to identify the needs of existing staff and set appropriate targets for all new drivers to achieve (Article 12 of 89/391/EEC Directive).
5. Utilise the assessment process for a range of pre-employment, current staff and other purposes (Article 12 of 89/391/EEC Directive).
6. Reassess to identify and evaluate improvements as per Directive 89/391/EEC Article 12.

Risk assessment of transport should return to some of the questions covered at the start and include the basic information such as: what journeys have to be taken by our employees? Which modes would represent the lowest risk? What vehicles do you have? Who are they driven by? Where are they driven? What type of drivers do we have? How long have they been driving? What are we asking them to do apart from driving? The driver needs to be checked but so does the supervision and management level. The risk assessment should identify key performance indicators which should be monitored and evaluated.

Risk can be reduced through a reduction in the amount of road use by employees[69]. Also steps taken to reduce travel by the riskier road modes such as driving and cycling (for example by using teleconferences, and taking public transport – bus and rail-where travel is necessary) have the best chance of proving effective at reducing road injuries[70].

65 ibid
66 European Commission (2005) Causes and Circumstances of Accidents at Work in the EU.
67 Murray W & Dubens E Driver assessment including the use of interactive CD-ROMs, Paper presented at the 9th World Conference on Transportation Research, Seoul, 24-27 July 2001.
68 Murray, W. 2004, The driver training debate. Roadwise: Journal of the Australasian College of Road Safety, Vol 14 (4), May 2004, pp. 3-5.
69 Grayson, G. B. and Helman, S. (2011). Work related road safety: a systematic review of the literature on the effectiveness of interventions. Research report 11.3. Institute of Occupational Safety and Health.
70 ibid

Risk assessments are limited by the level of knowledge that the assessor has. So if the level of knowledge within a company is an issue, it will be worth involving an external expert, if only to act as a challenger to review with the organisation its own internal assessment.

4.2 Risk Assessment Tools

Online interactive Risk Assessment tool (OiRA)

EU-OSHA has developed a comprehensive, easy to use and free web application, the OiRA - Online interactive Risk Assessment tool launched in September 2011[71]. This enables any employer, specifically SMEs, to put in place a thorough step-by-step risk assessment process. It aims to increase the number of SMEs assessing and managing their occupational risks and thus contributing to an improvement of working conditions. It also aims to encourage sectors (via the social dialogue at EU and Member State level) to develop, implement and keep updated sectoral specific OiRA tools. The tool starts with the identification and evaluation of workplace risks, through to the decision making on preventive actions and the taking of action, to monitoring and reporting. The Project currently involves some 15 European Member States (national governments, social partners, and research organisations). They are developing sectoral tools in their own languages and piloting them among micro and small businesses.

Risk Assessment for Organisational Mobility (GUROM)

The risk assessment tool and danger awareness tool on organisational mobility (GUROM[72]) has been developed for use by individual employees and whole organisations by the University of Jena and the German Road Safety Council. As risk assessment is obligatory by law this new tool gives a systematic application of carrying this out. The project aims to develop risk assessment specifically for transport. It comes up with measures to increase the safety of an individual person or an entire organisation. The project looks at the scientific outcome of the effectiveness of the measures to prevent collisions. It is based on the principle of TOP: **T**echnology/transport context, **O**rganisation and **P**erson[73]. It links into the circular proves of risk

assessment presented earlier. Those who would like to evaluate their risk fill out a questionnaire about their risk when travelling both for work and on the commute to and from work. This is done on the dedicated and data protected project website. The questions cover a number of issues related directly and indirectly to safety. Users are also asked about their choice of mode, their job and personal life. They will receive an individual response about their level of risk together with recommendations and tips on reducing their risk in transport.

The suggested measures are based on interventions validated by the German Social Accident Insurance and the German Road Safety Council. At present this includes an inventory of 400 measures. The measures are categorised depending on the target groups and effectiveness for individual risks. This database is being adapted and enlarged constantly. Also their data will be compared with other participants so that they can form a better picture about their own level of risk. Entire organisations can also be evaluated as a whole to create a general profile. Data protection is respected in both cases of a general organisational evaluation or a personalised one.

At a national level, Germany has also developed a database[74] that includes over 1,000 practical risk assessment aids to carry out risk assessment. These are either of a general nature or they may relate to certain sectors, workplaces and types of risk. The database can be searched for specific providers and sectors and types of hazard.

The German Road Safety Council offers a service to employers which aim to improve quality, efficiency and safety through external expert consultancy[75]. The concept aims to offer a holistic solution to operational problems. A DVR counsellor is invited in to the organisation to undertake a consultation on WRRS. A DVR counsellor will discuss the issues first together with management and they will look at ways to implement the concept. Employees are also involved, as they often know the weaknesses in the operational process best. The DVR counsellor will then submit to the employer their recommendations for improving the road safety of the organisation. External input has also been found to be helpful.

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71   http://www.oiraproject.eu/#mainContent#title
72   www.gurom.de
73   Gregersen N P, Brehmer B and Morén B. Road safety improvement in large companies. An experimental comparison of different measures. Accident Analysis & Prevention 1996; 28: 297–306
74   http://www.gefaehrdungsbeurteilung.de/en/handlungshilfen/datenbank
75   http://www.dvr.de/betriebe_bg/beratung/vs_arbeit.htm

Risk Assessment for SMEs in Spain

The Spanish National Institute for Occupational Health and Safety (INSHT) has prepared a guide[76] which sets out the most frequent and dangerous risk situations in public transport, in order to facilitate the assessment of risk in transport SMEs who transport passengers. The information contained in the guide enables the employer, in collaboration with employees, to assess risks in their company by themselves. External experts are only required for those risks where assessment requires particular specialist knowledge. The guide sets out the measures and procedures to be put into place to reduce risks and the cases in which it is necessary to provide specific training for workers. The guide also includes all the legal references relating to the prevention of individual risks. All the information is supplied in a clear and simple form that can be easily understood by anyone who, as often happens in small companies, does not have specific knowledge regarding safety.

Zurich Risk Engineering Assessment Example

One example of applying the risk approach to employees is cited in the Zurich Risk Engineering Guide[77] and is based on an outcome of an assessment showing that for an employee driving 60,000km per year, the risk reduction strategy would be, in this order:

1. Eliminate some of the exposure, which is generally a management initiative. As an example, sales territories could be reorganised.
2. Substitute some of the journeys for ones on public transport, which is also generally a management initiative. Air and train travel are both significantly safer than travelling by road.
3. Ensure you have robust policies on fatigue management, also a management initiative.
4. Raise awareness about fatigue issues and provide practical suggestions on how to manage this, also as a management intervention.
5. Provide guidance and training on effective route planning, to ensure journey times are minimised.
6. Provide guidance and training on effective schedule setting to ensure journeys are planned effectively.
7. Provide guidance and training on how to attain the correct seating position, as incorrect posture will lead to the early onset of fatigue.

Recommendations for Employers

• Undertake a risk assessment that applies to the road user, journey, vehicle and management systems in compliance with the European Framework Directive 89/391/EEC.

4.3 Monitoring and Evaluation

Monitoring allows for the identification of changes over time and is a critical part of the ongoing risk management process which involves measuring key performance indicators. Deciding what is required in terms of monitoring should be linked directly to the risk assessment process, its outcomes and the measures identified to manage risk. Monitoring and evaluation will help to identify how effective the road safety management programme is at managing and reducing risks and also help to develop future standards, objectives and targets. Monitoring is useful not only in identifying significant achievements but also in recognising when measures are not working or targets are not being met. This can also inform the business case for WRRS within an organisation, allow organisations to properly target resources, to prove that they are complying with legislation or standards, and contribute to motivating both management and other staff by highlighting positive outcomes. At a broader level monitoring can also provide an opportunity for benchmarking between organisations of similar size in the same sector.

'There are two key components of monitoring systems:

• Active monitoring, monitoring before things go wrong. It involves regular inspection and checking to ensure that your standards are being implemented and management controls are working. You will be able to answer the question - are you achieving the objectives and standards you set and are they effective?
• Reactive monitoring, monitoring after things go wrong. This involves learning from mistakes and incidents, whether they have resulted in injuries and property damage or near misses.' [78]

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76 http://www.insht.es/InshtWeb/Contenidos/Documentacion/TextosOnline/Guias_Acc_Preventiva/Ficheros/gap_020.pdf
77 Zurich Risk Engineering Managing Work Related Risks (2008).
78 Shaw, K., Global Road Safety Partnership (2009) Draft Fleet Safety Manual, Part 1.

Organisations should carry out both active and reactive monitoring and procedures should be identified to facilitate this. The table below suggests actions that should be carried out at the monitoring and evaluation stage.

	ACTIONS[79]
Monitoring & Evaluation	• Determine personnel responsible for monitoring and evaluation • Examine aims and objectives of all of the initiatives • Develop monitoring and evaluation structures for each of the initiatives • Analyse the amount safety culture has been integrated into the organisation • Provide reports on progress of the work-related road safety initiatives • Use outcomes from reports to inform business case

In order to monitor effectively, organisations should identify quantitative or/and qualitative indicators across the areas that influence the road safety performance of the organisation namely:

• Employees (Drivers, Managers)
• Journeys Vehicles
• Business / Operating Environment including Contractors (especially for road transport services)
• Incidents

The type of indicators will depend largely on the specific characteristics of the organisation, its resources and ability to collect and analyse data. Useful information and data sources that can be developing into indicators should already have been identified as part of the risk assessment process which would include gathering information on the current situation within the organisation. The table below suggests some basic indicators that could be used.

Suggested key performance indicators:

	Indicators
Employee	Number and types of driving violations Insurance claims per employee Complaints from members of the public Number of days absent due to illness Employee hours, shift pattern Health, eyesight and wellbeing checks Staff risk assessed
Journey	Mode of travel to work Mode, journey type and kms travelled High risk locations on regular routes
Vehicles	Number, type, characteristics of vehicles Number, type and severity of collisions Insurance claims per vehicle Fuel Consumption Number of maintenance checks per vehicle Vehicle faults identified Maintenance costs
Business/Operating Environment	Budget for (road) safety Staff resources for road safety Number of safety meetings/toolbox talks Number of compliance checks, audits and management reviews
Incidents	Number of near missed by kms travelled Number of incidents by kms travelled Incident location Cost of incidents Involvement of third parties Number of crash free days

79   http://www.devon.gov.uk/workrelateddriversfinal.pdf

Technological development, in terms of telematics and intelligent transport systems, are increasingly offering new avenues for data collection and monitoring in relation to driver behaviour and driver safety. There is also an element of driver self-improvement in some systems that provide immediate in-vehicle feedback for the driver following a high risk manoeuvre (such as cornering, accelerating, braking and speeding). Such advances are particularly relevant to the commercial road transport sector and can offer organisations support with driver behaviour-based reporting. With lone worker legislation on the rise and the onus put squarely on the employer to protect both their mobile employee and those they may come in contact with, it is imperative to be able to identify any potential risk. If telematics are utilised their introduction should involve staff consultation and their purpose should be clearly explained.[80]

Routine, systematic monitoring should be part of the day-to-day operation of the organisation. This should include compliance checks which are carried out on a regular basis 'to test how well safety rules and standards are being implemented and adhered to by staff'. These checks can also act as a helpful tool to reinforce rules, policies and standards amongst staff.

Compliance checks might include:

- Checking documentation including licences, driver training records, fitness to drive records, driving/working hours.
- Random checks on the road to check compliance with rules such as seatbelt wearing, mobile phone usage, speeding, tailgating.'[81]
- Checking that employees have actually read and understood all of the key policies/procedures/guidance in driver handbooks.

Compliance checks needs to be supplemented and reinforced by more extensive reviews (or audits) of the overall performance of the road safety management programme. The Draft ISO 39001 defines an audit as a 'systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled.'[82] A review or audit can be an internal or an external process. However, either way it should

be independent and objective and therefore not led by management or the person(s) responsible for the area being reviewed. Checks of this nature should be carried out at least once a year. A number of gap analysis online tools have been developed to assist with this process.[83]

In order for the monitoring, compliance checks and audits to be truly effective it is important that management fully consider the findings of such processes on a regular basis and ensure that resulting recommendations are implemented. Management should carry out a comprehensive review, at least annually, that should:

- 'Ensure compliance with standards.
- Assess suitability and effectiveness of standards.
- Ensure the adequacy of risk controls.
- Update inadequate procedures from new information, including an updated review of hazards and risks.
- Monitor achievement of targets and objectives.
- Investigate causes of incidents.
- Identify possible trends and issues.
- Identify improvements required.
- Reward improved performance and achievement of significant milestones.
- Discuss audit results.'[84]

The audit and review processes should be linked into the general operation of the organisation and to external influences. For example, changes in legislation in the health and safety area may require organisations to look again at their existing road safety management systems. Similarly, if major changes are envisaged on the business side, such as significant expansion of the fleet or decisions to subcontract work, there is likely to be a knock-on effect on risk that will need to be reassessed. 'As such, the review process must identify these changes and prompt re-alignment of the management systems to take account of the changes and maintain the focus on identified risks.'[85]

Recommendations to Employers

- Identify quantitative or/and qualitative indicators, based on the outcome of the risk assessment, covering drivers, journeys, vehicles, incidents and operational environment.

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80 PRAISE Thematic Reports 5 Minimising In-vehicle Distraction & 8 Driving for Work, Managing Speed. http://www.etsc.eu/PRAISE-publications.php
81 Shaw, K., Global Road Safety Partnership (2009) Draft Fleet Safety Manual.
82 Draft ISO 39001.
83   www.fleetsafetybenchmarking.net and http://www.roadsafetyatwork.ca/
84 Ibid
85 Zurich Risk Engineering (2008) 'Managing Work Related Road Risk'.

- Set up clear procedures and lines of responsibility for carrying out the monitoring/data collection in each of the areas identified.
- Build monitoring and evaluation into the day-to-day operations of the organisation
- Set up clear, standardised incident and collision reporting and investigation mechanisms.
- Utilise technology were possible by monitoring and reviewing important data such as tachograph records, telemetry data.
- Set up procedures for, and facilitate, systematic compliance checks on regular basis.
- Set up procedures and facilitate audits and management reviews.

Part 5 Work Related Road Safety (WRRS) Policy

A WRRS policy is a clearly written statement of intent setting out the organisations commitment in terms of WRRS encompassing the basic aims of reducing road risk, collisions and injury and upholding the law. The policy provides a framework for action, for the setting of objectives and targets and guides the implementation of the overall management programme.[86] The policy should clearly outline the roles and responsibilities of both employees and management including

signed and dated declarations to comply with it. A comprehension check should be carried out to ensure that the policy has been read and understood. In this regard it is crucial that the policy is led or strongly influenced by the head of the organisation.

Research suggests that, in terms of policy development, organisations 'have tended to adopt a 'one size fits all' approach. However, in order to focus on the particular issues of an organisation it is important to undertake a needs analysis to establish the issues within an organisation'[87] and gain an understanding of the current situation. This will allow organisations to tailor their policy to their own specific characteristics (including operations and activities), structure (management structure, relationship with external organisations), needs and main risks identifying through a risk assessment. Such an approach can foster a better understanding of the relevant work related road risks as well as helping to ensure that action and resources are appropriately and effectively targeted. The table below suggests actions that should be taken in the preparation of a WRRS policy in order to make sure that it is relevant, targeted and appropriate.

	ACTIONS[88]
POLICY	• Examine current work-related road safety policy in the organisation • Examine health and safety policy within the organisation • Research and determine relevant road safety policies from external influential bodies • Determine legal standards for work-related safety nationally and worldwide • Develop policy from research including processes to report and examine work-related road collisions

The policy should make it clear what is expected of each and every employee in terms of their road safety responsibilities. 'The organisation's safety policy needs to be written to influence all of its activities to improve fleet safety, including organisational design, selection of people and drivers, vehicles and equipment, and the way that driving work is carried out and managed to provide continuing high safety performance.'[89] The policy should include the organisations' aims and commitments in the three key areas of WRRS namely drivers, journeys and vehicles both at the level of the organisation and of the individual.

Based on the current baseline situation in the organisation and on the findings of a risk assessment, statements of intent or commitments can be formed under each of these three areas. Given that work-related road use is both a road safety and occupational safety issue it is important that WRRS policy is linked into broader health and safety policies of the organisation and to business policies. 'This should include human resources or employment policies such as contracts of employment, codes of conduct, drugs and alcohol policies, and health & safety requirements.'[90]

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86   Draft ISO 39001, Road Traffic Safety Management Systems with Guidance for Use.
87   http://www.devon.gov.uk/workrelateddriversfinal.pdf
88   Ibid
89   Shaw, K., Global Road Safety Partnership (2009) Draft Fleet Safety Manual.
90   Ibid

The Road Safety Authority and Health and Safety Authority in Ireland recommend that 'a good policy should include the following:

- Clearly state the main aims of the policy
- Show that management is committed
- Refer to relevant driving for work legislation
- Explain how you are managing driving for work and its three key elements – drivers, journeys and vehicles
- Give details of resources'[91]

Depending on the needs of each organisation specific policies can be developed in relation to the main risks, for example, if many employees use their own cars for work purposes (grey fleet) or if employees occasionally use a shared pool car for work purposes specific policies may be required to manage the risk in these areas.

'One important consideration is to what extent driving for work policy should cover employees driving employer-owned (or employer-leased) vehicles or their own vehicles whilst on business (grey fleet). Employee responsibility for their vehicle needs to be clearly outlined in the policy. Employers can have a huge influence in fostering improved road safety compliance for employees using their own vehicles for work purposes. Large employers can also influence policies in Small and Medium Enterprises (SMEs) when they subcontract out work further along the supply chain by insisting that subcontractors adopt the same conditions and standards in relation to driving for work.[92] Large employers should be encouraged to also share their good practice with smaller companies who may not have the facility of human resource management found in many larger companies.'[93]

Consultation and buy-in are critical in developing a successful WRRS policy. 'Employers should ensure that the policy is clearly articulated and broadly communicated so that employees are aware of the existence of the policies (for example by reading the policy out loud with the employee upon employment or getting the employee to sign a declaration or a 'pledge', rather than simply handing out a few pages for the employee to read). If a company is providing mobile phones,

at the very least employees should be required to sign and acknowledge that they have received, understood and will comply with the company policy.[94] Best practice is to ask employees to undertake comprehension checks – this compels them to read the material at least once, and increases the chance that they will follow the advice given – it also provides a very robust audit trail for the employer as not only can they prove that they have given these documents to the employee, but that they have also read and understood them. Policies should also be uniformly enforced'[95].

Rules and procedures should be put in place to ensure that the policy is implemented. These written rules should clearly show what is permitted at work and explain procedures in case of breaking the rules and presenting solutions in case of problems. Finally the policy should be evaluated, followed and adjusted according to suggestions and also experience. This is discussed further later in this report.

An example of WRRS Policy can be found in Appendix 2.

Recommendations to Employers

- Adopt a clear policy setting out the organisations commitment in terms of WRRS.
- Clearly outline the roles and responsibilities of both employees and management (all staff should be required to complete signed and dated declarations that they agree to comply).
- Communicate to staff the reasons why policies are in place: the risks posed to employees and others.
- Ensure sanctions are in place to deal with unsafe behaviour and rule contraventions commensurate with the nature and impact of the act. Also ensure reward and recognition is given to employees who comply with the rules and display safe behaviours.
- Ensure there is a mechanism in place to verify the policy such as a training session to ensure that employees, including management level, are aware and understand existing policies.
- Make sure senior managers take the lead by respecting the policy.

91   http://www.hsa.ie/eng/Vehicles_at_Work/Driving_for_Work/Driving_for_Work_CD_Rom/
92   PRAISE Thematic Report 5, Minimising In-vehicle Distraction. http://www.etsc.eu/PRAISE-publications.php
93   PRAISE Thematic Report 8 Driving for Work; Managing Speed. http://www.etsc.eu/PRAISE-publications.php
94   Noble, J. & Riswadkar, A.V. (2009), Cell Phone Liability for Employers. The John Liner Review, quarterly review of advanced risk management strategies 23 (1). PP 73-79.
95   PRAISE Thematic Report 5, Minimising In-vehicle Distraction. http://www.etsc.eu/PRAISE-publications.php

Part 6 Common risks and how to manage them

The main causes of road traffic collisions include speed, drink and drug driving and, especially whilst driving for work, higher levels of fatigue. Recent research also suggests that driver distraction is increasingly contributing to collisions on the roads. These are risks that typically need to be managed in the WRRS context. Furthermore, organisations may find that they are faced with other risks, beyond the scope of this list, resulting from the specific nature of their business or work practices. The extent to which measures to tackle these risks will need to be developed and implemented will depend on the specific characteristics of the organisation, the outcome of risk assessment and the commitments contained in the organisations WRRS policy. High risk areas and immediate risks should be addressed first before moving on to tackle lower and more remote risk; all risks should eventually be addressed in order to continually improve on overall WRRS. Measures can be implemented either at an organisational level, for example changing work practices by implementing new journey planning rules, or at the individual level, such as providing training for employees with regards to a new vehicle they will be expected to drive. In tackling common risk areas employers should consider employees, vehicles and environment in order to development effective measures.

The common purpose of all measures introduced is to achieve the organisations WRRS policy; at a minimum managing (eliminating or reducing) road risk to employees and others and upholding the law. Where possible, 'undertaking pilot studies at one site, or with one team of drivers, is a very useful exercise because it helps to evaluate the effectiveness of a program, make appropriate cost tradeoffs and develop the process for implementation of any wider program.'[96]

6.1 Speed

'Speeding can be defined as driving in excess of legally set speed limits and/or driving at speeds which are inappropriate to the prevailing conditions. Speeding is the main cause of road traffic collisions, deaths and serious injury. Loss of control of the driving task, and thus potentially of the vehicle, arises when the demands of the driving task exceed the available capability of the driver. As speed increases the task demand rises and the driver's capability is reduced. Employers have a clear responsibility to reduce incentives to speeding and to raise understanding of the serious consequences it can have.'[97] Drivers travelling for work are often under pressure to meet tight deadlines and this means that they are a group that are often likely to speed. A British study found that speeding amongst company car drivers was common for over half the sample, and excessive speeding was common for 13% of the sample. The most important reason was the desire to arrive at meetings on time, even if this meant breaking the speed limit combined with a reduced perception of excess speeding as an important collision risk factor and lower driving experience.[98]

Thematic report 8 offers employers an insight into tackling speeding amongst employees driving for work. The second part focuses on management issues covering topics from journey planning to payment schemes with advice on how such practices can help to manage speeding in the work context. The third part of the Thematic Report looks at what employers can do from risk assessment of potential speeders and identification of training - including also eco driving synergies - to the promotion of safer and more economic driving. It also looks at what can be done to rehabilitate speeding offenders. The final part looks specifically at different speed management technologies which can also be a useful additional tool in managing speed. A policy mix is needed to effectively tackle speeding and the report aims to present recommendations to reduce speeding across the board amongst those who are driving for work.

6.2 Alcohol and illegal and Medicinal Drugs

Employers have an important role to play in increasing the awareness of drivers about the risks of drunk driving and driving under the influence of both illegal and medicinal drugs. 'Employers and fleet operators should be strongly encouraged to set up their own initiatives. This should form part of a holistic approach in setting up a road safety programme. One helpful set of guidance is set out in the ILO's Code of Practice on Management of Alcohol and Drug-Related Issues in the Workplace.[99] This recommends that every employer should, in cooperation with employees and their representatives, develop in writing the organisation's policy on alcohol and drugs in the work place.

96 Murray, W., et al., (2003). Evaluating and improving fleet safety in Australia. Canberra: ATSB. www.infrastructure.gov.au/roads/safety/publications/2003/eval_fleetsafe.aspx
97 PRAISE Thematic Report 8 Driving for Work; Managing Speed. http://www.etsc.eu/PRAISE-publications.php
98 Adams-Guppy, J. and Guppy, A. (1995) Speeding in relation to perceptions of risk, utility and driving style by British company car drivers. Ergonomics, 38, 12, 2525-2535.
99 http://www.ilo.org/public/libdoc/ilo/1996/96B09_297_engl.pdf

Thematic report 3 focuses on Fitness to Drive in the work-related context looking at general Workplace Health Promotion (WHP) including dealing with alcohol, illegal drugs and medicines. Thematic Report 1 also discusses the potential of in-vehicle safety technologies for improving WRRS and includes a section on managing alcohol with the use of alcohol interlocks.

6.3 Fatigue

Another major risk factor affecting driving for work is fatigue. Research shows that driver fatigue is a significant factor in approximately 20% of commercial road transport crashes. Surveys show that over 50% of long haul drivers have fallen asleep at the wheel. Increased crash risk occurs at night (peak levels at night can be 10 times daytime levels), the longer the working day and with irregular hours. Those fatigue factors that have been shown to influence road safety need to be better controlled in regulation policy and risk management. The most important factor that will ensure safety is to effectively implement and enforce regulation.

Thematic Report 3 focuses on managing fatigue or sleepiness in the work-related context. Thematic Report 8 focuses more specifically on tackling fatigue amongst HGV drivers including an overview of EU legislation on driving and resting times in the context of road safety. The report also looks specifically at what employers can do to tackle fatigue. An employer's 'safety culture' which integrates fatigue policy across its supply chain can support compliance with existing EU legislation.

6.4 Distraction

'Distraction on the roads is a major source of concern. Driver distraction is thought to play a role in 20-30% of all road collisions.'[100] There is a long list of distractions that undermine the driver or the rider's ability to perform the driving task. Employers should identify and manage all distractions linked to driving for work and ensure that drivers reduce risks by, for example, not eating or drinking while driving; presetting music/radio and climate controls; securing any loose objects; pulling over to adjust equipment, check maps or attend to personal grooming; asking passengers to help with tasks (e.g. checking maps).[101]

Increasingly, distractions are becoming more technology focused as vehicles are becoming "moving offices". They are often environments in which employees are likely to receive or make phone calls, check text messages or even check their emails, not appreciating the enormous road risk that this type of behaviour poses while driving. Thematic Report 5 offers employers insight on how to minimise in-vehicle distractions associated with the use of electronic devices or so-called "nomadic devices" including mobile phones, smart phones, music players and portable navigation devices (PNDs). The report looks at the positive and negative impacts of such devices in the work-related road safety context and discusses measures to minimise risk in this regard including employer policies, communications and general business practices.

Recommendations to Employers

- Develop measures in direct response to the outcome of risk assessment.
- Address high risk areas and immediate risks first before moving on to tackle lower and more remote risk; all risks should eventually be addressed in order to continually improve on overall WRRS.
- Implement organisational level measures before implementing individual level measures.
- In tackling common risk areas consider employees, vehicles and environment in order to develop effective measures.

Part 7 Journey Management and Planning

The planning and management of journeys plays a central part in influencing work related road risk and preventative measures in this area should be developed as part of an organisations' road safety programme. Journeys should be optimised to minimise the need to travel. Journeys should also be shared or consolidated as far as possible and public transport should be used wherever practical and appropriate (i.e. attending business meetings).

At the organisational level managers and human resource staff within organisations should work to ensure that current employment contracts, shift patterns and work schedules do not contribute to driver sleepiness and stress. As a minimum work patterns and journey schedules must enable drivers to stay within the law.

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100   PRAISE Thematic Report 5, Minimising In-vehicle Distraction. http://www.etsc.eu/PRAISE-publications.php
101   Ibid

Journey planning software can be used to optimise journeys. Route planning of commuting could then identify and evaluate issues such as terrain and infrastructure. Traffic conditions (which can vary as regards time of day) should also be taken into account. Moreover, weather conditions and seasonality (such as light and darkness) are also issues to be considered when choosing the route.

All employees who drive for work whether they be 'grey fleet', company car drivers responsible for their own work schedule or professional drivers of HGVs with logistics managers, can utilise journey planning and ITS to help ensure that their speeds are appropriate. Ensuring 'that journey schedules, distances and plans allow sufficient time for drivers to complete their journeys (including delivery stops, rest breaks and foreseeable weather and traffic conditions) safely is critical. Those responsible for journey planning or scheduling including the transport operators have a responsibility to take all such factors into account. With better logistics planning employers should consider introducing buffer times in the supply chain: the drivers are thus relieved from time pressure and can concentrate more on safety and energy-saving issues.'[102]

Recommendations to Employers

- Ensure that employment contracts, shift patterns and work schedules do not contribute to putting employees under time-management pressures.
- Review scheduling, rostering and load route planning arrangements and proactively address driver stress in the context of a health and safety plan.
- Provide journey planning capabilities to facilitate realistic scheduling of trips and contribute to appropriate time management.
- In dealing with clients, avoid making any concessions that might adversely affect road safety, such as commitments to deliveries or completion of work packages that set unrealistic time constraints.
- Establish schedules, including those for sub-contracting chains, which allow drivers enough time to obey speed limits and avoid peak hours driving. These should be flexible and adaptable to changes such as the weather.

Part 8 Employee Management and Internal Communications

Employees or drivers are a key element of an organisation's road safety programme that should also focus on issues such as management culture, journeys, vehicles and safety of sites (see Haddon Matrix). Employee management can include any process or activity designed to ensure that WRRS policies and practices are being consistently followed. Organisations should develop procedures that allow them to effectively manage the risk faced by employees at both the organisational and individual level. Employees themselves also have a responsibility to behave in a way that minimises risk for themselves and others. Employees should be informed of and involved in all stages of the development and implementation of road safety management programmes for their organisation.

8.1 Communications and Involvement

Consulting with the workforce is a legal requirement where heath and safety is concerned.[103] Framework Directive 89/391/EEC expressly requires employers to consult workers and/or their representatives and allow them to take part in discussions on all questions relating to safety and health at work; proactive organisations consult their drivers from the outset.

In their Guide on Worker Representatives[104], the European Agency for Safety and Health at Work also suggest that it may be useful to designate a 'worker representative'. 'The role of the worker representative is to ensure that workers have an input into managerial decision making when preventive and protective measures are being developed, by reflecting their views, concerns and ideas. This role is distinct from employees such as supervisors whose job description includes tasks to help manage health and safety.' 'Depending on national legislation, consultation may be direct or through a worker representative'; however a combined approach that integrates health and safety into everyone's roles is the most effective approach.[105]

Using employee knowledge helps to ensure risks are correctly identified and assessed and that workable solutions are identified and implemented. A WRRS management programme

102 PRAISE Thematic Report 8 Driving for Work; Managing Speed. http://www.etsc.eu/PRAISE-publications.php
103 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31989L0391:EN:NOT
104 European Agency for Safety and Health at Work, (2012) 'Worker Participation in Occupational Safety and Health A PRACTICAL GUIDE'.
105 European Agency for Safety and Health at Work, (2012) 'Worker Participation in Occupational Safety and Health A PRACTICAL GUIDE'.

will require the development of a communication strategy to ensure that all relevant people, both externally and internally, are aware of it and what it requires of them and the organisation. More importantly, communications can help to ensure buy-in and contribute to changes in behaviour and attitudes. The diagram below illustrates various states in the 'communications' process – one which is ongoing. As with all aspects of the programme the extent and nature of the communications required should be tailored to the specific characteristics of the company (number of employees, work patterns, types of communications already used within the business) and their road risk.
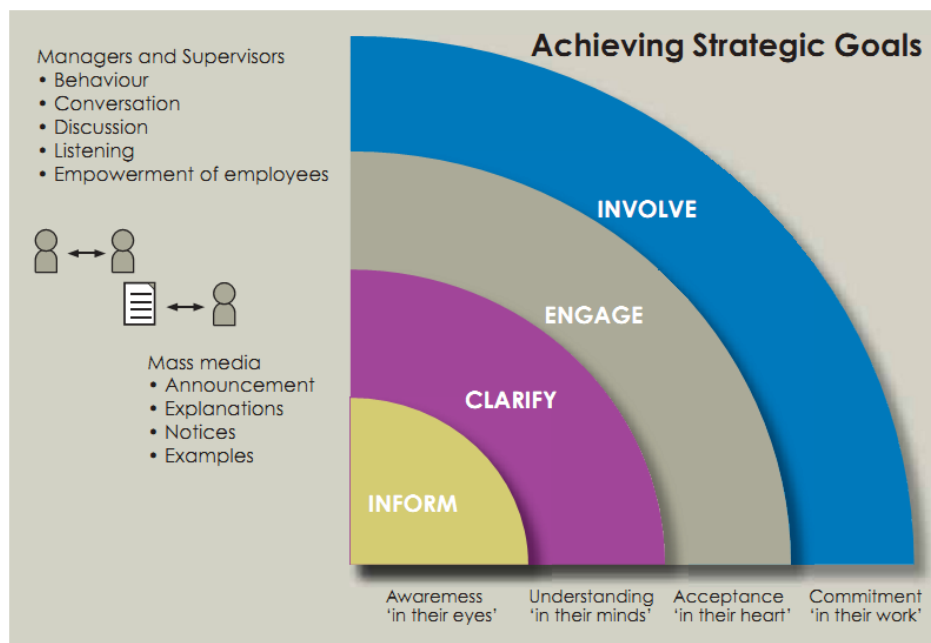
Source: K Shaw, Global Road Safety Partnership Draft Fleet Safety Manual

It is important that employees are involved from the outset and continuously in order that reducing work related road risk becomes inherent in their every approach to work. The communication methods used will depend on what is trying to be achieved and how embedded the concept of reducing road risk is within the organisation. In the initial stages simple awareness raising activities are likely to be required to make employees think about road risk and why it is an issue for them. Communication may simply take the form of emails from management that they intend to take action on WRRS. Later this should be develop into clarifying the exact nature of risks faced and engaging employees in developing solutions during which more interactive communications methods are likely to be more effective such as team discussions. The process is continuous and should 'drip-feed safety information to all employees who make work-related road journeys, in order to develop the on-road safety culture in business.'[106]

'There are many ways of engaging and communicating with staff using both direct and indirect channels of communication. Some examples are provided below:

- Direct communications:
  - Workshops for managers and implementation teams
  - Staff briefing sessions or 'toolbox' chats
  - Driver training
  - Staff induction courses
- Indirect communication:
  Placing fleet safety information in other documents or media:
  - Safety manuals
  - Driver handbooks
  - Driver passports
  - Organisational newsletters
  Placing fleet safety awareness information on:
  - Notice boards
  - Posters
  - Websites
  - Emails'

Safety should be a regular item on the agenda of not only management but also team meetings providing opportunities to discuss emerging issues or risks and offering a positive environment through which safety concerns can be raised.

106   Zurich Risk Engineering, Managing work-related road risks - A strategic must-have.

The outcomes should be fed back to operational managers and drivers through discussion. 'To really achieve acceptance and commitment managers and supervisors must be personally and deeply involved in the process. It will take time and effort to do, however, this is essential to realise the benefits.'[107] It is important that management lead at all stages in the communications process and that there are clear structures via which all levels of employees can have a voice. Employees also have a duty to communicate and cooperate with their employers in contributing to identifying and reducing risk. In order to facilitate this interaction, management should ensure that proper systems are in place which provides adequate opportunity for communications, proactive discussion surrounding risks and the reporting of incidents.

The European Agency for Safety and Health at work underlines ways in which employees can act to effectively utilise communication systems provided by their employers. The following are highlighted:

- 'asking questions, raising issues and making suggestions during meetings, team talks, training sessions, one-to-one talks with supervisors or managers;
- taking part in any consultation activities;
- being involved in trials, e.g. selection trials for personal protective equipment;
- volunteering to take part in occupational safety and health activities such as working groups;

- reporting accidents, near misses or anything else they think could be unsafe, unhealthy or obstructive, but also pointing out any ideas for improvements;
- speaking with their worker representative, if they have one, and participating in any activities they organise (meetings, surveys, etc.). Consider volunteering to be a worker representative;
- contributing to health and safety news in the company newsletter;
- applying the knowledge received in training to work tasks;
- setting a good example to new recruits and helping them on the health and safety aspects of their work.'[108]

Good Practice Case Studies

Vauxhall[109]

Improved driver awareness is seen as critical. For this reason, on-going communication to drivers is a key element of Vauxhall's strategy using as many methods as possible. Most communications are either sent in the name of, or endorsed by, the Managing Director. Guidance is regular, targeted and where possible to use real life examples, including serious or costly collision details being shared with other drivers to prevent re-occurrence. Some of the measures adopted are described in Figure 3, which summarises the Driver Handbook and other communications.

A detailed Driver Handbook and Safe Driving booklet which all drivers (business and private use) receive, covering:
- Safe Driving Policy and rules.
- Useful Contact numbers – insurance, roadside assistance, windscreen/tyre providers.
- Safety tips, driver fatigue and on mobile phone use.
- Service & repair guidance.
- Roadside assistance.
- Insurance policy information, including collision trends, excess rules, age restrictions etc.
- What to do in the event of a collision.
- Foreign travel rules.

Front cover of latest version of Safe Driver Handbook

Figure 3. Summary of Vauxhall driver communications and handbook

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107   Shaw, K., Global Road Safety Partnership (2009) Draft Fleet Safety Manual.
108   European Agency for Safety and Health at Work, (2012) 'Worker Participation in Occupational Safety and Health A PRACTICAL GUIDE'
109   Price, A., et al., Building work-related road safety into organisational DNA: Case study of Vauxhall. Draft paper, currently in review process for Journal of the Australasian College of Road Safety.

The Safe Driver Handbook is personally endorsed by the chairman of Vauxhall and goes to all employees. The latest version, published in the autumn of 2010, includes sections on the risks associated with fatigue, using a mobile phone whilst diving and speeding, along with information on how the fleet is performing and details on some of the activities that are taking place as part of the risk management program. This is supported by an integrated communications strategy including:

- Quarterly driver bulletin, with safety articles, repeat messages, trends and statistics.
- Email, web and paper-based reminders on key issues including mobile phone use, fatigue, defensive driving and the ergonomics of 'How to sit safely'.
- Safe Driving pamphlet to all drivers, online and hard copy, endorsed by the MD.
- Road safety awareness posters in fleet management centres.
- Comprehension checks of the handbook are also carried out and the pass mark set at 100% to ensure complete understanding.

Cummins[110]

To ensure the sustainability of their program, Cummins developed a very robust, technology-driven communication strategy. By using their internal website (MyCummins), a driver safety webpage, viewable by the global population, was created. The page includes relevant details such as: translated versions of the global policy, frequently asked questions, vehicle audit forms, links to the online training package, instructions on how to report vehicle incidents/claims, an archived collection of Cummins' monthly driver safety topics, as well as an avenue to deploy periodic communications from key Cummins leaders from within the organisation. In addition to the creation of the webpage, Cummins also developed and deployed monthly driver safety communications, via company email, to provide employees with general tips and strategies to enhance their driver safety knowledge, and ultimately their driving performance. These topics included: cell phone use while driving, eco (green) driving, seat belt safety, impaired driving, adverse weather driving, motorcycle safety, night driving, holiday driving, super bowl driving, road construction safety, and tips to avoid/prevent rear-end collisions.

British Telecom

This is an example of BT's annual communications calendar. Typically each safety message is approximately 400 words in length and is written to show the extent a particular problem, and to provide best practice tips.

Month	National Road Safety issues	Organisational level issues
January	Fatigue	Why fleet safety is important
February	Driving in snow	Program launch
March	Mobile phones	Reducing rear end collisions
April	Seatbelts	Slow speed manoeuvring
May	Drugs and driving	Vehicle checking
June	Summer driving	Safe parking / Hit whilst parked incidents
July	Young driver road safety	Incident reporting
August	Speed	Online interventions launch
September	Holiday driving / child restraints	Fire, theft and vandalism
October	Flexible	Family member safety
November	Winter driving Using	ABS brakes
December	Drink driving	Road safety and the Christmas party

Finland

Simo Salminen of the Finnish Institute of Occupational Health has described a promising group discussion intervention based on Group decision Theory. A social psychological discussion method was used with 172 electricians. This study was carried out in a company responsible for the building and maintenance of the electricity network in the Helsinki capital area of about one million inhabitants. All 172 electricians participated in the study. They drove company vans and lorries an average of 278 km per week.

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110   Adapted from PRAISE Awards Application 2011.

Each subject participated in three small group meetings of 7–14 drivers from the teams in which they normally worked. In the second intervention, 179 employees of another electric company participated in a 1-day course of anticipatory driving. In the first discussion round, the 19 teams reported 183 problems in work-related traffic. During the second round, the teams produced 594 suggestions to solve the problems. In the third round, the electricians made decisions on 53 commitments to change their driving behaviour. Evaluation data suggested that the number of occupational accidents increased by 15% during the eight-year follow-up period, while the number of traffic-related collisions decreased significantly by 72%.

8.2 Sanctioning or Incentivising Employees

It is also important that there are clearly defined enforcement and sanctioning measures within individual organisations for ensuring compliance with their WRRS polices and legal requirements in this area. However, it is important to note that whatever form sanctions take, they should only be considered once all possible organisational and management root causes for the inappropriate behaviour have been eliminated. As an example, someone who has more than one speeding offence may have been put under undue pressure to speed to meet the objectives set by their employer–this also raises the issue of who should determine whether it was the employee at fault for the incident(s), as it may actually be the manager who is investigating them that is the root cause of the problem.

The circumstances of individual's failure to comply with health and safety procedure or commitment of driving violations should form part of an individual employee's performance appraisal, leading, where appropriate, to new personal performance targets.[111] 'In the first instance, the approach should be positive and helpful, rather than punitive, although it should be made clear that repeat offending may lead to disciplinary procedures' which could include the loss of authority to drive.'[112]

'From psychological theories on learning and motivation it is known that rewarding good behaviour is at least as powerful as a behaviour modification tool as punishing bad behaviour. In road safety theories, rewarding has not received that much attention. However, research has indicated that it can indeed have a positive effect on traffic behaviour.'[113][114] While this may be difficult at the national level, at the organisational level such an approach is less problematic as new technologies such as telematics allow for driving to be continuously monitored. This gives employers the potential to incentivise employees in relation to their behaviour. Incentives could be in the form of vouchers or bonuses. It should however be highlighted that these programmes are difficult to implement in practice and there is not yet much evidence on their cost-effectiveness.'[115]

8.3 Recruitment and Fitness

When driving for work is required (whether it be as a professional driver or occasionally in order to complete the main role of the job) employers should consider this as part of the recruitment process. It is possible for employees to request a minimum amount of driving experience or/and specific experience with handling certain types of vehicle as part of job descriptions. During the application process it is also important to ask whether or not driving violations are held and, to check that employees are physically and mentally fit to carry out the job and to ensure that they understand their legal requirements in relation to driving for work.

'Driving is a demanding task and the risk of crash is high when individuals are not physically or mentally fit to drive. This is especially true when looking at work related driving, since conditions such as work related stress or sleepiness resulting from driving long hours come to play a role.'[116] In this regard, employers should ensure that all employees are mentally and physically fit to drive. 'A minimum 'fitness to drive' standard must be set, and procedures should be in place to ensure that these are met.'[117] Furthermore, drivers should be aware that it is their responsibility to refrain from driving if they recognise that they are impaired. Employees should also be expected to inform their employer if they are under medication or experiencing ill-health that could temporarily impair their driving. PRAISE Thematic Report 3

111   Adapted from RoSPA http://www.rospa.com/roadsafety/info/workspeed.pdf
112   Ibid
113   Hagenzieker (1999) in OECD (2006) Speed Management http://www.internationaltransportforum.org/Pub/pdf/06Speed.pdf
114   See also Grayson, G. B. and Helman, S. (2011). Work related road safety: a systematic review of the literature on the effectiveness of interventions. Research report 11.3. Institute of Occupational Safety and Health.
115   PRAISE Thematic Report 8 Driving for Work; Managing Speed. http://www.etsc.eu/PRAISE-publications.php
116   PRAISE Thematic Report 3 Fitness to Drive.
117   Shaw, K., Global Road Safety Partnership (2009) Draft Fleet Safety Manual.

looks in detail at this issue focusing on Workplace Health Promotion (WHP) and three areas that pose specific challenges: sleepiness, alcohol, and illegal drugs and medicines and covering existing legislation and initiatives that employers can utilise in this area.

For posts where a significant proportion of driving is required or driving of certain vehicle types it may also be advisable to check the competence and ability of the potential employee as part of the recruitment process. As with hiring a new employee for any type of post it is important to check references from previous employers; where appropriate the request for references should include commentary on previous driving history. The Health and Safety Authority UK suggest that the recruiters ask themselves the following when looking for new employees:

- What skills and knowledge does the person need?
- How will we assess their competence before they start work?
- What certificates and qualifications do they need for the vehicle they are operating?
- How will we check that these are valid and up-to-date?
- Will the person need additional training?
- What safety signs and signals do they need to know?
- Can they understand and follow instructions for safe working?[118]

For those with more time and resources, exploring peoples' perception of risks and their attitudes towards driving may assist in identifying and recruiting safer drivers. 'Research has highlighted the potential scope for recruitment of safer drivers based on personality profiles, risk perception, experience, age, and medical screening. Little evaluation, however, seems to be available of driver selection strategies.'[119] 'A number of driver selection strategies have been proposed to improve fleet safety. Their general focus has been on trying to identify potentially risky drivers on the basis of their previous driving record. It has been noted, however, that while this may identify a small number of highly risky drivers (e.g. disqualified drivers or repeat drink drivers), it may not be predictive of later crash involvement for the majority of drivers'[120] Despite this it is possible to include some simple questions surrounding perception.

When a new employee is hired it is critical that their induction process include all aspects of heath and safety (including WRRS), the organisations expectations and culture in general as well as elements relevant to their specific role.

This is likely to include that they understand the following:

- Legal requirements under health and safety and road safety legislation.
- Organisations health and safety and road safety policy including employer and employee responsibilities.
- The role of risk assessment and procedures for monitoring and evaluating risk.
- Procedures for reporting incidents.
- Implications of not complying.
- Other requirements specific to their role (including vehicle familiarisation checks and more in-depth training regarding use of specific vehicles or machinery).

8.4 Training

There is a requirement for compulsory training on safety and health issues (Article 12 of Framework Directive 89/391/EEC). A screening process should also be undertaken to determine which drivers need, apart from the compulsory safety and health training, to undergo specific and targeted training. This should be carried out during the induction process and also again during employment, as deemed appropriate through risk assessment and monitoring. Whatever type and level of training is chosen, it should always be based on a needs analysis. Undoubtedly driver training can be an important tool to reduce work-related road risk. However, much care should be given by employers in identifying whether driver training is a tool that suits their needs, and when it is the case which type of training they should opt for.[121] Carrying out continuous risk assessment provides the basis for identifying appropriate training requirements. 'It should also be borne in mind that driver training is of course intended as a mean to reduce collisions and casualties, but it also has other goals such as mediating more general responsibility, generating interest in safety issues, team-building, quality assurance.'[122] It is also important that the effectiveness of training is assessed. Thematic Report 2 discusses these issues in detail looking at risk assessment as a basis for training and how this can improve WRRS.

118   http://www.hse.gov.uk/workplacetransport/personnel/recruitment.htm
119   http://ec.europa.eu/transport/wcm/road_safety/erso/knowledge/Fixed/60_work/work_related_road_safety.pdf
120   http://ec.europa.eu/transport/wcm/road_safety/erso/knowledge/Fixed/60_work/work_related_road_safety.pdf
121   PRAISE Thematic Report 2 Fit for Road Safety From Risk Assessment to Training.
122   Ibid

Good Practice Case Studies

nkl Automotive[123]

nkl Automotive recognise that a comprehensive driver selection process is an essential part of assisting the company in minimising risk faced by their drivers. Before any potential nkl driver is employed, they undergo a stringent selection process which consists of three phases. Initially applicants complete a job application form that also includes a medical questionnaire. This is a comprehensive statement regarding the past and present health state of the applicant and includes a section on eye-sight. nkl require eye tests at least every two years. A driving history declaration including driving licence information and collision history is also required. Any applicant with an excess of six penalty points on their driving licence will be automatically rejected at this point[124]. All application forms are assessed by a senior operational manager who will have many years of experience and can accurately assess an applicant's suitability for this role. Those who successfully pass through this selection gate are sent a comprehensive job prospectus laying out fully all the roles and responsibilities of the position and are invited for a face to face interview. These structured interviews are always conducted by a senior member of staff. Both parts of the driving licence are required to be produced at interview for examination. Those who pass through are invited to an nkl driver induction day where the potential employees undergo specific assessment and job training. Finally, the new employees spend some time undergoing 'on the job' training with their Mentor. The Mentor is an experienced member of the driving force who does not 'sign-off' the new employee until they are satisfied with all aspects of their work including their road safety.

Recommendations to employers

- At the interview stage explore past collision or prosecution history and attitudes towards road safety.
- Undertake employee assessment on recruitment. This should also include checking documentation, licences, driver training records and fitness to drive records and assess driving competence and attitudes.
- Comply with the requirements of the Directive on Health and Safety at Work in ensuring that proper training is given linked to the needs of the employees including the use of transport vehicles.
- Subject drivers using their own vehicles to the same recruitment, induction and risk assessment and reduction procedures as company-car drivers.
- Integrate road safety relevant themes into the professional development of other staff such as schedulers, vehicle purchasers and of course management and leadership.

Part 9 Vehicle Management

Vehicles have a critical role to play in influencing road safety and choices in this regard offer both opportunities and risks for improving safety. As such, vehicles should be a central consideration in any organisations work-related road safety programme. Vehicle management processes and initiatives should be developed in the context of the outcomes of a risk assessment.

'Key aspects to be addressed under the heading of vehicle management include:

- Vehicle selection and specification
- Additional safety equipment
- Vehicle maintenance
- Vehicle checks
- Vehicle defects
- Use of privately owned vehicles'[125]

Vehicle management should address not only vehicles owned by the organisation, but also the grey fleet and contract vehicles. There are additional concerns that need to be considered here. Employers should (through internal policies and/or contracting arrangements) ensure that such vehicles are 'fit for the task': this means also that they should be fully insured, serviced and maintained to a high standard. This should also include ergonomic issues which will be determined by the tasks the employee has to do in relation to driving. Regardless of ownership, employers could also specify minimum standards of vehicle safety features, such as maximum age, if they are being driven for work-related purposes. The development of a policy (as part of or interlinked with an overarching WRRS policy) setting out the organisations' commitments and procedures in these areas would be beneficial.

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123   Adapted from PRAISE Award Application 2011.
124   In the UK Penalty Points are accrued and once twelve points are reached the driver is liable for disqualification.
125   GRSP Draft Manual, Part 2.

9.1 Selection and Procurement

Over 50% of new vehicles are initially purchased for commercial purposes. Purchasing safe vehicles is therefore an excellent way for employers to provide a safe working place for their employees. At a basic level, those responsible for procuring vehicles in an organisation need to communicate closely with the employees who will be utilising the vehicles to ensure that they will be fit for purpose and appropriate for the required job. There is also a need to link fleet safety and vehicle procurement with broader business management, planning and operations. Proposed changes to a business may have an impact on the suitability and therefore safety of the existing fleet.

The draft ISO international standard 39001 for road traffic safety management discusses how organisations can influence road safety through vehicle selection highlighting four areas where this has an impact namely, the protection of occupants in crashes, the capability to avoid or mitigate crashes, the protection level given by the vehicle for unprotected road users, and the vehicle's compatibility with other vehicles.[126] These issues should be considered at the procurement stage in the context of the nature of the business and the type of vehicle required. The findings of the risk assessment should inform this process and will assist organisations in identifying the vehicle type and specifications most appropriate for them.

'Generally the safety aspects of vehicles are legislated and most new vehicles deliver safety beyond legislation. This leaves considerable room for organisations to make informed decisions about the level of safety they seek in the vehicles which they use. To assist in these decisions, consumer programs test and publish safety ratings for many vehicle types and models, which influence vehicle design and equipment.'[127]

Employers should be aware of the various types of vehicle technologies on the market that can assist risk management and should include the most appropriate of these as standard requirements when purchasing or leasing vehicles. 'It's important to specify and then select vehicles that are suitable and safe for employees and the type of trips they are expected to undertake, and consider body style, ergonomics, equipment and visibility to ensure the selected vehicle is fit for its purpose.[128] In 2009 the European New Car Assessment Programme (EuroNCAP) introduced a new element in its star ranking called "Safety Assist". Euro NCAP rewards manufacturers for the fitment of a speed limitation device, as well as electronic stability control, and intelligent seat belt reminders. Employers should specify minimum standards of vehicle safety features and EuroNCAP star rating. Vehicle safety features can reduce the incidence and severity of crashes and the vehicle supply industry developed many technology-based interventions for fleet operators to consider in vehicle specification and procurement decisions. PRAISE Thematic Report 1 presents how in-vehicle safety equipment can improve and manage WRRS and discusses the various types of equipment or measures that can help to address risks such as speeding, drink driving and failure to wear a seatbelt. In terms of safety technologies available, passive measures are those that protect individuals automatically without any action on their part, including vehicle design changes. Active measures require individuals to actively participate in their own protection[129]. The table below lists a range of technologies or measures that can be considered by employers in the context of the roads risks that they are faced with. Many of these measures are discussed in more details in PRAISE Thematic Report 1.

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126 ISO International Standard DRAFT ISO 39001, (2012) Road traffic safety (RTS) management systems – Requirements with guidance for use.
127 Ibid
128 GRSP Draft Manual, Part 2.
129 Murray, W., Pratt, S., Hingston, J. & Dubens, E. (2009). Promoting Global Initiatives for Occupational Road Safety: Review of Occupational Road Safety Worldwide (Draft). www.cdc.gov/niosh/programs/twu/global

Passive (protect drivers automatically)		Active (involves driver participation)
Proactive/ Primary actions to avoid crashes	Speed limiter/intelligent speed adaption Electronic Stability Control (ESP) Wired in daytime running lights Visible colour Alcohol ignition interlock Self checking/inflating tyres Stronger/safer seats Mobile phones confiscated Automatic ventilation control Automatic reversing brakes EDR vehicle monitoring	Cruise control Antilock braking systems (ABS) Daytime running lights High mounted rear centre brake lights Alcohol policy and testing Tyre check policy Ergonomic seat adjustment Mobile phone use banned Air conditioning Reversing warning devices & cameras Driver near hit reporting
Reactive/ Secondary/ At-scene	Airbag including side/head protectors Seatbelt interlock/reminder Crashworthy vehicle (NCAP rating) Heavier vehicle Anti whiplash protection Crush zones and safety cages Fire resistant vehicle interiors Cargo barrier/load restraint Side and frontal impact protection EDR including crash recorders, forward/cab facing cameras and accelerometers	Front and rear seatbelts Seatbelt wearing Strong, easy to open doors Seat and head restraint positioning Correct head restraint use Child restraints Fire safety equipment

9.2 Vehicle and Driver

'Organisations should have very clear requirements for who can use what vehicle on what roads and reinforce the importance of compliance with these requirements.'[130] This should be linked to driver risk assessment with vehicle use induction or specific training as required. 'Employers should ensure that the performance characteristics of vehicles are matched to the competence level of their drivers and try to offer a choice including smaller-engine vehicles.[131] It is important that employees fully understand the purpose and benefits of any safety equipment installed in vehicles as well as knowing how to use it properly. Again, a proper induction programme supplemented with ongoing information sessions and training can assist in this regard. Methods for successfully communicating with drivers are discussed in more detail in Part 8 of this report. 'Safe usage is not only dependent on the vehicle and driver characteristics, but also on vehicle management systems that can offer added support to the driver, for example, to monitor and log the use of a vehicle.'[132] In this regard, monitoring of vehicle use and condition is critical.

9.3 Inspection and Maintenance

Organisations should ensure that processes are put in place for regular inspection and maintenance of all vehicles used for work purposes as it is their responsibility to ensure roadworthiness at all times. At a minimum, maintenance regimes recommended by vehicle manufacturers need to be adhered to and more regular checks by drivers should also be required.

Guidance from the Health and Safety Executive in the UK suggests that the following questions need to be answered by organisations in assessing whether or not their vehicles are maintained in a safe and fit condition:

- 'Do you have adequate maintenance arrangements in place?
- How do you ensure maintenance and repairs are carried out to an acceptable standard?
- Is planned/preventative maintenance carried out in accordance with manufacturers' recommendations?
- Do your drivers know how to carry out basic safety checks?

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130 ISO International Standard DRAFT ISO 39001, (2012) Road traffic safety (RTS) management systems – Requirements with guidance for use.
131 http://www.rospa.com/roadsafety/info/workspeed.pdf
132 ISO International Standard DRAFT ISO 39001, (2012) Road traffic safety (RTS) management systems – Requirements with guidance for use.

- How do you ensure that vehicles do not exceed maximum load weight?
- Can goods and equipment which are to be carried in a vehicle be properly secured, eg loose tools and sample products can distract the driver's attention if allowed to move around freely?
- Are windscreen wipers inspected regularly and replaced as necessary?' [133]

Maintenance should also be regularly assessed to ensure it is of an appropriate high standard and to ensure approved replacement parts are used on vehicles, particularly for safety-critical elements such as brakes and tyres.[134]

Part of the vehicle maintenance procedures should include carrying out vehicle checks as part of the daily driving routine. It is important to fully clarify what the organisation regards as fundamental defects under which a vehicle should not be used. In deciding if a vehicle is fit for use a range of factors should be considered including its suitability for the job, its condition, ergonomic factors, required safety equipment.[135] The Road Safety Authority and Health and Safety Authority in Ireland have devised a sample 'Daily Work-related Road Vehicle Checklist'[136] as a simple tool to assist drivers in this regard.

The European Agency for Safety and Health at Work have also produced a useful summary Factsheet on this topic that suggests using the word 'POWER' as a way of helping drivers to remember necessary basic checks that are required. This stands for Petrol, Oil, Windows, Electrics, and Rubber.[137]

Good Practice Example

Swedish Transport Administration[138]

In Sweden the Swedish Transport Administration, a government body, are leading the way in terms of improving vehicle safety by passing a law[139] that has set high vehicle requirement standards for government fleets. Recommended minimum traffic safety requirements have been developed, not only for government owned vehicles but also for lease vehicles, short-term rental vehicles and private vehicles used for work purposes. A Swedish law, passed in 2009, requires all government bodies to buy or rent only 5-star Euro NCAP cars for occupant protection ("government specification" as is the case for environment standards).

- Cars rented for less than 6 months need to be equipped by the following safety requirements:
  - **Crashworthiness** that is awarded 5 stars by Euro NCAP
  - **Seat Belt Reminder** (SBR) at front seats that meets Euro NCAP requirements (2 points)
  - **Whiplash protection** that meets Euro NCAP requirements (2 points)
  - **Pedestrian protection** that meets Euro NCAP requirements (14 points)
  - **Head support** and **three points seat belt** on all seats used
  - **Electronic Stability Control** (ESC) system
- Additional requirements for cars rented for more than 6 months. Cars need to be equipped with:
  - **Alcohol ignition interlock**
  - **Intelligent Speed Assistance** (ISA) system
- Minimum requirements for usage of the grey fleet. For regular use of your own car in work the following requirements needs to be fulfilled:
  - Be **registered** later than or at 1 January 2001
  - Be within the **weight** interval 900 kg to 1900 kg
  - Be equipped with **Occupant** protection: Euro NCAP 4 stars if tested before 2009, 23.5 points in occupant protection if tested 2009 or later (front, side and pole collision protection)
  - Be equipped with **Seat Belt Reminder** (SBR) at front seats that meets Euro NCAP requirements (2 points)
  - Be equipped with **Head support** and **three points seat belt** on all seats used
  - Be equipped with **Electronic Stability Control** (ESC) system

In Sweden it is recognised that the highest Euro NCAP standards should be aimed for and this is a moving target with room for continual technological improvements.

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133 http://www.hse.gov.uk/pubns/indg382.pdf
134 GRSP Draft Manual, Part 2.
135 http://www.rsa.ie/PageFiles/2895/drivingforwork.pdf RSA/HSA Ireland
136 pdf Version (size 6.2 MB) http://www.hsa.ie/eng/Vehicles_at_Work/Driving_for_Work/Driving_for_Work_CD_Rom/Daily_Work_Related_Road_Vehicle_Checklist.pdf Word Version (size 17.0 KB) http://www.hsa.ie/eng/Vehicles_at_Work/Driving_for_Work/Driving_for_Work_CD_Rom/Daily_Work_Related_Vehicle_Checklist_Word_Version_.docx
137 http://osha.europa.eu/en/publications/e-facts/e-fact-56-maintenance-and-work-related-road-safety
138 Anders Lie, The Swedish National Road Administration, Traffic Safety Division, presentation 2010.
139 Government Decree (2009:1) Environmental and Road Safety.

Recommendations to Employers

- Develop policies and procedures for the management of vehicles
- Include safety criteria when purchasing vehicles, including 5 star EuroNCAP cars and vehicles using in-vehicle safety technologies.
- Communicate vehicle safety technologies purpose (i.e.: "This is for your own good and we value you and are concerned for your wellbeing!") to employees and train them to use equipment properly.
- Work closely with suppliers, equipment manufacturers, insurers and customers to develop appropriate safety solutions.

Appendix 1

A list of possible costs:[140]

Vehicle costs	Recoverable/insured
Recovery and storage	Yes/no
Repair of vehicle	Yes/no
Vehicle downtime and replacement vehicle	Yes/no
New vehicle if written off	Yes/no
Reduced resale value	Yes/no
Leased vehicle life costs if written off	Yes/no
Increased insurance excess and premiums	Yes/no
Driver costs	**Recoverable/insured**
Loss of expertise	Yes/no
Personal injury compensation	Yes/no
Lost productivity due to injury absence	Yes/no
Replacement driver - overtime, temporary driver	Yes/no
Medical and welfare	Yes/no
Counselling	Yes/no
Reassessment and training	Yes/no
Third party costs	**Recoverable/insured**
Vehicle damage	Yes/no
Vehicle downtime and loss of earnings	Yes/no
Property damage	Yes/no
Personal injury compensation and rehabilitation	Yes/no
Hospital fees	Yes/no
Inconvenience	Yes/no
Disbursements including expert witnesses, police reports, post-mortem if fatality and GP notes or reports	Yes/no
Legal, court issue setting down and specialist report fees	Yes/no
Fines	Yes/no
Other costs	**Recoverable/insured**
Redelivery	Yes/no
Missed/late delivery penalties	Yes/no
Customer service/good will/missed sales	Yes/no
Damaged/lost stock	Yes/no
Own property damage	Yes/no
Investigation time	Yes/no
Management and administration time	Yes/no
Image/reputation/PR	Yes/no
Increased congestion	Yes/no
Extra tax to cover road safety improvements	Yes/no

140   Murray, W (2011) Sustaining Work-Related Road Safety in Hard Times: understanding collision costs.

Appendix 2

Example A

XXX Fleet Safety Policy

XXX recognises that there are risks to the health, safety and welfare of all employees who are required to drive on Company business. The company recognises its responsibility to provide, so far as practicable, for the health, safety and welfare of all employees and others that may be affected by our activities.

Our aim is to further the knowledge, develop the attitude and influence the driving behaviour of all employees in order to eliminate vehicle incidents from our business. We will measure our achievement of this policy through quarterly reviews of our key performance indicators.

In order to ensure the health and safety of vehicle fleet drivers, this policy sets out Company objectives and driver responsibilities. These objectives and responsibilities are in addition to those set out in the Company's General Policy Statement.

The Company objectives are to:

- Continuously improve fleet safety management practices.
- Monitor to ensure that employees or agents (agency drivers) who drive on Company business are legally entitled to drive with a current valid licence for the relevant class of vehicle.
- Assess the risks relating to the use of Company vehicles.
- Operate vehicles in a safe efficient manner and to strive for continual improvement in occupational road safety performance by minimising risk to those affected.
- Implement consistent practices with regard to fleet safety: consult with employees, and update policies and practices accordingly.
- Annually review the safety of both the commercial and car fleets through analysing data such as maintenance and incident records.
- Provide a vehicle handbook and/or advice about road safety to anyone who uses a vehicle on Company business.
- Monitor to ensure that the Company vehicle fleet is mechanically safe, and vehicle defects reported by employees are rectified promptly.
- Assess driving abilities, and provide driver training for employees who fall below the required standard, or as otherwise required.
- Ensure as far as is reasonably practicable that all drivers are fit to drive.
- Provide training for employees on how to carry out vehicle checks, and ensure that these checks are carried out.

Employees have a duty to co-operate in the operation of this policy by:

- Adhering to Company policies, advice and guidelines relating to road safety, and abiding by the provisions of the Rules of the Road.
- Carrying out vehicle checks as specified by the Company and vehicle manufacturer's instructions.
- Allowing adequate time for journeys, including time for breaks on long journeys.
- Reporting all accidents or damage to a vehicle immediately to your manager
- Ensuring they are fit to drive before undertaking a journey.
- Reporting vehicle defects or safety concerns immediately to management and not using the vehicle until the defect is rectified.
- Showing consideration for the safety of passengers and other road users, including drivers, cyclists and pedestrians.

Example B

Example Fleet Safety Policy Statement

In [Name of Organisation], we are committed to:

- Safeguarding people
- Protecting our movable and immovable property
- Managing fleet safety as any other critical business activity

We will strive to achieve this through:
- Compliance with the law related to road safety
- Continuous improvement in our road Safety performance
- A systematic approach to road safety management by establishing minimum standards and processes for –
  - Driver Management
  - Vehicle Management
  - Journey Management
- Training, education and motivation of all our employees to follow safe work practices
- Conducting planned inspections and audits on a regular basis to identify and eliminate sub-standard working conditions and practices
- Reporting and conducting thorough investigations of all road incidents
- Reporting and learning from near misses and potential incidents
- Communicating this policy to all employees, customers and other relevant stakeholders

To be signed and dated by: Executive Director / Secretary General

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ETSC

European Transport Safety Council

Preventing Road Accidents and Injuries for the Safety of Employees

How can In-vehicle Safety Equipment improve road safety at work?

ETSC
European Transport Safety Council

PRAISE
Work-Related Road Safety

PRAISE
Work-Related Road Safety

PRAISE is a project co-funded by the European Commission and implemented by ETSC on Preventing Road Accidents and Injuries for the Safety of Employees (PRAISE). The project aims to advance work-related Road Safety Management and provide the know-how to employers who have to take on that challenge. It also aims to present the work-related road safety standards of EU Member States and carry out advocacy work at the EU level: work-related road safety is an area of road safety policy that clearly needs renewed political commitment.

How can In-vehicle Safety Equipment improve road safety at work?
Contents

ETSC
European Transport Safety Council

Road Safety in the work context: identifying the problem and introducing in-vehicle technology

The scope of the problem varies from one organisation to another, the starting point for any employer should therefore always be to *undertake a risk assessment and draw up a road safety action plan, based on priorities identified in the assessment* and as part of occupational health responsibilities (a European Directive[1] requires every employer in Europe to undertake a risk assessment). This action plan can include in-vehicle safety features and equipment as part of the solution as judged appropriate. The preferred safety equipment to be fitted in vehicles should be identified according to the particular risks. To do that you need to know both the nature and size of the risks:

• *The nature of the risks*: all risk factors that lead to collisions should be listed. *Excessive speed, drink driving and not wearing seat belts are the traffic offences that research suggests most often contribute to traffic injuries and deaths.* However, you should also consider more specific risk factors related to the organisation. Organisations supplying and operating fleet vehicles most often find that they face particular risks related to their type of vehicles: for example large goods vehicles rollover at lower speeds than other motorised vehicles because of their height, and most large vehicles have visibility problems when reversing and blind spot problems. Finally, do not forget that drivers are human beings with limited abilities and skills, and biological constraints. Fatigue for example is a very common risk factor in road business, and one that is too often overlooked by organisations asking their people to travel for work purposes.

• *The size of the risks*: for each type of collision caused by those factors you should know the related amount of asset damage, number of injuries and deaths, and quantify the resulting costs, including material damages, to the organisation. Depending on the size and capacity of the organisation you will have different means to gather such data. The different ways of assessing the size of the risk range from simply asking employees how often particular incidents occur, to analysing collision/incident records or even fitting vehicles with event data recorders and analysing the resulting information. As a general rule, *what gets measured gets improved!* For organisations running fleet vehicles, an easy source of data on vehicle damage can be their insurance, insurance broker, accident management supplier, and or vehicle leasing company.

Once the employer has identified the nature and size of the risk faced, they will be able to assess their priorities and make the relevant cost tradeoffs and business case. Fitting safety equipment or purchasing vehicles fitted with particular safety features and equipment is can be an effective way of reducing the risks, however you should always explain the reason for it to employees (a good safety culture should always be shared with all employees instead of seen only as something imposed by the management), but also very importantly: *train employees on how to use that equipment properly.* Fitting vehicles with particular safety equipment is just one part of a greater sequence of actions; it is never the only thing that you have to do.

The Business Case:

Duty of care, health and safety compliance are legal necessities in most EU Member States, and is an essential consideration for employers. Employers should also make sure that their employees are able to comply with the law for example making sure there are seat belts on all seats. But equally important, it most often makes sound business sense to draw up and implement a road safety action plan. For businesses there is a clear link between safety, quality, customer service, efficiency and the environment. Road safety has a massive impact on society, and for this reason can play a major role in improving – or damaging an organisation's corporate social responsibility (CSR). This can be reflected in different ways:

• Reduced running costs through better driving standards (fuel consumption/vehicle maintenance costs);
• Fewer working days lost due to injury;
• Reduced risk of work-related ill health;
• Reduced stress and improved morale / job satisfaction;
• Less need for investigation and paperwork;
• Less lost time due to work rescheduling;
• Fewer vehicles off the road for repair;
• Fewer missed orders and business opportunities, reduced risk of losing the goodwill of customers;
• Less chance of key employees being banned from driving;

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1   Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1989:183:0001:0008:EN:PDF

Employers have to identify which safety feature gives what benefit. Each safety feature needs a detailed investment-based business case, linked to the risks they have identified.

Collisions most often have financial implications on a business that stretch well beyond reported costs. This can be illustrated by the following model of a collision's costs[2]:

Item of cost	Sample data
Own damage costs	£1,000 (€1,145)
Third party vehicle damage costs	£1,000 (€ 1,145)
Third party injury costs (eg Whiplash)	£1,000 (€ 1,145)
Reported cost of collision	£3,000 (€ 3,432)
Total cost of collision (including hidden costs at 2 times reported costs)	£6,000 (€ 6,865)
Revenue required to fund a single collision at 10% return on Sales	£60,000 (€ 68,649)
Widget sales (at 50p) required to fund fleet safety costs	£120,000 (€ 137,299)

For this one incident a conservative decision to multiply by 2 the £ 3,000 figure to identify hidden costs was taken. To cover a £3,000 collision cost, £ 60,000 of revenue would be required, equating to sales of 120,000 units of this hypothetical company's product. The company therefore needs to ask itself: "is it easier to sell 120,000 units of our product or be more proactive in preventing this collision?". In the current economic climate, such models are needed to justify up-front investments in safety programs. They can also be used to project long-term costs and potential returns on investment from adopting a proactive Fleet Safety Policy.

Finally, a proactive road risk program can also keep organisations ahead of and protected from regulations and legal requirements and gain a competitive advantage compared to more 'reactive' competitors.

In-Vehicle Technologies: Description and Life-saving potential and examples of use

This section will present the most important in-vehicle technologies and give examples of their use. The different technologies should be linked to tackling problems[3]. The below table gives an overview of possible interventions.

Vehicle related interventions in the Prevention Model[4]

Vehicle safety features can reduce the incidence and severity of crashes and the vehicle supply industry developed many technology-based interventions for fleet operators to consider in vehicle specification and purchase decisions. Note that in the Prevention Model passive measures are those that protect individuals automatically without any action on their part, including vehicle design changes. Active measures require individuals to actively participate in their own protection. This definition differs from the commonly used definition of active and passive safety, with active safety referring to intervention before collisions, and passive safety referring to interventions after collision (for that definition see ERSO[5])

2   © and Intellectual Property Dr Will Murray, Interactive Driving Systems, all rights reserved, 2009
3   For a ranking of the life saving potential of vehicle safety technologies see: Cost-benefit assessment and prioritisation of vehicle safety technologies (EC 2005) http://ec.europa.eu/transport/roadsafety_library/publications/vehicle_safety_technologies_final_report.pdf
eImpact: (2008), Socio-economic Impact Assessment of Stand-alone and Co-operative Intelligent Vehicle Safety Systems (IVSS) in Europe http://www.eimpact.info/download/eIMPACT_D6_V2.0.pdf
TRACE: Review of Crash Effectiveness of Intelligent Transport Systems http://www.trace-project.org/
4   Murray, W., Pratt, S., Hingston, J. & Dubens, E. (2009). Promoting Global Initiatives for Occupational Road Safety: Review of Occupational Road Safety Worldwide (Draft), www.cdc.gov/niosh/programs/twu/global
5   Crash Avoidance and Crash Protection definitions: http://erso.swov.nl/knowledge/content/50_vehicle/crash_avoidance_and_crash_protection.htm

Passive (protect drivers automatically)		Active (involves driver participation)
Proactive/ Primary actions to avoid crashes	Speed limiter/intelligent speed adaption Electronic Stability Control (ESP) Wired in daytime running lights Visible colour Alcohol ignition interlock Self checking/inflating tyres Stronger/safer seats Mobile phones confiscated Automatic ventilation control Automatic reversing brakes EDR vehicle monitoring	Cruise control Antilock braking systems (ABS) Daytime running lights High mounted rear centre brake lights Alcohol policy and testing Tyre check policy Ergonomic seat adjustment Mobile phone use banned Air conditioning Reversing warning devices & cameras Driver near hit reporting
Reactive/ Secondary/ At-scene	Airbag including side/head protectors Seatbelt interlock/reminder Crashworthy vehicle (NCAP rating) Heavier vehicle Anti whiplash protection Crush zones and safety cages Fire resistant vehicle interiors Cargo barrier/load restraint Side and frontal impact protection EDR including crash recorders, forward/cab facing cameras and accelerometers	Quality front and rear seatbelts Seatbelt wearing Strong, easy to open doors Seat and head restraint positioning Correct head restraint use Child restraints Fire safety equipment

Seat Belts and Reminders

Seat belts are a highly effective way of reducing deaths and injuries with lasting effects to car occupants. Yet, despite the legal obligation to wear a seat belt, seat belts are still not always present in all seats and in all vehicles. Moreover, wearing rates still vary greatly across Europe especially between front and rear seats, different user groups and between urban and rural areas. Although much can be achieved through raising awareness seat belt reminders can be an efficient way to increase seat belt use.

Seat belt reminders detect occupants and their seat belt use in all seating positions, and then create a series of alarms to alert the car occupant if he or she is not belted. There are different types of seat belt reminders – some issue only visual warnings while others issue both visual and auditory warnings. The potential to save lives is most effective when using seat belt reminders that disable ignition. But even audible seat belt reminders have a large life saving potential. Only a few car models are to date fitted with seat belt reminders for the rear seat. Compared with front-seat systems, rear seat systems appear more costly because their installation is more complex.

ETSC has undertaken a cost-benefit analysis for the mandatory introduction of audible seat belt reminders for front seats[6]. It was based on the assumption that roughly 50% of fatally injured front seat car occupants killed in the EU did not wear seat belts and that audible seat belt reminders for the front seat could increase seat belt wearing among front seat occupants to 97%. After twelve years of introduction, the costs would amount to about 11 million Euro while the benefit would be 66 million Euros. The cost-benefit ratio would be 1:6. The situation of SBR in the EU has improves since 2005, when some 56% of cars were equipped with a SBR for the driver's seat; in 2008, it was 70%. However, big differences persist between particular types of vehicles. Whereas 97% of the Executive Cars sold in 2008 were equipped with a SBR for the driver seat, only 83% of the Multi Purpose Vehicles (MPVs) and 68% of the Superminis were fitted[7].

6   ETSC (2003) Cost Effective Transport Safety Measures http://etsc.eu/documents/costeff.pdf
7   ETSC (2009) PIN Annual Report http://www.etsc.eu/documents/ETSC%20PIN%20Annual%20Report%202009.pdf

Examples of compliance with Seat Belt use

A campaign called "Did it click?" ran by the German Road Safety Council and the Statutory Accident Insurance in the Vehicle Operating Trades (BGF) together with other partners including the automotive industry, the haulage sector, print media ran over 6 years. It led to increases of seat belt wearing rates from 10% to up to 50% in non-urban areas according to Police and DEKRA traffic observation reports[8]. The campaign is made up of personal communication with truck drivers at their rest places on the roadside of the highways explaining them the usefulness of wearing seat belts based on results from accident research. A roll-over simulator gives them hands on experience, a film gives additional information, especially on the compulsory use of seat belts for truck drivers. A leaflet and a sticker with the campaign logo are handed out to the drivers. Information about the place of further demonstrations are given also on a campaign Website www.hatsgeklickt.de

Instead of seat belt reminders Scania trucks and Aral introduced a different non technical solution by fitting coloured seat belts this was coupled with random checks by the employer.

Speed and Speed Management Technologies

There is a well documented relationship between speed and collisions resulting in death and injury with lasting effect. The adaptation of driving speed to the prevailing conditions and speed limits is a primary way of controlling the crash risk of the driver. Different systems exist, ranging from informative to intervening systems. *Intelligent Speed Adaptation (ISA)* is an Intelligent Transport System (ITS) which warns the driver about speeding, discourages the driver from speeding or prevents the driver from exceeding the speed limit[9]. Information regarding the speed limit for a given location is usually identified from an onboard digital map in the vehicle. Other systems use speed sign reading and recognition either using already built into the vehicle or aftermarket navigators.

There are two major types of systems – informative and supportive. An informative system gives the driver feedback in the form of a visual or an audio signal. A supportive system works in the form of increasing the upward pressure on the pedal or cancelling a driver's throttle demand if it demands more throttle than is required to drive at the speed limit.

A Swedish large-scale study of the effect of informative and supportive ISA, involving nearly 4,500 vehicles, shows that if everyone had informative ISA fitted, injury accidents could be reduced by 20% in urban areas[10]. Supportive systems have even greater potential to reduce fatal and serious accidents[11]. Estimates by Carsten show that a mandatory supportive ISA scheme could lead to a reduction of 36% in road traffic (injury) accidents and 59% in fatal accidents. There would also be benefits in terms of lower fuel consumption (up to 8%) and more effective road traffic enforcement.

Examples of Speed Management Technology Use

Examples of the implementation of ISA come mostly from Sweden. ISA systems have been installed in about 4,000 of the Swedish Road Administration (SRA) cars. A number of city municipalities have equipped their vehicles with informative ISA. The local buses in Lund for example are today equipped with an ISA system with auditory warning for the driver if he/she exceeds the speed limit. In Sweden ISA is also already used by several companies and between 50 and 60 local authorities, such as Stockholm and Västerås, on the basis of an informative system.

Some examples of companies are:
- Transport companies: SITA, Panaxia, Alltransport
- Taxi companies: Gävle taxi, TaxiBil Syd
- Rental car companies: Hertz
- Elevator supplier and service: Kone

Speed limiters have also been used by some companies. These limit the speed and are not as flexible as ISA. In the UK Royal Mail and Centrica have fitted speed limiters (limited to 70mph) on all vehicles including vans and put stickers on the back of all their vehicles to inform other road users of their self imposed speed limit.

8   Hat's Geklickt Campaign (German) http://www.dvr.de/site.aspx?url=html/presse/informationen/887.htm
9   Regan M., Young K. (2002) Intelligent Speed Adaptation: A Review
Note also that this definition is very similar to the one given for "speed alert" the term used in the ITS Action Plan: "The system alerts the driver with audio, visual and/or haptic feedback when the speed exceeds the local legal speed limit. The speed limit information is either received from transponders in speed limit signs or from a digital road map, requiring reliable positioning information." http://ec.europa.eu/information_society/activities/intelligentcar/technologies/tech_18/index_en.htm
10   Biding, T. and Lind, G. (2002) Intelligent Speed Adaptation (ISA), Results of large-scale trials in Borlänge, Lidköping, Lund and Umeå during the period 1999–2000, Swedish National Road Administration, Publication 2002:89 E URL: http://www.isa.vv.se/novo/fi lelib/pdf/isarapportengfi nal.pdf (2004-11-04)
11   Carsten O. et al (2008) ISA-UK intelligent speed adaptation Final Report http://www.righttoride.co.uk/virtuallibrary/warningcontrolsystems/isareportjune2008.pdf

Adaptive Cruise Control (ACC) System

Adaptive cruise control (ACC) enhances classical cruise control and automatically maintains a following distance to the preceding vehicle[12]. The distance to the preceding vehicle is measured by radar either with laser radar or millimetre wave radar. When the vehicle ahead is driving more slowly than the adjusted speed the ACC system will control the vehicle speed and follow the lead vehicle at a safe distance. Once the road ahead is clear again, the ACC will accelerate the vehicle back to the previous set cruising speed. Some employers are being encouraged to purchase vehicles with ACC (see example under the Statutory Accident Insurance in the Vehicle Operating Trades (BGF)/BGL/KRAVAG Initiative).

Example of ACC Use

The Pöppel Company is a big Southern-Germany-based transport enterprise which transports dangerous goods, especially liquids. The company has 550 employees and a fleet of 200 heavy goods vehicles. The company focuses very much on improving its efforts for occupational safety and health. About 95 % of the vehicles are equipped with Adaptive Cruise Control Systems to avoid collisions. In the course of the campaign concerning the Driver Assisting Systems the company has obtained a subsidy from the BGF for 10 vehicles (see the BGF Initiative).

Alcohol and Alcohol Interlocks

Driving whilst under the influence of alcohol contributes annually to at least 10,000 deaths on EU roads. In the EU as a whole around 1% of journeys are associated with an illegal Blood Alcohol Limit (BAC)[13]. If the number of alcohol impaired drivers dropped to zero, some 6,800 lives would be saved, representing 16% of road deaths in 2007. Driving under the influence is less common in commercial transport compared to individual transport. Yet, alcohol related road crashes in commercial transport tend to result in more serious outcomes due to the vehicle crash incompatibility caused by increased size and mass of commercial vehicles. Besides, the number of people injured in such a crash may be high in case of vehicles operated by public transport companies[14].

Alcohol interlocks are devices that require the driver to take a breath test before starting the car. If the driver fails the test, the device locks the ignition of the car. Commercial use of alcohol interlocks is the voluntary introduction either by public sector authorities or private commercial vehicle operators for a variety of reasons but mainly as a corporate responsibility towards road safety and limiting risk[15]. The gradual introduction of alcohol interlocks starting with target groups (commercial drivers and repeat drink driving offenders) could reduce the high toll of drink driving casualties every year in the EU. Crucially in the commercial context alcohol interlocks must not be seen as a stand-alone issue but should be introduced as an integral part of an employer's drink driving policy. Indeed some employers have a zero tolerance to alcohol policy which is also specified in employee contracts. Alcohol interlocks can also be a good preventative tool for deterring drink driving for drivers still affected by alcohol the morning after drinking has taken place.

Examples of Alcohol Interlocks use

The most well-known is the Swedish programme[16] introduced late 1999 and aimed at increasing the quality assurance in commercial transport. The implementation started with a small-scale demonstration project in partnership with a bus, taxi and truck company and was funded by the Swedish National Road Administration Vägverket[17]. One hundred vehicles of each company were alcolock-equipped. To minimise discomfort to the drivers and the risk of economic loss to the fleet owners, all alcohol interlocks were programmed for 30 minutes stall protection, allowing to restart the vehicle motor without providing a breath test. Moreover, the alcohol interlocks had a function that allowed the ignition to be on without the motor being running (for heating purposes, among other things), as well as a reset function for driver changes within the aforementioned 30-minute grace period[18]. Various facilities and regular control make fraud very difficult[19]. Finally, the commercial alcohol interlocks did not have a running retest function. A first evaluation of attitudes among drivers, employers, customers and passengers showed that the alcolock was widely accepted as the best alternative to reduce drink

12   Liang, C-Y. et al (1999) Optimal Adaptive cruise control with Guaranteed String Stability, Vehicle System Dynamics, 31, (1999) pp.313–330
13   ERSO (Road Safety Observatory) (2006a): Alcohol. Retrieved January 20 2008, www.erso.eu.
14   ETSC, (2009) Alcohol in Commercial Transport Brussels
     http://etsc.eu/documents/DrinkDriving%20in%20CommercialTransport%20ETSC.pdf
15   ibid
16   Alcohol Interlock Implementation in the European Union http://ec.europa.eu/transport/roadsafety_library/publications/alcolock_d3.pdf
17   ibid
18   ibid
19   Beirness, D.J. (2001). *Best practices for alcohol interlock programs.* Traffic Injury Research Foundation of Canada TIRF, Ottawa

driving[20]. However, it was also reported that there was a lot of mistrust in the beginning regarding the alcohol interlocks due to technical problems with the devices and mistakes with regard to the servicing infrastructure[21]. The problems need to be overcome as a matter of priority for the application to be effective.

In Belgium a taxi firm started a small alcolock trial in April 2008 supported by the alcolock supplier ACS Belgium. This is within the context of the development of new legislation. N Taxi is based in Mechelen and has a zero tolerance policy towards alcohol and drugs. All taxi drivers have to sign the house rules and commit to this policy on alcohol and drugs. Alongside fitting in with their zero tolerance policy the firm had a problem with a driver who lost his job due to an alcohol problem. Preventing a repeat of this was a further motivation for them to take up alcohol interlocks. If a drink driving offence is detected by the alcolock the company director talks to the driver and gives them a warning. There has been a 20% increase in the company´s business since the introduction of alcohol interlocks. The biggest customers of N Taxi have supported the project and have commissioned more work for the small taxi firm. The taxi firm owners will extend the trial by keeping the current locks in the cars and introducing more alcohol interlocks to other taxis[22].

Electronic Stability Control

ESC acts on the braking or power systems of a vehicle to assist the driver in maintaining control of the vehicle in a critical situation (caused, for example, by poor road conditions or excessive speed during cornering). ESC will also become mandatory under the new vehicle safety regulation. As well as saving casualties, the widespread use of ESC in vehicles could significantly reduce the traffic congestion caused by accidents involving large vehicles. Large differences in fitment rates within the EU member states make it even more important to have this legislation. In Sweden 96% of all new sold cars were fitted with ESC, while in many other EU countries the fitment rate may be below 30%[23]. A further variation of ESC is also on the market which adapts the capability to the load by calculating the vehicle's centre of gravity and

its weight. This is particularly relevant for vans. Finally, it is also important to note that studies suggest that the impact of ESC varies with vehicle types. In New Zealand and Australia for example Sculy and Newstead[24] have suggested that ESC is more effective at preventing single vehicle crashes for 4WDs than for passenger cars, given their greater risk of being involved in rollover crashes.

Examples of ESC use

Napp Pharmaceuticals[25], a Cambridge-based company, is one of the first UK fleets to answer calls for companies to take a lead in ensuring the life-saving anti-skid technology is a 'must have' feature. Following the launch of a Europe-wide 'Choose ESC!' campaign, which is designed to speed-up the take-up of the technology by fleets and private motorists, Napp Pharmaceuticals has taken its pioneering stance. The company operates an open choice 340-strong userchooser company car fleet with Audi, BMW and Volkswagen models making up the majority of vehicles. The company, has updated its driver electronic car ordering system to make it impossible for company car drivers - sales representatives visiting pharmacists, hospitals and doctors' surgeries and headquarters' staff - to select a new vehicle that does not have ESC fitted.

Event Data Recorders

Functionalities

Event or Accident Data Recording systems (EDRs/ADRs) are commonly known for their 'black box' type of use and were designed for aircraft or trains. They provide information regarding the circumstances surrounding a crash. A typical example for the use of EDRs is for the authentication of an incident for insurance claims or for the rejection of insurance claims (e.g.: drivers involved in a crash because of allegedly inappropriate speed). EDRs can be used for accident investigation as well as for driver monitoring. But EDRs are typically not designed for recording driving data as a tachograph because the recording is linked to a defined event trigger threshold. This could typically be a collision impact or a harsh driving manoeuvre. This depends on the functionalities required by the customer.

20   Ibid, Lönegren, B. (2003). *How to achieve drug-free driving?* In: Safe and sustainable transport: a matter of quality assurance. OECD, Paris: p. 101-103.
21   ibid
22   ETSC Drink Driving Monitor 2008 http://etsc.eu/documents/DDMon6.pdf
23   ETSC, (2008). Vehicle Safety Regulation Position. Brussels
http://etsc.eu/documents/ETSC_Position_-_Proposal_for_a_Regulation_on_type_approval.pdf
24   Sculy et al (2008) Follow Up Effectiveness of ESC in Australasia http://www.ors.wa.gov.au/Documents/safervehicles-report-effectivenessofesc.aspx
25   http://www.napp.co.uk/Pages/default.aspx http://www.roadsafe.com/magazine/2007summer/fleet_chief_leads.html

One comprehensive evaluation of the EDR impact on road safety, not limited to professional vehicle use, concludes that under a scenario where the technology would be implemented on a wide scale, there would be an average reduction of collision probability of 10% for deaths as well as for serious and light injuries (European Commission 2005) [26]. Benefits are estimated to outweigh costs by a factor of 7. For all the values used in the sensitivity analyses, benefits exceed costs. Thus EDRs/ADRs figure as number 2 in that evaluation among the most cost effective road safety technologies[27]. The VERONICA projects[28] (2006 and 2009) propose the mandatory implementation of a standardised set of data elements with a defined functionality capable to record most collisions with harmful consequences.

Some stakeholders in Europe propose a solution to determine whether drivers display aggressive driving styles. This works through the use of in-car devices such as sensors and GPS systems that monitor the acceleration, speed, and movement of vehicles. Through these, the system analyses different types of manoeuvres and identifies for each manoeuvre performed during a trip whether it has been performed correctly or too aggressively (changing lanes abruptly, accelerating suddenly and so on). On the basis of this the system can identify risky manoeuvres, and empower drivers to manage their own safety by giving instantaneous in-vehicle feedback.

The information from the EDR can also be used as a management tool for driver training or to change the times of driving to avoid risky periods or routes. When using EDRs data protection concerns must be considered at an early stage and proper explanation of the appropriate use of data given to staff. It needs to be borne in mind that recorded incidents may go up at the start because collisions that were not reported previously start to get reported.
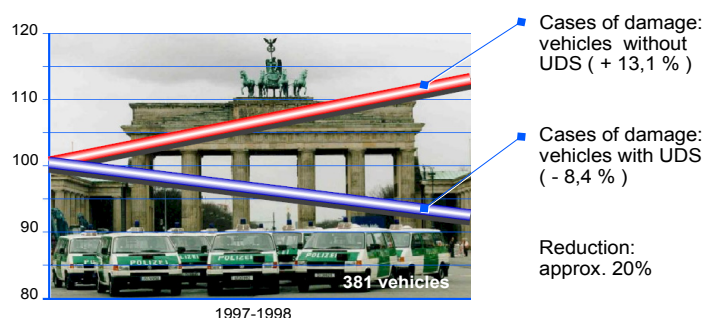
Examples of EDR use

Event or Accident Data Recorders have been introduced in a number of professionally used vehicle fleets throughout Europe since the mid-nineties. Some of these fleets published their experiences which reveal an approximate 25% reduction in collisions and/or costs. However not all companies -fleet operators as well as insurance companies- want to reveal data as their technology gives them a comparative advantage over their competitors.

A well documented field test was also that of the Berlin Police conducted in 1997/98[29]. Equipping all 380 radio patrol vehicles led to a 20% drop in accidents and a 36% drop in accidents involving emergency trips. According to the accompanying investigations by an external expert, damage costs were reduced by approximately 20%. It became clear that these positive effects are owed to a change of driving behaviour by those drivers who in the times before EDR implementation did not care sufficiently about the vehicles entrusted to them. It became also clear how important human leadership is in connection with the use of EDRs. Only if the staff and/or its representative body is involved early on and an awareness of the joint responsibility for the operational success can be achieved, which is ultimately in the interest of both, employers and employees, distrust and tensions can be avoided. However, positive impacts tend to fade out if monitoring and management efforts are not strictly maintained on a high level. A thorough analysis of the recorded damage events should be accompanied by appropriate restrictive measures. Negligence and effects of getting used to the system might otherwise discredit the potential enshrined in the implementation of EDR. In other words a framework of institutional rules with incentives and disincentives is recommended.

Benefits

Example: Berlin police savings

Cases of damage: vehicles without UDS (+ 13,1 %)

Cases of damage: vehicles with UDS (- 8,4 %)

Reduction: approx. 20%

1997-1998

Damage reduction in EDR equipped Berlin Police fleet

26 *Cost-benefit assessment and prioritisation of vehicle safety technologies* in particular 142 seq. (144) and p. 8)http://ec.europa.eu/transport/road-safety_library/publications/vehicle_safety_technologies_final_report.pdf (2005)
27 Another study based on available practical experiences concludes that a reduction in the number of accidents by 20% would generate a reduction of 26,1% of lightly injured, of 36,9% of seriously injured and of 50,4% of killed road users (Bach 2000)
28 The VERONICA Projects http://www.veronica-project.net/
29 Rau (1998) The use of UDS by the Berlin Police], final report pilot phase III, Ing. Büro Berlin

Another example involves the Rotterdam-Rijnmond police, which achieved a drop in damage costs of 25.1 % with 100 EDR units between 1999 and 2000. This led to the police insurers refunding 45,000 € in premiums for 2000 and reducing premiums by 90,000 € for 2001. The investment in EDR had paid for itself within a year.

"About fleet", a Swiss magazine focusing on company vehicles and fleet management, reports in its 2/2009 edition (p. 43) about "polyrose", a swiss company specialised in the delivery of medical and pharmaceutical products. The experiences made by PolyRose with its 100 vehicles, 20% equipped with a EDRs capable of recording also risky driving maneuvers revealed that the drivers with the largest number of accidents also had a record of bad driving performance which included high ratios of driving curves on the limit and of emergency braking. Consequences were a process of direct dialogues with the drivers to raise their awareness, a drive training programme, consultation of ophthalmologists and subsequently a sustainable reduction of the damage frequency and the number of damage claims. Similar experiences were made with Securitas and PostLogistics.

Following Distance Warning

The distance warning system warns both visually and with a sound that the driver is too close to a vehicle. The warning depends on how long the distance is between the vehicle and the vehicle ahead[30]. The level of warning will switch from "safe" to "critical" as distance decreases. Systems with auditory warnings have been proven to be effective warning mechanisms. Driver inattention, or failure to pay adequate attention to the driving task, is the single most common cause of front-to-rear end collision crashes. The following distance warning system was installed in trucks in the US and has the potential to reduce the rear impact by 57%.

Example of Following Distance Warning Use

Drivers who took part in a training scheme in Germany including the use of different Driver Assistance systems reported that they appreciated the Following Distance Warning as one of the most helpful technologies. The Statutory Accident Insurance in the Vehicle Operating Trades (BGF) offers all companies training in which drivers are first informed about the systems, can try them and can also exchange experience of having used them. So far 400 drivers have taken part[31].

Reverse Collision Warning

Insurance claims data from many companies and research undertaken at the University of Huddersfield suggests that between a quarter to a third of all reported freight transport collision accidents arise from vehicles reversing. A proactive approach to reversing safety – and applying a
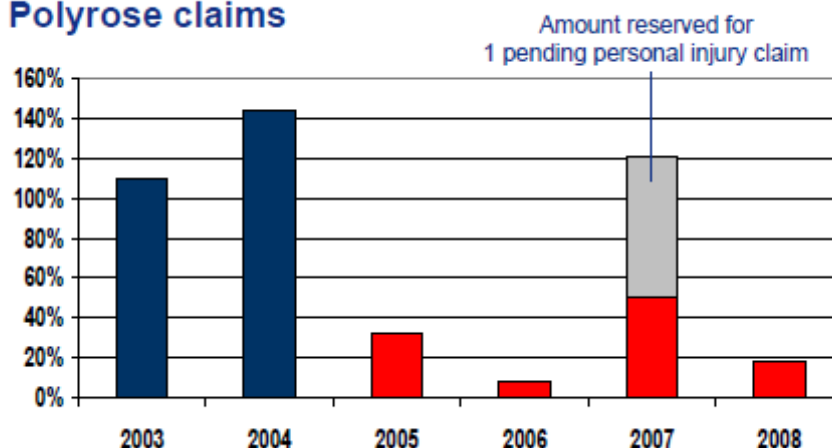
Claims reduction in a Swiss EDR equipped fleet; source: AXA-Winterthur Accident Research

30   Regan M., Young K. (2002) Intelligent Speed Adaptation: A Review
31   Driver Assistance Systems (German) http://www.fahrer-assistenz-systeme.de/2008/index.php?id=57

range of appropriate management (e.g. analysis and review), site (e.g. risk assessment), driver (e.g. assessment and training) and vehicle-based (eg reversing cameras and alarms) interventions are needed. A reversing audit should be undertaken including the use of reverse collision warning systems[32].

The Reverse Collision Warning System warns the driver if they are likely to collide with an object behind the vehicle. Sensors in the rear bumper reveal the vehicle. The rate of warning becomes more rapid if the distance between the vehicle's rear and the object decreases. Studies made in driving simulators indicate that the reverse collision warning system could help the driver to react more quickly[33]. Rear-end collision avoidance system with early and late warning was compared with no-warning condition. The early warning system reduced the number of collisions by 81 % and the late warning system reduced collisions by 50 %.

Example of Reverse Collision Warning Use

The Hamburg-based UPS branch has equipped until the year 2000 a large number of vehicles with the Reverse Collision Warning System. During a one-year-period the efficiency and the user acceptance have been measured by UPS: 345 questionnaires have been handed out to the drivers and evaluated after the test period. This field test in the end has lead to a lot of positive results: 29 % of the drivers estimated the system as indispensable, 69 % of the employees judged it very useful. The UPS branch in Hamburg could realise the remarkable reduction of the accident number by 26 % and the reduction of repair costs by 52 %.

Emergency Braking

Emergency Braking is already present in some vehicles. This will be extended to all large vehicles in 2013. The aim of Emergency Braking is to avoid fully automatically or to mitigate longitudinal crashes (braking only). The system reacts if a vehicle approaches another leading vehicle. The system reacts in three steps:

1) Optical and acoustic warning, if the approaching could lead to an accident.
2) Autonomous partial braking, if the distance is

reduced further.
3) Autonomous full braking, if an accident appears inevitable. Input is the distance and the relative speed to a leading vehicle.

The system reduces impact speed in case of immediate danger, which increases passive safety and reduces accident consequences.

- Reduced risk of injuries / collision mitigation through decreased impact velocity
- Reduction of braking distance through immediate braking action and adapted, improved brake assist function
- Support for collision avoidance and collision mitigation

This has an estimated fatality reduction of 7% on the EU25 scale with full penetration, and one of the highest benefit-cost ratios there is for driver support systems[34]. The eSafety Forum included it as one of the priority systems in 2008.

Route planning

Travel behaviour can be affected by ITS applications that mainly provide the traveller with a better basis for decisions in terms of traffic and travel information. In the field of ITS, travel planners have been developed on-line. The typical solution is based on the internet giving the answer of how to get from A to B taking various requirements into account. This can also be complimented by help of in vehicle satellite navigation systems. This may give information on time of arrival, time of departure, travel time, travel cost and be of relevance to route planning at work. Technologies to help with journey planning can also direct drivers along the most efficient routes. They can be linked to technologies used out of the vehicle to do with scheduling of shifts and link to managing fatigue. Some satnavs and journey planners already take into account school times to direct drivers away from schools during peak times.

An EU funded project called "HeavyRoute"[35] has developed tools, systems and collected data to link Europe's road infrastructure via electronic mapping systems to the truck operators and drivers. It is hoped this will contribute to the overall road safety and congestion both giving route information before the trip commences and on-trip.

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32   Murray W Reducing Risks: improving the reversing safety of commercial vehicles. Public Service Review: Freight, Issue 9, 2005/6, www.publicservice.co.uk

33   Lee, JD., McGehee, DV., Brown, TL., Reyes, ML. (2002) Collision warning timing, driver distraction, and driver response to imminent rear-end collisions in a high-fidelity driving simulator. Human Factors 44 (2): 314-334 Sum 2002

34   eIMPACT Project Results http://www.eimpact.eu/download/eIMPACT_D6_V2.0.pdf

35   Heavy Route Project Co-ordinated by FEHRL http://heavyroute.fehrl.org/

Lane Departure Warning and Lane Keeping Support

The lane-keeping warning is an electronic warning system that is activated if the vehicle is about to veer off the lane or the road. This device can be effective in managing fatigued drivers, those under the influence of alcohol and also those distracted by eating, smoking or using their mobile phones. Lane changing represents 4 to 10% of all crashes. Studies show that the Lane Departure Warning could reduce the number of impact by 37%[36]. Times to collision during dangerous lane changes are normally much less than one second[37]. A new feature called "Lane Keeping Support" is also coming on the market which not only gives the warning but also steers the vehicle back.

Fatigue and Drowsiness Detectors

Research shows that driver fatigue is a significant factor in approximately 20% of commercial road transport crashes[38]. Fatigue affects drivers when they start to become tired as they can't concentrate properly on driving and can't respond as quickly and safely as they should.

Research has also been undertaken to track the drowsiness of drivers and advise them to take a break if alertness starts to fade. One of the technolgies includes tracking the pupil. Tests have been carried out by Volvo Trucks in Sweden in 2008 involving 68 drivers. Mercedes has developed a system which is already on offer in E-Class cars called 'Attention Assist' which observes driver behaviour such as speed, lateral and longitudinal acceleration and steering wheel movement. If the system detects typical indicators of drowsiness the driver will be alerted by an audible signal and flashing message to take a break.

Of course, the bottom line here is always that the most effective countermeasure for fatigue is sleep. Fatigue detectors will only therefore be effective in so much as they are used to ensure drivers take some sleep.

Example of the Promotion of use of ACC, ESC and Lane Departure Warning

In Germany the Institution for Statutory Accident Insurance in the Vehicle Operating Trades (Berufsgenossenschaft für Fahrzeughaltungen BGF) has set up a scheme with a €2,000,000 budget available to transport sector enterprises to invest in their heavy goods vehicles with driver assisting systems. An employer can apply for €2,000 per vehicle as an investment aid if the new truck is equipped with the following three driver assisting systems:

ACC: Adaptive Cruise Control
LDW: Lane Departure Warning
ESC: Electronic Stability Control

The BGF plans to assess the effectiveness of these measures up to the year 2010 by comparing accident data for 1,000 vehicles that are equipped with the systems, with data for another 1,000 vehicles without the assisting systems. Driver training concerning the advantages and risks associated with the systems is also part of this campaign. The campaign is a joint venture of various partners (BGL, KRAVAG) car manufacturers, (IVECO, MAN, Mercedes Benz) with different levels of engagement. The campaign was launched on 23rd May 2008 under the patronage of Mr. Günter Verheugen, Commissioner for Enterprise and Industry[39].

Existing EU Level Initiatives

At present there are a number of EU initiatives including legislation and information campaigns that will promote the use of in vehicle technologies although none specify prioritising them within the work related road safety context.

36   Olsson T., Truedsson N., Kullgren A., Logan, D., Tomasevic, N., Fildes, B. (2002) Safe Car II – New Vehicle Extra Safety Features, Monash University Accident Research Center
37   ETSC (2005) In-Car Enforcement Technologies Today. Brussels, Belgium
http://etsc.eu/documents/ETS_brochure_4.pdf
38   ETSC (2001) The Role of Driver Fatigue in Commercial Road Transport Crashes. Brussels, Belgium
http://etsc.eu/documents/drivfatigue.pdf
39   EU-OSHA (2011) Case Studies Report Study of Protection of Road Haulage Workers, Bilbaohttp://osha.europa.eu/en/publications/reports/managing-risks-drivers_TEWE11002ENN

"Type Approval requirements for the general safety of motor vehicles" (COM 2008/316)

The new regulation on the "Type Approval requirements for the general safety of motor vehicles" (COM 2008/316) advances the deployment of a number of in-vehicle technologies. ESC for new car series and commercial vehicles will be phased in from 2012, with all new cars being equipped by 2014. Advance Emergency Braking Systems will be in all large vehicles from 2013. Lane Departure Warning systems will also be introduced to all large vehicles by 2013. The Regulation also foresees the compliance with the provision of visual and audible seat belt reminders for the driver's seat by the 1st of November 2012. This could particularly help raise the seat belt wearing rates amongst HGV drivers.

Directive laying down the framework for the deployment of Intelligent Transport Systems in the Field of Road Transport and for interfaces with other transport modes (COM 2008 887) and ITS Action Plan COM 2008 886

The EU ITS action plan suggests a set of concrete objectives and a Directive laying down the framework for the implementation of ITS stressing that they can contribute to making transport safer, more efficient and competitive, more sustainable and more secure. The EU ITS Action Plan also includes a number of proposed measures specifically related to in-vehicle technologies (ESC, ACC, lateral support, emergency braking, eCall, Speed Alert and alcohol interlocks) for safety. Under Area 1 of the ITS Action Plan and in the Directive there are provisions for the optimal use of road, traffic and travel data. This includes the definition of procedures for the provision of EU-wide real-time traffic and travel information services and optimisation of collection and provision of road data and traffic circulation plans, traffic regulations and recommended routes. This also includes definition of procedures for accurate public data for digital maps. The provision of such a digital database of all speed limits on the network is an important prerequisite for the implementation of ISA.

eSafety Forum and the Intelligent Car Initiative

These initiatives were both launched in 2006 to promote the use of information and communication technologies for smarter, safer and cleaner road transport. The eSafety Forum, is the first pillar of the Intelligent Car Initiative, and is a joint initiative of the European Commission, industry and other stakeholders. It aims to accelerate the development, deployment and use of Intelligent Vehicle Safety Systems that use information & communication technologies to increase road safety. It also coordinates the stakeholders and meets regularly. The Intelligent Car Initiative aims to support research into intelligent vehicle and cooperative systems and take up research results. Information dissemination is the other activity field of the Intelligent Car Initiative and it ran the first awareness raising campaign: Choose ESC!

Recommendations to the EU

4th Road Safety Action Programme

- Recognise the contribution of in-vehicle technologies by employers in improving road safety and contributing to the EU target of reducing deaths on Europe's roads beyond 2010.
- Encourage employers managing fleets (also those of EU institutions) to purchase vehicles with in vehicle technologies which have high life saving potential.

Public Procurement

- Adapt the EU Directive on the promotion of clean and energy-efficient road transport vehicles[40] to include in vehicle technologies for safety in public procurement.

Seat Belt Reminders

- Adopt legislation to ensure that every new vehicle has as standard equipment an enhanced seat belt reminder system for all occupants with audible and visual warnings. This is of particular relevance to increase seat belt wearing rates of drivers of commercial vehicles who tend to have low average seat belt wearing rates.

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40   Directive 2009/33/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of clean and energy-efficient road transport vehicles

Speed Management Technologies

- Encourage further roll out of speed management technologies including ISA amongst particular user groups such as government vehicle fleets, public buses and company vehicle fleets including those of rental car companies. In the medium term adopt legislation for the mandatory fitting of all fleet cars with speed management technologies including Intelligent Speed Assistance systems.

Alcohol Interlocks

- Support the development of uniform standards and a high level of reliability for alcohol interlocks in Europe to pave the way for legislation in the medium term making alcohol interlocks mandatory for commercial transport drivers.

Event Data Recorders

- Contribute to the development of harmonised standards of in-vehicle "Event data recorders" functionalities to record collisions with most harmful consequences. Encourage the wider use of in-vehicle "Event data recorders" in fleets.

ITS

- Within the context of the EU's ITS Directive and Action Plan, regularly monitor developments in passive and active safety technologies for fleets for standard setting followed by market penetration or eventual legislation for their deployment.

Road Safety Charter

- Recognise specifically the use of in-car technologies by employers who have implemented successful programmes within the scope of the Road Safety Charter.

Research

- Influence the development of in-vehicle technologies in fleets which are linked to tackling the biggest causes of road death by allocating additional research and development budget.

EU Member State Level Legislation or Policies

Some Member State governments have taken action to improve work related road safety and a number of these have also specifically promoted in-vehicle safety technologies as part of their policies. Beyond the Risk Assessment required by EU legislation some governments have legislated further that employers should take specific action on improving road safety at work. In the UK, Health and Safety at Work legislation includes the requirement of ensuring health and safety of all employees while at work and not putting others at risk by work-related driving activities[41].

Others take the non-legislative approach and encourage employers to take action via different initiatives such as in France. Governments can bring about change by setting an example. They can influence demand through their own public procurement policies. There is in fact great potential to do this. All non-private customers, such as governmental bodies, local authorities and companies can play an important role by including specific requirements on minimum safety levels in their vehicle purchase and leasing policies. In doing so, public authorities and companies contribute to the market penetration of safer cars by supporting the demand for such vehicles and for safety technologies, which hopefully in turn help lowering the price of safety technologies.

Swedish Road Administration leads the way with Safety Requirements for their vehicles

Since the 1st of February 2009 Sweden introduced compulsory rules for governmental authorities concerning environmental and traffic safety requirements when purchasing a vehicle. The goal is that 75 % of governmental authority vehicles (11 000 vehicles or 0,23% of the vehicle fleet in Sweden) shall be fitted with alcohol interlocks by 2012. Some governments also take a specific interest in promoting EuroNCAP ratings and in-vehicle technologies to employers. Moreover there are NGOs active in some of the leading countries that also are running different initiatives to promote work related road safety by directly working with business. Within this context some action is also taking up the issue of specifically promoting the use of in-vehicle safety technologies amongst employers.

As part of its travel policy, the Swedish Road Administration has set up strict requirements for cars used on official business. Requirements are regularly updated and will continue to be in order to raise the standards on energy efficiency, vehicle

41 The Corporate Manslaughter and Corporate Homicide Act Newer legislation adopted in 2007 in the UK introduces an important new option for certain very serious senior management failures which result in death.
Department for Transport (2003) Driving at Work Managing work-related road safety, London

emissions and safety[42]. Cars rented for less than 6 months must meet specific requirements such as:

- Be awarded 5 stars for occupant protection by Euro NCAP
- Be equipped with Electronic Stability Control (ESC)
- Be equipped with a seatbelt reminder on the driver seat that meets Euro NCAP requirements

Cars rented for more than 6 months must also meet additional requirements such as:

- Be awarded at least 2 stars for pedestrian protection by Euro NCAP
- Be equipped with an alcohol ignition interlock
- Be equipped with an informative or supportive Intelligent Speed Assistance system.

Those requirements are also used by other public bodies and private companies. A brand new national law requires all government bodies to buy or rent only 5-star Euro NCAP cars for occupant protection ("government specification" as is the case for environment standards). This also has another overspill effect as rental companies, such as Hertz, Avis and Europcar, are upgrading their whole fleet to offer 'SRA recommended cars' to all their customers[43].

Driving for Better Business Initiative in the UK

In the UK the Department for Transport runs a Driving for Better Business outreach programme. This supports business leaders who have successfully managed driving for work in their companies to take the message, at high level, to business more widely. Roadsafe is the Department's partner in delivering the programme. Its main activities have been to recruit 'champions' from the business community, identify partners for pilot project; and engage a wide range of other commercial and road safety interests. Roadsafe has worked closely with the Department and its driving-for-work campaigns and has developed links with the National Business Travel Network (also DfT sponsored).

France: Committee to Prevent Road Risk Amongst Professional Transport

In France the Government took the initiative to set up the "Steering Committee to prevent road risk amongst professional transport", an organisation responsible for advising a number of government bodies and putting forward proposals on work related road safety. The work of the Committee has the potential to reach 22 million employees in France. The Committee also disseminates information to all stakeholders involved in work related road safety, including the private sector.

The Committee underlines that both road safety 'at ' work and road safety 'to' and 'from' work (commuting) should be addressed, and in this light in 2008 the French Interministerial Committee on Road Safety has asked the various Ministries to consider whether it would be possible to define motor vehicles a piece of work equipment.

The Committee is also involved with the private sector actors, a number of which have signed charters declaring that road safety is one of their key concerns. The Committee also organises an awards programme to congratulate and encourage companies concerned with road safety to continue investing efforts. One of the awards concerns fleet management. When it comes to fleet management the Committee is especially concerned with Light Commercial Vehicles (LCVs), and publishes the following recommendations in terms of in-vehicle equipment: Airbags, ABS, ESC, a visual display in the dashboard in case of vehicle overload, and tyres fit for the professional use of vehicles.

Germany –"Best Co-Driver": Campaign of the German Road Safety Council

Three years ago the German Road Safety Council (DVR) has launched a campaign on Advanced Driver Assistance Systems including ACC, ESC and Lane Departure Warning. It is mainly focused on reaching media message multipliers such as the print media and radio stations to inform the general public about driver assistance systems. In the course of the campaign, employers and politicians have been invited to demonstrations and training for the use of ADAS. An easy to use brochure has been developed (also in English) about the different technologies and their life saving potential. DVR has also created a database where purchasers of vehicles including employers can find the availability and cost of the technologies for each vehicle type[44]. This campaign is connected to the EU's eSafety Aware Initiative.

42   Swedish Road Administration Travel Policy http://www.vv.se/Andra-sprak/English-engelska/Facts-about-the-Swedish-Road-Administration-/Policy-documents/Travel-policy/
43   PIN Annual Report 2010 http://www.etsc.eu/documents/ETSC%20PIN%20Annual%20Report%202009.pdf
44   Bester Beifahrer (German) http://suche.bester-beifahrer.de/result/

Recommendations to Member States

"Be the market":

- Include safety criteria (including in-vehicle technology) for purchase of vehicles in public procurement requirements.
- Influence the development of in-vehicle technologies by allocating additional research and development budget to those with the most life saving potential.

Disseminating information:

- Support employers to fulfill their legal requirements to undertake a risk assessment. As part of this provide information and training to fleet managers to inform them about the need to consider in-vehicle safety technologies in the new vehicle purchase and lease process and in how to conduct a fleet risk assessment, with supporting examples and case studies.
- Highlight the need for a wider use of in-vehicle technologies with a high life saving potential especially in fleets.
- Promote vehicle safety information, such as EuroNCAP results (especially the safety equipment rating) more widely and effectively so that they play a more prominent role in new vehicle choices and fleet purchasing policies.

Financial instruments:

- Give incentives to employers investing in vehicle safety technologies but need to manage the systems that are put in place – not box ticking.
- Encourage insurers to provide reductions in insurance premiums if in-car technologies are put into fleets. Insurers should be encouraged to review the cost/benefit of in-vehicle technologies against the insurance premiums.

Legislative instruments:

- Consider the classification of the vehicle used at work as a piece of work equipment.
- Revisit exemptions from seat belt wearing legislation of some blue light fleets (and taxis), especially as now seat belt technologies improved and seat belt can be released in much faster time and based on evidence, compare the risk to taxi/bus and blue light drivers/passengers on non-seatbelt use.

Initiatives of Employers to introduce In-Vehicle Technology

Private sector awareness and engagement in road safety is increasing, and is essential for the alleviation of the injury and death toll in road transportation at large. Indeed private sector actions can help protect not only professional drivers but all road users. The private sector is nowadays expected to be socially responsible, which in the field of fleet management very often means going beyond legal requirements. Innovations in vehicle safety equipment are developed and hit the markets at a very fast pace (much faster than the time it takes to legislate on their use) and fleet vehicles are most often the quickest route to get vehicles fitted with such innovations on the roads. Large fleet operating organisations can also literally influence the market by using their strong purchasing/consumer power and dictate what sort of vehicles and equipment hit the market. The vehicle industry has already started responding by marketing vehicles such as the "safety van" which includes the latest safety features in their state of art vehicles[45]. As such they have a moral obligation to provide not only their employees with safe vehicles but also help profit road safety at large.

In terms of vehicle safety and in-vehicle equipment what employers can do ranges from purchasing safer vehicles to fitting very advanced safety equipment to their fleet.

Recommendations to Employers

Getting started:

- Undertake a risk assessment and draw up a road safety action plan. Based on priorities identified in the assessment and as part of corporate / organisational transportation and occupational health responsibilities include in-vehicle technologies as part of the solution as appropriate.

Vehicle selection[46]:

Fleet vehicle purchase decisions have the potential to have a dual impact on road safety: there is some evidence that fleet or company vehicle drivers may be more at risk than private vehicle drivers[47], and the penetration rate of ex-fleet vehicles in the second-hand vehicle market is very large,

45 http://www.mercedesbenz.co.uk/content/unitedkingdom/mpc/mpc_unitedkingdom_website/en/home_mpc/van/home/vans_world/innovation/safety_van.html
46 Adapted from © and Intellectual Property Dr Will Murray, Interactive Driving Systems, all rights reserved, 2008
47 Bibbings R. (1997). Occupational road risk: Toward a management approach. *Journal of the Institution of Occupational Safety and health*, Vol. 1, No. 1, 61-75.

providing a penetration of new technologies into the vehicle market at a rate faster than there otherwise might. Over 50% of new vehicles are initially purchased for commercial purposes. Most of these vehicles will be integrated into the wider vehicle pool within two to three years. This means that the more safety features fleet buyers specify, the more they help the general vehicle pool to become safe – relatively quickly.

Purchasing safe vehicles is therefore an excellent way for employers to provide a safe working place to their employees; however some evidence suggests that other considerations still outrank safety in fleet vehicle purchase selection[48]. Koppel et al.[49] compared both Spanish and Swedish fleet managers' responses to vehicle purchase questionnaires and found that vehicle safety is not the primary consideration in both countries, but is outranked by factors such as price, running cost, reliability, size, and fuel consumption. Interestingly vehicle safety did not appear to be significantly more important to Swedish fleet managers. Regarding how to find safety information, EuroNCAP ratings were only cited by a small proportion of Swedish fleet managers and no Spanish fleet managers as the most valuable source of information. Overall this suggests a need to increase the profile of vehicle safety, and provide information about where to find objective safety information, such as EuroNCAP, to fleet managers (rather than letting them rely on manufacturers' information: manufacturer website / dealership etc.).

Providing passive protection through product or environmental design is a good strategy. Thus employers anticipate human failure and specify passive safety features on vehicles, as this does not require any difficult behavioural changes. The counter argument is that it lowers driver concentration and skill levels. In reality, a combination of both is generally implemented in organisations (see Prevention Model table above).

- Include safety criteria when purchasing vehicles, including 5 star Euro NCAP cars and vehicles using in-vehicle safety technologies.
- Include pre-crash features to help reduce the chances of a crash and at scene and post crash safety features which are designed to prevent or minimise injury to the vehicle's occupants in the event of a crash. Active features involve driver action, Passive features do not.

- Specifying as many safety features as possible, to avoid collisions (ABS or ESC) and reduce injury (quality front and rear seatbelts) can improve safety and increase vehicle resale values.

Guides to select safer vehicles are also provided at: www.landtransport.govt.nz/vehicles/ www.monash.edu.au/muarc/about/RS040134.pdf

Managing staff and use of in-vehicle safety technology:

- Safety features are not an excuse for ignoring the wider fundamentals of fleet risk management. For example, employers should ensure that employees always wear their seatbelts - as well as just having them in the car.
- Communicate vehicle safety technologies purpose (i.e.: this is for your own good and we value you and are concerned for your wellbeing!) to employees and train them to use equipment properly.
- Apply in-vehicle safety technology criteria to the management of "grey fleet" (grey fleet vehicles are employees own, 'private', vehicles when used for work) and lease vehicles.
- Try to encourage "ownership" of vehicle and driver as much as possible (1 vehicle = 1 driver) as experience has shown greater care in looking after the vehicle and included technological equipment benefits from such use.

Working with third parties:

- Choose contractors who also apply road safety to their work and fit safety equipment to vehicles – safety as part of the supply chain.
- If possible influence vehicle manufacturers through high purchasing consumer power.

Event Data Recorder Use:

Based on experience so far employers should:

- Develop a contractual and binding system of incentives and sanctions to generate and maintain the necessary level of cooperation between the insurance company and the fleet operator.
- Instruct the staff about the use of EDR, its data and possible consequences; set up also here a system of incentives and sanctions.

48   Koppel S. et al (2007) How Important is Vehicle Safety in the New Vehicle Purcahse/Lease Process for Fleet Vehicles ? in *Traffic Injury Prevention*, 8:130-136.
49   ibid

- Download and evaluate EDR data regularly for taking practical measures within the fleet.[50]

Downsides of technologies, potential barriers and how to overcome them

In-vehicle technological features are welcomed only after verifying their life saving potential. They must be implemented carefully with proper training to avoid a number of downsides. One major downside is the so-called risk compensation effect. This is an effect whereby individuals may tend to adjust their behaviour in response to perceived changes in risk. There is evidence to suggest that such an effect can be linked to the use of safety features in vehicles. This is particularly compelling for the case of antilock braking systems (ABS). There have been experiments asserting that drivers adapt to the safety benefit of ABS by driving more aggressively, and there is empirical evidence that collisions occurred after the introduction of ABS because of people testing the system's thresholds[51].

Technologies like ABS place over emphasis on reactive safety, rather than proactive safety and careful driving. *Drivers must drive carefully at all times* (ABS is designed to help the driver maintain control of the vehicle during emergency braking situations, not make the car stop more quickly)[52]. To gain any safety advantage from ABS, drivers must learn how to operate it correctly[53].

Data security and protection, and liability issues

The handling of data (notably personal data) in in-vehicle applications raise a number of issues, as citizens' data protection rights are at stake. At the same time, data integrity, confidentiality and availability must be ensured for all parties involved, especially citizens. Finally, the use of applications create additional requirements in terms of liability. These issues can be a major barrier to wide market penetration of some technologies if citizens' rights are not shown to be fully protected. The EU's ITS Action Plan proposes to assess the security and personal data protection aspects related to the handling of data in ITS applications and services and propose measures in full compliance with Community legislation. Furthermore it also aims to address the liability issues pertaining to the use of ITS applications and notably in-vehicle safety systems (EC 2008 ITS Action Plan).

Who is responsible if a system fails and the car is involved in a crash? The usual case when a crash occurs is that the driver is responsible for an accident. However, in the case where a failure of technical equipment is in part responsible for a crash, it has to be determined whether the crash would have been avoidable if the system was functioning correctly, and whether the driver had the chance to overrule the system. Collisions rarely meet all the conditions to determine that the failure of a technological component alone is responsible. In Germany for example Menzel[54] notes that there are no cases known in which an unavoidable accident occurred only because of a failing ADAS (advanced driver assistance system). The liability argument is often put forward when technological advancements hit the markets, however many of the handling and engine management packages currently on offer in vehicles intervene in some way between the driver and the controls of the vehicle. However with all these, the driver does remain in control of the driving task[55]. Furthermore, manufacturers of in-vehicle equipment tend to protect themselves with disclaimers in their manuals, so that it becomes very difficult for customers to prove that the damage has been caused by system failure.

Conclusion

In conclusion in-vehicle technologies can make a life saving contribution to improving road safety at work. Crucial to their effectiveness however is that they are integrated into management structures that address the greatest risks. Employers should make every effort to apply them but also train staff on their use and monitor their implementation. At a European level the deployment of life saving technologies should be prioritised in the upcoming ITS Action Plan and Directive. Their use within the context of improving road safety at work should also be included in the new 4th Road Safety Action Programme. They should be prioritised by all according to their greatest life saving potential.

50   A comprehensive study on what is necessary in practical and organisational terms to make successful use of EDR in fleets was presented by Christian Nasca for Winterthur Versicherungen (Accident Research), [Investigations on the use of Accident Data Recorders in fleets].
51   Aschenbreener, M. (1994) Improved Safety Through Improved Technical Measures? Empirical Studies Regarding Risk Compensation Measures in Relation to Anti Lock Braking Systems, Styx Publishing
52   Murray W. Anti-lock braking systems (ABS) Journal of the Australasian College of Road Safety. Vol. 19 (3° August 2008, P.18-20)
53   ibid
54   Menzel C., (2004), 'Basic Conditions for the Implementation of Speed Adaptation Technologies in Germany', Doctoral thesis, Technische Universität Kaiserslautern
55   ETSC, (2006). Intelligent Speed Assistance – Myths and Reality, ETSC position on ISA. Brussels

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Preventing Road Accidents and Injuries for the Safety of Employees

Fit for Road Safety: From Risk Assessment to Training

ETSC
European Transport Safety Council

PRAISE
Work-Related Road Safety

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PRAISE is a project co-funded by the European Commission and implemented by ETSC on Preventing Road Accidents and Injuries for the Safety of Employees (PRAISE). The project aims to advance work-related Road Safety Management and provide the know-how to employers who have to take on that challenge. It also aims to present the work-related road safety standards of EU Member States and carry out advocacy work at the EU level: work-related road safety is an area of road safety policy that clearly needs renewed political commitment.

Fit for Road Safety: From Risk Assessment to Training
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Introduction

This thematic report aims to present how driver risk assessment and training can improve work related road safety. This report aims to address all employers managing all type of vehicle from public authorities providing school transport, small two car delivery companies to large international companies and organisations. The scope of this report covers both fleet and grey fleet (i.e.: private vehicles used for work-related purposes) drivers and riders, from all vehicle classes: truck, bus, van, car and Powered Two Wheeler.

This Thematic Report looks at risk assessment as a basis for training. It is in four sections. The first section presents what risk assessment is in the occupational road safety context whilst making reference to EU legislation. It also presents the business case behind training in the workplace. What makes a safe fleet presenting how training should target influencing the different levels of driver behaviour according to the GDE (Goals for Driver Education) Matrix. The second section looks at the area of driver training which is covered by new EU Legislation: the training of bus and truck drivers in the EU. It presents the legislation itself with some examples of how it has been implemented in the Member States and some initial feedback from surveys on how it has been received. The third section looks at driver and rider training of other road users including vans and powered two wheelers. It presents relevant EU legislation and gives some examples of best practice from the Member State level. It also presents the idea of setting up an EU Quality Labelling Scheme for Driver Training as suggested by the EU Advanced project[1]. The fourth and final section looks at employer level initiatives to train drivers with some examples of best practice. It also includes some advice to employers such as a checklist for employers to select trainers. The Thematic Report also elaborates recommendations to the EU, National level and employers on improving driver risk assessment and training with the aim of reducing road deaths in the EU.

Drivers are only one element of an organisation's road safety program, that should also focus on issues such as management culture, vehicles, journeys and safety of sites (see Haddon Matrix below). Demand for post-licence driver training has grown markedly over the years[2]. Undoubtedly driver training can be an important tool to reduce work-related road risk. However, much care should be given by employers in identifying whether driver training is a tool that suits their needs, and when it is the case which type of training they should opt for.

There is much debate about the value of in-vehicle driver training as a road safety (and particularly a work-related road safety) improvement countermeasure. The classical criticism is the argument that many driver-training courses (often delivered by former racing icons, police or military personnel) focus on drivers' abilities to handle a vehicle in an emergency. However, in-vehicle-skills-based driver training is only one type of training, and research suggests that driving is about more than just skills. Health, well-being, lifestyle, attitude, knowledge, hazard perception, attention to detail, hand eye co-ordination, concentration, anticipation and observation are all important[3]. Exactly these factors affecting safety should also form part of an employer's culture to promote work related road safety. Great care should therefore be given into identifying programmes that are not only 'skid courses', but in which driving skills are part of an overall package that also trains drivers to be aware of risks and how to avoid risky situations.

Finally, it should also be born in mind that driver training is of course intended as a mean to reduce collisions and casualties, but it also has other goals such as mediating more general responsibility, generating interest in safety issues, team-building, quality assurance, and preparing positive attitude to « harder » safety measures.

Part 1: Driver Training in the work context

Risk Assessment

In accordance with Framework Directive 89/391/EEC[4], employers shall, taking into account the nature of the activities of the enterprise and/or establishment, evaluate the risks to the safety and health of workers. This first section gives an overview of what makes good training with links to different theoretical frameworks with practical applications. It includes the importance of risk assessment as a starting point. Subsequent to this evaluation the employer must implement the resulting preventive and protection measures,

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1 Advanced Project (2002) http://www.cieca.be/download/SummaryAdvancedEN.pdf
2 ibid
3 Murray, W., Pratt, S., Hingston, J. & Dubens, E. (2009). Promoting Global Initiatives for Occupational Road Safety: Review of Occupational Road Safety Worldwide (Draft), www.cdc.gov/niosh/programs/twu/global
4 Framework Directive 89/391/EEC http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31989L0391:EN:HTML

in particular the training needs required to the situation. Overall, it is important for organisations considering driver training to have an effective risk assessment-led process. There is a requirement for compulsory training on safety and health issues (Article 12 of Framework Directive 89/391/EEC) Whatever type and level of training is chosen, it should always be based on a needs analysis. Typically organisations tend to have a reactive approach following an increase in collisions demonstrated by insurance data, their own reported collision data, or telemetry. However an effective risk assessment should also involve participants in assessing their own needs, as Framework Directive 89/391/EEC expressly requires employers to consult workers and/or their representatives and allow them to take part in discussions on all questions relating to safety and health at work. Proactive organisations consult their drivers from the outset to know whether they feel they ought to receive training, and what their training requirements are. The outcomes should be fed back to operational managers and drivers through discussion. This can take place within workshops, toolbox chats, debriefs, intranets, notice boards, newsletters and with the support of handbooks.

A screening process should also be undertaken to determine which drivers need, apart from the compulsory safety and health training, to undergo specific and target training. This can be done for example by monitoring excessive fuel consumption, excessive tyre usage, collisions or infringements.

Murray & Dubens[5] suggested following **6 step approach** to implement a driver assessment, monitoring and improvement program which has been adapted to reflect the legal requirements under the Directive 89/391/EEC:

1. Review the existing road safety system in the organisation using a detailed framework such as the Haddon Matrix, a fleet gap analysis or the forthcoming ISO39001. This should also be in line with the general principles of prevention as set out in Directive 89/391/EEC Article 6.3.

2. As a result of the assessment of the occupational risks, managers, supervisors, driver assessors, work schedulers, shop stewards and any other potential users must undertake the assessment themselves including assessing the tasks they must carry out as well as the skills they possess. This shows their commitment to safe driving and helps to sell the concept to the rest of the workforce, as well as learning how to use the system and the data outputs from it. Actually this phase should be more than just "showing their commitments". The assessment should contain also "organisational level" as described later. This organisational level is the most important one in safety as also set out in Directive 89/391/EEC Article 6.3a.

3. All existing drivers should then undertake the assessment again covering their tasks, possibly at one site initially, to build up a benchmarking database of existing company norms and standards.

4. The output must be used to identify the training needs of existing staff and set appropriate targets for all new drivers to achieve (Article 12 of 89/391/EEC Directive). For example in a case using web-based assessment of the participant drivers risk exposure, attitude, behaviour, knowledge and hazard recognition, drivers obtaining >80% are congratulated, those scoring 60-80% receive a 'web-based' training package and those with <60% take an immediate on-road assessment.

5. Utilise the assessment process for a range of pre-employment, current staff and other purposes (Article 12 of 89/391/EEC Directive).

6. Reassess to identify and evaluate improvements as per Directive 89/391/EEC Article 12. Users should be aware of any potential order or familiarity effects. It is also common for 'gossip' about the correct answers and how to cheat the system to spread quickly.

The Haddon Matrix is particularly useful as a framework for undertaking an overall review of the organisational safety context into which the driver assessment, monitoring and improvement program should fit. Haddon provides an all-encompassing pre-crash, at-scene and post-crash systems-based framework for fleet safety. As well as classifying improvement interventions to be piloted, implemented and embedded, it can be used as a gap analysis and investigation tool by asking: '*Do we have the following in place?*' for each of the statements in the Matrix. *'No'* responses indicate the gaps in the fleet safety system, some of which can be addressed by training (Murray et al 2009a).

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5   Murray W & Dubens E Driver assessment including the use of interactive CD-ROMs Paper presented at the 9th World Conference on Transportation Research, Seoul, 24-27 July 2001

The starting point lies firmly at the top of the Management culture column of the matrix, as follows:
1. Identify, obtain and analyse available data (e.g. insurance, licence & telemetry) on the extent of the problem.
2. Use this to make a business case to relevant senior managers in the organisation.
3. Focus on the other areas shown under Management culture first to ensure appropriate systems are in place.

	Management Culture	Journey	Road / Site Environment	People - Drivers & Managers	Vehicle	External / Societal / Community / Brand
Pre-Collision or Pre-Drive	Business case Legal compliance Safety audit, claims analysis & focus group discussions Benchmarking Board level champion Pilot studies & trials Goals, policies & procedures Safety culture / climate Management structure Fleet safety committee Safety leadership by example and commitment Communications programme Contractor standards Grey fleet (own vehicle) policy	Travel survey Travel policy Purpose Need to travel Modal choice Journey planning and route selection Route risk assessment Journey scheduling Emergency plan Shifts / working time Fatigue management	Risk assess Observation Guidelines & rules Site layouts & signs Work permits Delivery & collection procedures Road improvement Black-spot mapping and hazard assessments Engage local and national agencies	Select Recruit Contract Induct Licensed & qualified Handbook Risk assess Train Work instructions Engage & encourage Equip e.g. high viz Communicate Driving pledge/ Code of Conduct/Risk Foundation Health & wellbeing Monitor Correct	Risk assessment Selection Specification Active and passive safety features Standards Servicing Maintenance Checking Use policy and legal compliance e.g. loading Mobile communication and navigation policy Telematics to monitor Wear and tear policy Grey fleet standards	Regulator / policy engagement Insurer engagement CSR External benchmarking External communications Family members programme Community involvement Engaging other road users Road safety weeks / days Safety / ECO groups European Road Safety Charter Road safety conference presentations Media / outreach / PR Safety & environmental achievement awards
At Scene	Emergency support to driver	Engage local investigators	Manage scene	Known process and 'crash pack / bumpcard' to manage scene	Reactive safety features Crashworthy Telemetry data capture	Escalation process

	Management Culture	Journey	Road / Site Environment	People - Drivers & Managers	Vehicle	External / Societal / Community / Brand
Post-Collision	Policy and process to report, record & investigate incidents Change management process Ongoing claims data analysis Data warehousing & linkages Evaluation, KPI benchmarking & programme development	Debrief and review Review journey elements of collision data Ongoing journey management review	Investigate and improve Review site / road elements of collision data	Reporting and investigation process Driver debrief and corrective action Review people elements of collision data Counselling, trauma management & support Reassess / train	Strong open able doors Investigate telemetry data Vehicle inspection & repair Review vehicle elements of collision data Review vehicle selection & use	Manage reputation and community learning process

Murray[6] provides a good practice example of how one organisation used such an approach to implement its driver risk assessment, monitoring and improvement program as one element of its fleet safety system. Darby[7] provide another detailed case, based on a driver risk assessment initiative involving 26,000 drivers.

The freely available, UK Department of Transport supported, 10 question fleet gap analysis on the Fleet Safety Benchmarking project website at www.fleetsafetybenchmarking.net is also a good free resource for undertaking the initial review of an organisations fleet safety.

Business case

Quantifiable results are not always possible (e.g. small driver population). However, as much as possible driver training in the workplace should be conducted if there is a clear business case for it (i.e.: it will lead to quantifiable reductions in collisions and casualties). Each training course considered needs to be backed up by a detailed investment-based business case, and linked to the risks that have been identified. This should be done by using a model of collisions´ costs. Collisions most often have financial implications on a business that stretch well beyond reported costs (for a model of collision costs see PRAISE Thematic Report 1).

Once a training programme has been identified as likely to provide positive results, a pilot study at one site or with one group of drivers (depending on the size of the organisation this might not always be possible) helps to evaluate the usefulness, cost effectiveness and implementation of the program before deciding to proceed with its full implementation.

In fact, from an academic point of view, the literature on driver training in the workplace draws rather mitigated conclusions. A number of studies have evaluated the effects of formal training of professional drivers, including people who drive a great deal as part of their work (for example, craftsmen). The measures reviewed include: courses in defensive driving, skid training and more stringent driving tests. There is no scientific evidence in the literature in the form of scientific controlled studies that conventional fleet driver training is effective in reducing crashes[8], despite the strong belief in the effectiveness of driver training courses by those involved[9]. However, formal defensive driver training for professional drivers, taught at the workplace, combined in larger companies with motivation and incentive systems for crash-free driving, has been found to reduce the crash rate by around 20%. Other types of instruction for professional drivers, including skid training, both amongst ambulance drivers and drivers of lorries and articulated lorries have been found to increase the crash rate[10]. It should be emphasised that these studies should not be interpreted as criticism towards training overall,

6   Murray, W, et al (2009) Effective Occupational Road Safety Programs: A Case Study of Wolseley, Transportation Research Record, 2096, 2009, 55-64.
7   Darby, P. et al (2009). Applying online fleet driver assessment to help identify, target and reduce occupational road safety risks. Safety Science, 47, 436–442. http://www.sciencedirect.com/science/article/pii/S0925753508000702
8   Keigan et al 1999 in Elvik, R. and Vaa, T. (2004) Road Safety Handbook, Elsevier, Amsterdam
9   Hawarth et al 2000 in Elvik et al 2004
10   Elvik et al 2004

but rather suggest that simple skill-based training schemes do not suffice, and that training should always be integrated into a wider employer safety strategy.

Effects of training and testing professional drivers on the number of collisions[11]			
Percentage change in the number of collisions			
Collision severity	Type of collision affected	Best estimate	95% confidence interval
Course in defensive driving for experienced drivers (collisions per km driven)			
Unspecified (all)	All types of collisions	-20	(-33; -5)
Skid training for ambulance drivers (collisions per driver)			
Unspecified (all)	Collisions in icy conditions	+45	(-35; +220)
Skid training for drivers of heavy vehicles (collisions per km driven)			
Unspecified (all)	Collisions in icy conditions	+22	(+9; +36)
More stringent driving tests for drivers of heavy vehicles (total collision figure)			
Injury collisions	All types of injury	+5	(+4;

Group discussions: A Swedish study of countermeasures implemented by Televerket showed statistically significant reductions of crash risks in the groups which had participated in defensive driver training and group discussions[12].

Such mitigated results clearly show that choosing an efficient driver training program is no easy business, and particular attention should be given to which type of course is chosen, based on what one´s needs are.

The process:

So what should be the best process for an employer who wishes to embark on a fleet training programme? Murray[13] distinguishes the following steps:

• A problem or level of risk is identified, either proactively through a fleet safety review or gap analysis like that described in the Haddon Matrix above, or more typically through a series of negative symptoms – such as a high cost insurance claim, road death or an increasing amount of vehicle damage. Typically this leads proactive individuals in organisations to make a business case to develop a safety program, including driver risk assessment, monitoring and improvement.

• If the risks are identified as being people related, a training needs analysis should be undertaken to identify causes and any training issues. Detailed claims analysis, driver assessment, use of vehicle telematics and safety audits are all effective tools to identify training needs.

• The required type of training is determined, varying from totally in-vehicle to totally out of vehicle based options.

• An in-house or external trainer is chosen, depending on the situation and requirements.

• A pilot study at one site or with one group of drivers helps to evaluate the usefulness, cost effectiveness and implementation of the programme.

• Once the training has been undertaken it is important to evaluate its effectiveness.

What makes a safe fleet: "A safe driver in a safe organisation"

There are a plethora of training programmes available on the market, and as we have already touched upon, a first defining feature of training is that there are a number of environments in which it can take place: the classroom, the track, public roads, or a mixture of those. The matter is not merely to prefer one type of course over another but to understand the specific features of these different types of courses and the needs that they address. The training environment will dictate to a large extent the level of individual attention given to participants; the possibility to interact with other participants; and the flexibility to respond to individual needs. It is very important that employers understand the different types of training that there are on offer, and are therefore able to assess whether or not a certain type of training will respond to their demand.

11   ibid
12   Gregersen, N.P. et al (1996) *Road safety improvement in large companies. An experimental comparison of different measures*. Collission Analysis and Prevention, 28, 297–306 http://www.sciencedirect.com/science/article/pii/0001457595000607
13   Murray, W. Et al (2009). Promoting Global Initiatives for Occupational Road Safety: Review of Occupational Road Safety Worldwide (Draft), www.cdc.gov/niosh/programs/twu/global

Research in the field of driver training underlines four hierarchical levels permeating driving behaviour, and the need to design training to address each level. These are: basic vehicle maneuvering (knowing how to start; change gear, etc.); mastery of traffic situations (being able to adapt one's behaviour in accordance to the traffic situation, e.g. at junctions, when in the vicinity of vulnerable users, etc.); the context of driving (this involves the goals behind driving and the context of driving including the why, when, where, and with whom the driving is performed: day-time; night-time; rush-hour; driving under fatigue, alcohol etc.); and goals for life and skills for living (this refers to personal motives and tendencies in a broader perspective). The two last and highest levels generally tend to be neglected, but should be an integral part of good training as they are very important for risk awareness as opposed to merely improving driving skills, which is the content of the two first and lowest levels[14].

These four levels can best be visualised in the GDE matrix (Goals for Driver Education) that is a major outcome of the EU-project "Gadget". A fifth level has also been included in the latest version of the matrix, that includes not individual characteristics of the driver but rather the organisational setting within which the driving takes place. There are two versions of the latest model: GDE-5PRO (PRO for professionals and their organisational environment) and GDE-5SOC for private drivers and their social environment) that help describe the different situation of a professional driver and a private driver[15].

GDE-5 PRO[16]:

	Knowledge and skills	Risk increasing factors	Self-evaluation
Level V Company awareness, characteristics, safety situation (organisational level)	in logistics, safety systems, management, economy	Production/protection, feedback system	Company's / organisation's company's motivational system, awareness of safety situation
Level IV Goals for life and skills for living	Lifestyle, age, group, culture, social position etc. vs driving behaviour	Sensation seeking, group norms, peer pressure	Introspective competence, own preconditions, impulse control
Level III Goals and context of driving	Modal choice, choice of time, role of motives, route planning	Alcohol, fatigue, low friction, rush hours, young passengers	Own motives influencing choices, self-critical thinking
Level II Driving in traffic	Traffic rules, cooperation, hazard perception, Automatisation	Disobeying rules, tailgating, low friction, vulnerable road users	Calibration of driving skills, own driving style
Level I Vehicle control	Car functioning, protection systems, vehicle control, physical laws	No seatbelts, breakdown of vehicle system, worn-out tyres	Calibration of car control skills

Driver training usually focuses on levels 1 and 2, however a good driver is not only one that is skilled but also one that is aware of risks and his own individual abilities and characteristics. The hierarchy was expanded into a matrix in order to cover these different dimensions, and in addition to the four levels, three crucial dimensions were added: knowledge and skills; risk increasing factors; and self-evaluation. The first column describes knowledge and skills needed under normal circumstances for each level: for the lowest levels this equates to knowing how to manoeuvre the car and how to behave in traffic and following rules; whereas on the highest levels this has more to do with planning trips. The second-column is about the risk-increasing factors at every level of driving. On the highest levels this includes risky driving in darkness, on low friction, among vulnerable users, excessive speeding, mental overload, etc. It is also related to dangerous motives for driving and risk-increasing aspects of lifestyle and personality. The third column is about how the driver assesses his or her situation on the different levels. This is important for the driver to calibrate his self-

14   Advanced Project (2002) http://www.cieca.be/download/SummaryAdvancedEN.pdf
15   Keskinen, E., Peräaho, M. and Laapotti, S. (2010). GDE-5PRO and GDE-5SOC: goals for driver education in a wider context - professional and private drivers in their environment (unpublished manuscript). Unversity of Turku, Finland
16   ibid

perceived skills to correspond to his/her actual skills; and it also plays an important role in shaping the driver's abilities to make decisions about trips and in life in general.

When considering safety issues of a whole organisation, the fifth level is necessary. A private driver is independently selecting when, where, with whom and in what schedule they drive, but a professional driver is accomplishing tasks that they have from their organisation. The organisation sets the prerequisites for the task and also for the safety, providing the framework or the degrees of freedom within which the individual driver has to operate. The organisation is thereby limiting the driver's own set of choices, which in the worst case, can be counterproductive to the driver's own safety orientation. It is not often that a professional driver can select the timetable on their route nor are they able to change the route and they also drive the vehicles which belongs to the organisation's fleet.

Organisations have their own cultures, based on values and these cultures are affecting organisational safety by setting goals, standards, norms and in many ways giving and rewarding or restricting possibilities for safety increasing behaviour. Knowledge and skills in an organisational setting mean the global way how the organisation handles safety issues. Risk increasing factors on company level are connected to low level of knowledge and skills but also to the company climate where production, which is necessary for safety, of course, runs over the protection, like Reason[17] noted. An organisation's self-evaluation concerns mainly the control of the whole system: does it function in an appropriate way. One important element concerning this organizational level is that there must be a well functioning feedback system from driver level to company level and the company has to be interested in getting feedback in a real way.

Production vs. protection: the problem can be seen in an even wider environment than on the company/organisation level. Legislation and values behind legislation give a degree of freedom to companies/organisations when they are running their business under the pressure of economic (production) and safety (protection) factors. This society and legislation level, could be described

as the sixth level in the hierarchy concerning driving[18]. As this level, containing legislation and its surveillance, is affecting every transport company in a country or in the whole EU, it is a most important factor in safety work. Legislation should be based at least as much on ensuring correct protection as on delivering production.

In practice this matrix is of very important use both for providers of training course but also to inform those who seek to identify good courses available on the market. It should therefore provide a theoretical background to shape both the demand for and supply of training courses.

The 'Advanced' project concerned with post-licence training issued a number of recommendations[19], including the following: course content should be based on the different levels of driver behaviour; there should be a balance between skills and risk awareness exercises, the training environment; and overconfidence among participants should be recognised and discouraged. Advanced also recommends periodic, continuous training (training shouldn't be a one off)[20]. Employers should overcome the difficulty of keeping projects going through the "calendar theory of motivation" like Thierry[21] described the everyday situation in any organisation. It is easy to start different kinds of projects to increase e.g. safety, but it is extremely difficult to keep them going on and make them a functioning part of work. Often much emphasis is put on starting the project but too little is done to confine that the new ways of behaviour have been permanently taken as routines in the organisation. One of the real dangers in one or two day safety courses is self evidently, that there will be no change in the long run in drivers' behaviour, if there are no follow-up feedback mechanisms on the whole organisation level. This means that there has to be a common agreement of how the safety system of the organisation should work and what the responsibilities of each person are in the system.

One way of trying to make behavioural changes more permanent is to make training more self-controlled, self-activated, student centred. This means that instead of traditional teacher centred teaching methods; it should use coaching type methods to support learning.

17 Reason, J. (1997). Organizational collissions. Manchester: Manchester University Press
18 Keskinen, E., Peräaho, M. and Laapotti, S. (2010). GDE-5PRO and GDE-5SOC: goals for driver education in a wider context - professional and private drivers in their environment (unpublished manuscript). Unversity of Turku, Finland
19 Advanced Project (2002) http://www.cieca.be/download/SummaryAdvancedEN.pdf
20 ibid
21 Thierry, H. (2003) Calendar model of work behavior. Paper presented at the European Congress of Work and Organizational Psychology (EAWOP), Lisbon, Portugal

Coaching vs Teaching

An important question for trainers is: do you use coaching techniques or do you tell your clients to do what you think is best? The Advanced project underlines how a participant-centered approach is most likely to bring positive results[22]. This is well illustrated by the standard 1:1 trainee-trainer ratio that allows for a very intense learning environment, provided the approach is right. Trainers are too often looking to impose their own perception of matters. Many trainers only think in terms of detecting ´´errors´´ and correcting them. It tends to be more constructive to engage with the driver and ask him or her to express his or her experiences, difficulties, needs and work on those together. Constant targeted questioning should encourage the driver to think for himself or herself about his or her behaviour.

Stanton et al.[23] carried an experiment involving advanced coaching and concluded that drivers in the coaching condition improved markedly. They observed changes in the knowledge used by drivers and the information they attend to, which in turn improves their situation awareness. It also appeared in this experiment that drivers are able to deploy that to carry out more skillful driving behaviours. Finally they observed a favourable change in attitudes regarding external locus of control, with drivers more prone to anticipate hazards as a result. The focus in coaching is as much about changing drivers´minds as it is about improving their technical skills.

The European project HERMES[24] "High Impact approach for Enhancing Road safety through More Effective communication Skills for driving instructors" aims at creating an easy-to-use training package on teacher-trainee communication in classrooms, in cars and on dedicated tracks, based on coaching techniques.

Training: Safety and Fuel Efficiency Benefits

Finally, one point worth considering is the synergies between training drivers on eco-driving/fuel-efficiency and safe driving. Typically there are a number of training programmes offered that address both eco-driving and safe driving. This is also reflected in the new Directive for training truck and bus drivers. Examples for

this kind of training schemes include courses reviewed in the study "To the Point 3 - studies on drive like a pro – safe driving, both in a professional and a private context[25]" published by the German Road Safety Council, and the German Statutory Collision Insurance. This is also a good way of linking a company's sustainable development policy and road safety. This topic is covered in more detail in Thematic Report 9 on speed management.

The Hamburger Wasserwerke HWW (Water suppliers) carried out a data collection to ascertain whether the fuel saving training served to reduce fuel consumption and if it had an impact on safety. A comparison of the fuel consumption for the time periods before the training and after it showed that fuel consumption had decreased by 6,2 % and that third part liability claims dropped by 21,7 %, whereas own damage claims declined by 34%[26].

This section has given an overview of steps to risk assessment of drivers and their tasks. It also presented the background to what makes good training including explaining concepts such as training and coaching.

Part 2 Training for Truck and Bus Drivers

Overview of EU Level Legislation

Having established some of the background to driver training this next section will focus on driver training in the area where new EU legislation exists namely for bus and truck drivers. It presents the legislation itself with some examples of how it has been implemented in the Member States and some initial feedback from surveys on how it has been received.

Directive on Initial Qualification and Periodic Driver Training of Drivers of Certain Vehicles (2003/59)

EU professional drivers will now be required to have followed professional training. The Directive on the initial qualification and periodic training of drivers of certain road vehicles for the carriage of goods or passengers was adopted in 2003. This legislation came into force for bus drivers in autumn 2008 and for truck licence drivers in

22   Advanced Project (2002) http://www.cieca.be/download/SummaryAdvancedEN.pdf
23   Stanton, N.A. Walker G. H., Young, M.S., Kazi, T. and Salmon, P.M. (2007) Changing driver´s minds: the evaluation of an advanced diver coaching system.
24   Hermes Final Report http://www.efa-eu.com/Files/115/HERMES%20State%20of%20the%20Art%20report%20FINAL%2029%2010%2007.pdf
25   DVR (German Road Safety Council), UK/BG (German Statutory Collission Insurance), 2009 "To the Point 3 _- studies on drive like a pro – safe driving, both in a professional and a private context." http://www.fahren-wie-ein-profi.de/html/evaluation/to_the_point_3.pdf
26   ibid

autumn 2009. It is hoped that this important milestone in the harmonisation of social aspects in road transport policy will lead to enhanced safety on European roads and that this becomes a part of increased professionalism of this group of workers. It aims to improve road safety and the safety of the driver including operations carried out by the driver when it is stopped.

Until now very few EU drivers have followed professional competence training. Only some drivers were obliged by EU legislation to follow any training and in most of the Member States only 5 to 10% of professional drivers underwent such training, which was based upon requirements specified in a Directive that dates back to 1976[27]. The vast majority of professional drivers therefore worked solely on the basis of their driving licence.

However it has now been recognised that the demands on professional drivers today call for both basic and periodic training. Whereas the legislation on driver licensing concentrates on basic driving skills, the Directive has a much broader perspective and the syllabus covers elements to improve road safety in general, as well as safety during stops and also reducing CO_2 emissions through a special focus on reduction of fuel consumption. It also covers other areas such as how to act in an emergency situation. The Annex of the Directive goes into more details of the topics to be included in the curriculum of the Directive. This includes the objective to make drivers aware of the risks of the road and of collisions at work. Member States will issue the driver with a certificate of professional competence, referred to as 'CPC', certifying his or her initial qualification or periodic training.

These skills and knowledge will be kept up to date through periodic training. Periodic training is designed to complement the individual driver's work and be relevant to their everyday job. This will allow drivers to keep up with ever changing regulations and benefit from the state of the art in training throughout their whole career.

Member State Implementation of the Directive

This next section will present the different approach to implementing the Directive as well as examples of how two Member States have chosen to implement the Directive. It also gives first results from two organisations who have surveyed the first steps to put the Directive in place.

The Directive provides for two options for initial qualification and requires the systematic periodic training be put in place for all professional drivers. For the initial qualification Member States can combine both course attendance and a test or introduce an option only involving tests on theory and practice. Some Member States took great trouble to consult with industry to consider which option would suit them best and also to encourage high levels of compliance with the training take up.

Table of EU MSs taking Training or Testing Approach or a mixture

Training Approach	Testing Approach	Training and Testing
Norway, Luxembourg, Sweden, Poland, Switzerland, Estonia, France, Finland, Latvia, Czech Republic, Slovakia, Bulgaria, Greece	Netherlands, UK, Malta, Belgium, Ireland, Portugal, Spain, Austria, Hungary, Romania	Germany, Lithuania, Slovenia

The Netherlands has chosen the testing approach, this is because of the right to freedom of education included in its constitution. The Netherlands already has a mandatory system of certificates of professional competence. The new Directive will thus build on existing structures and processes. Another approach is that taken by France which introduced a system of compulsory training (basic and periodic) which was extended to include all professional drivers in 1998. The initial training takes four weeks and includes road safety on the curriculum. The periodic training is a 3 day programme held once every 5 years[28].

The Irish Road Safety Authority (RSA) is responsible for the implementation of the Driver CPC Directive in Ireland and has produced a periodic training curriculum for all professional bus and truck drivers which was developed in line with the EU Directive and in consultation with the industry[29]. In order to be in a position to facilitate Driver CPC training, interested training providers apply to the Road Safety Authority for approval and this is subject to a rigorous process assessing the quality and standards of their facilities and trainers. There are in excess of 200 approved training centres located around Ireland; this ensures competition

27   Council Directive 76/914/EEC
28   CIECA Workshop report 2006 Unpublished
29   CPC Training Guidelines http://www.rsa.ie/Documents/Road%20Safety/CPC/CPC_Training_Centre_Guidelines.pdf

in the marketplace for good standards and costs of training. All new bus and truck drivers will have to pass two hour theory tests and a 30 minute practical test as well as the current driving test in order to obtain Driver CPC. The theory tests and the practical test are developed to ensure the applicant has a comprehensive knowledge of the Rules of the Road and of the skills and professionalism to be a full time bus/truck driver. The RSA has developed a number of information documents including a 'Frequently Asked Questions' document to inform drivers and employers of all aspects of the Driver CPC process. The RSA have also engaged with the training organisations and have put a process in place whereby driver feedback is collected at each training course, the main purpose of this is to assess how the training can be improved. One issue of concern is the development of training materials that are easily understood and relevant to the driver. The RSA believes that the Driver CPC will lead to a change in the perception that driving professionally can be achieved by a one off test. It will now be seen as a profession which has continuous training and development of skills as a requirement.

Results of first Feedback on Implementation of the Directive

The Information and Initiative Days (I&I Days) recently completed a survey on the Directive 2003/59. This is a joint initiative of UITP (represented by UITP Euro Team) and the European Transport Workers' Federation (ETF), led by AFT[30]. The survey looked at training of bus and truck drivers in the urban context. The survey of employers, employees and authorities looked at the impact of training on the quality of work, driver's occupational qualifications and the policies of human resources. The first responses from the side of the employers are that the Directive will have a very positive effect on reducing incidents and collisions (by 71%). A same high level, 71%, said that there will also be an increase in the level of service. Another positive impact, 63% said that they see a decrease in the fuel consumption. One key finding of the survey was that the Directive will lead to higher professionalism of the Training Centres. Most of those surveyed agreed that there should be some national level regulation monitoring the quality of the training centres.

Eurotra the European Transport Training Organisation acting as the umbrella association covering the major European transport training institutes serving the road transport and logistics industry with 25 members ran a two year project called EU Safe Driver. One of the key outputs was a "Handbook on Initial Qualifications and Periodic Training of Professional Drivers"[31]. This gives common recommendations for training, minimum qualification and training requirements. At an expert forum held in the autumn of 2009 Eurotra concluded that so far the level of implementation of the Directive in the Member States is enormously diverse. Different measures and developments are being put in place by the authorities. These differences arise first of all from the different historic situation in countries in delivering training program. Other differences are due to different socio-economic situations. Some countries support the training activities via national financial compensatory systems. The second main conclusion made at the Expert Forum is the strong concern of almost all EuroTra representatives to face a capacity issue in the field of the availability of the necessary training infrastructure, training facilities and trainers at the end of the transition period ending in most of the Member States in 2015 and 2016.

They also propose the idea that information campaigns could be launched to raise awareness within all actors demonstrating the advantages of qualified drivers based on a high level of training leading to less damage in handling goods, less collisions, less cargo loss, less fuel consumption leading to better cost control and/or cost reduction. The higher professional qualification is also likely to lead to better recognition of the profession and lead to a positive overall social impact.

EU Respect Project – Testing the new Directive for Truck Drivers

The objectives of the RESPECT project (managed by NEA Transport Research and Training, the Netherlands) were to set up a 3-day education programme for truck drivers with the aim of reducing the fuel consumption of the drivers and reduce the collision/data rate. This programme includes simulator training, "real" truck driving and classroom training on theory. Agency for Transport, Training and Logistics in France (AFT-IFTIM) was one of the organisations in the RESPECT project and 300 professional drivers in France were involved in the project and completed a questionnaire providing feedback about the education programme developed in RESPECT. The questionnaire covered topics such as general

30 Association pour le développement de la Formation professionnelle dans le Transport, was created in 1957 by the French transport trade organisations. http://www.aft-iftim.com/infos-secteur/
31 In English, Danish, Polish, German, Swedish, Czech and French http://www.eurotra.eu/UserFiles/File/Downloads/SAFE%20EU%20DRIVER%20final.pdf

opinion, most useful and least useful parts of the programme, structure of the theory programme, structure of the practical programme, use of the simulator, value of practical on-road driving, etc. The most notable improvements in the skills of the professional drivers who completed the RESPECT programme were to be found in reduced fuel consumption, increased road safety, reduction in emitted pollutants, and increased professionalism.

CIECA Risk Awareness Database for Training

The Risk Awareness Database was developed as part of the Advanced project[32]. This was in reaction to the limited amount of quality risk awareness exercises used in post-licence training. The database is seen as a first step on an international level towards encouraging more focus on risk awareness in post-licence courses. The examples on the site have all been provided by course providers and can be used or adapted.

Recommendations to the EU

- Carefully monitor the implementation of the Directive and offer support to Member States in implementation with the aim of reaching high common standards in all Member States.
- Aspects concerning management, administration and policy are not yet fully developed in each Member State in the educational and training sector. The European Commission could create a platform to exchange information and experiences in that field in view of the development of "best practice" guidelines[33].
- Should act as a catalyst for the enhancement of an appropriate "training" infrastructure including qualification of trainers and content of the training.

Recommendations to Member States

- Be able to guarantee the quality of both the initial and periodic training of professional drivers of trucks and buses in their countries.
- Inform drivers and employers about the new Directive by also setting up websites with information.
- Set up financial compensation systems to fund training.

- Develop the capacity of training institutions to deliver training for professional drivers.
- Encourage trainers to include risk awareness in their training by, for example, making use of the CIECA risk awareness training database.
- Ensure enforcement of CPC qualification card of drivers will take place.

Recommendations to Employers

- Make sure that all professional drivers of category C and D have gained their CPC and take part in initial and periodic training.

Part 3 Training for Professional Drivers of Vans, Cars and Powered Two Wheelers: Relevant for all Drivers

This third section will look at driver training of other vehicle classes. Firstly looking at two European Directives that apply to all drivers, then by looking at best practice examples from Member States and employers to set up structures and implement effective driver training to improve road safety. It also presents the idea of setting up an EU Quality Labelling Scheme for Driver Training as suggested by the EU Advanced project[34].

EU Legislation

Driving Licence Directive (2006/126)

A new EU Driving Licence Directive was adopted in 2006 which brings in new requirements for qualifications and the continuous training for driving examiners. The issuing of new licences will be obligatory as from 2012, since the new directive will apply two years after entry into force, and after that period Member States will have four years in which to comply with its provisions. Under Article 7 Driving Licences can only be issued to those who have completed training or passed a test of skills and behaviour, or completed a training and passed a test of skills and behaviour.

Council Directive on Safety and Health of Workers at Work 89/391/EEC

There is also another relevant Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work already mentioned earlier. This Directive

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32   Advanced Project (2002) http://www.cieca.be/download/SummaryAdvancedEN.pdf
33   ETSC (2003) Transport Safety Organisation in the Public and Private Sectors
34   Advanced Project (2002) http://www.cieca.be/download/SummaryAdvancedEN.pdf

includes under Article 1 general principles concerning the prevention of occupational risks, through also the training of workers. Under Article 6 within the context of their responsibilities, the employer shall take necessary measures for the safety and health protection of workers, including prevention of occupational risks and provision of information and training, as well as provision of the necessary organisation and means. There is a whole Article 12 on the training of workers which states that the employer shall ensure that each worker receives adequate safety and health training, in particular in the form of information and instructions specific to their workstation or job. This should cover all aspects from time of recruitment or in the event of a transfer or a change of job. Also training should take place in the event of the introduction of new work equipment or a change in equipment, or in the event of the introduction of any new technology. The training shall be adapted to take account of new or changed risks, and repeated periodically if necessary.

As well as the employers, under Article 13 workers also have obligations. Each worker should take care as far as possible of their own safety and health in accordance with their training and the instructions given by their employer. Workers must in particular, in accordance with their training and the instructions given by their employer make correct use of machinery and transport equipment. Finally, they should also cooperate with the employer to ensure that the working environment and working conditions are safe and pose no risk to safety and health within their field of activity.

Recommendations to the EU

- Monitor the implementation of its Directive on safety and health of workers and ensure the proper provision of training by employers and application of the training by the workers themselves. This should also include explicitly tasks such as the use of transport vehicles.

Recommendations to Member States

- Develop the capacity of training institutions to deliver training for all professional drivers.
- Promote the implementation according to the Directive on health and safety at work of employers delivering adequate training to enable employees to protect the health and safety of its employees.

Recommendations to Employers

- Guarantee that training is rooted in the company's health and safety at work culture.
- Comply with the requirements of the Directive on Health and Safety at Work in ensuring that proper training is given linked to the needs of the employees including the use of transport vehicles.

Drivers and Riders of other Vehicles

Apart from the aforementioned parts of relevant legislation there is not yet any specific legislation foreseen at EU level on training of drivers or riders of other vehicles. One next step supported by experts would be the extension of the Council Directive Initial Qualification and Driver Training of drivers of certain vehicles (2003/59) to another group associated with driving for work: van drivers and Powered Two Wheeler drivers.

Formal training and testing of professional drivers is intended to prevent clearly unsuitable drivers from becoming professional drivers and to give professional drivers a lower collision rate than they would have had without formal training and testing. Furthermore it is desirable to aim for a lower collision rate for professional drivers than for other groups of road users[35].

Advanced reported that over 400,000 drivers took part in continuous driver training throughout Europe in the year 2000[36]. Moreover, demand for post-licence driver training has grown over the last 5-20 years across the European Union. Amongst the various reasons cited, the main explanation for this rise in demand is the growth of fleet driver training. The increase in the provision of company cars over the last few years has led to higher collision and damage claims which company management are at pains to reduce and which their insurance companies are unwilling to support over the long-term. Changes in working practice are also encouraging governments and authorities to consider the company car as an extension of the workplace. Health and safety regulations, in addition to legal concepts such as corporate responsibility, are therefore no longer restricted to the office. Post-licence training varies considerably in popularity from one country to another. Fleet driver training accounts for the vast majority of current post licence training[37].

35 Elvik, R. and Vaa, T. (2004) Road Safety Handbook, Elsevier, Amsterdam
36 Advanced Project (2002) http://www.cieca.be/download/SummaryAdvancedEN.pdf
37 ibid

Light Commercial Vehicles (Vans)

LCV the formal term in the European Union for goods vehicles with a Gross Vehicle Mass (GVM) of up to 3.5 tones. There has been a rise in LCVs use in Europe. A large part of this rise is a consequence of the home delivery sector, which has seen phenomenal growth recently due to internet shopping. There is some evidence on certain behavioral aspects concerning LCV drivers. In Great Britain the DfT's campaign to improve the safety record of this group observes that, in the last 10 years, the number of vans in the UK has increased by around one third and van traffic by 40%. It goes on to note that there are now three million vans on Britain's roads, and the annual volume of new registrations is around 320,000[38]. The SafetyNet project collected information on daytime seat belt wearing rates in light vehicles, distinguishing passenger cars and commercial vans and found a consistent pattern of much lower rates of seatbelt wearing by the drivers and passengers of LCVs.

In GB the examination of the severity of collisions show that LCVs are more likely than other vehicle groups to be involved in fatal and serious collisions. About a quarter of deaths caused by LCV drivers involve breaking the speed limit; these include cases where the driver is breaking the applicable limit for a vehicle of that class, as well as those ignoring posted speed limits[39].

In Germany there is a considerable increase in the frequency of registered goods vehicles with a maximum permissible weight less than 7.5 t involvement in collisions since the end of the 80s[40]. Transporters (box-type trucks) are the majority within this vehicle category. With this background the collision research unit of DEKRA started to study real-world crashes with involved transporters. One of the results of the study is that transporters drive and collide at similar speeds as cars but only 20% of the transporter drivers wear seat belts.

As in the case of truck and bus drivers training can be appropriate. But only if this is part of an integrated approach to risk assessment by an employer with the aim of improving the safety of their operations.

UK Best Practice: SAFED for Van Drivers

The UK's Department of Transport has adapted an existing Guide for Safer and Fuel Efficient Driving (SAFED) to van drivers. The Handbook aims to outline the elements of Safe and Fuel Efficient Driving (SAFED) training specifically relevant to the driving of vans. It also aims to define the qualifications, skills and experience required by trainers intending to deliver the SAFED training programme to candidate drivers. It will also explain the content, and delivers the one-day SAFED training course designed to improve the safe and fuel efficient driving techniques of existing van drivers.

The LCV driver is initially assessed by a qualified trainer. Training on best practice in safe and fuel efficient driving techniques is then given. The driver is then reassessed to record improvements in driving technique and where possible actual fuel consumption. The driver is also assessed on performance in safety check and knowledge test exercises as well as the number of faults recorded during the day's practical driving sessions. Successful drivers receive a certificate of achievement.

Powered Two-Wheelers

It is well known that motorcyclists face a much higher risk of being killed than other road users. For the same distance travelled, the risk for riders to be killed in road collisions is on average 16 times the risk of being killed in traffic for car drivers. In 2006 at least 6200 Powered Two Wheeler (PTW) riders were killed in road crashes in the EU25[41] representing 16% of the total number of road deaths while accounting for only 2% of the total kilometres driven[42]. While riding a motorcycle will inevitably carry more risk than driving a car, evidence shows that the implementation of dedicated safety measures can substantially improve PTW safety. The measures should aim at improving the behaviour of motorcyclists, but also the behaviour of other road users and providing a safer environment for PTW riders. The rider's skills, training, experience and attitudes are fundamental to safe motorcycling. A project co-funded by the EU has developed a basic manual for initial rider training that includes hazard awareness and rider attitude and behaviour

38   DfT, THINK! http://www.thinkroadsafety.gov.uk/campaigns/drivingforwork/index.htm

39   PACTS (2003), Speed Cameras: 10 criticisms and why they are flawed, PACTS & SSI, London, p4

40   Niewoehner, W. Berg.F; A., Froncz, M. (2001) Collissions with Vans and Box-Type Trucks: Results from Official Statistics and Real-Life Crash Anaylses DEKRA

41   Estimation based on 2006 national data; except GR, SI (2005 data), IT: min. 1000 deaths (based on 2000-2004 data). This report considers GB and not the UK.

42   PIN Annual Report http://www.etsc.eu/documents/copy_of_copy_of_2nd%20PIN%20Annual%20Report%202008.pdf

www.initialridertraining.eu. At present there is very little post licence training within the work context. However general multiphase training does exist and has been introduced for example in Austria[43].

One example of post licence training for powered two wheelers in the driving 'for work' and 'to work' context comes from the UK. BikeSafe-London invites motorcyclists, moped and scooter riders to participate in Rider Skills Days that offer assessment on present skills, and advice to help make their riding in London safer and more enjoyable. As well as professional riding techniques, topics covered include the system of motorcycle control, collision causation factors and security. Research also indicates that motorcyclists and scooter riders are disproportionately represented in serious injury road crashes and within London this is linked significantly to the journey to/from work - a feature not as apparent in the rest of the country. BikeSafe-London has therefore initiated partnerships with a number of forward thinking companies to support them in encouraging and supporting their staff to undertake BikeSafe, and in turn further training, as part of our commitment to `Working Together to make London Safer`. The team has in recent months been to train British Airways, Tesco and HSBC staff. Many motor insurance companies acknowledge the value of the scheme and offer a discount on premiums to riders who have completed the programme.

A specific Guidance document has also been produced by the Royal Society for the Prevention of Collisions and the Department for Transport on reducing risk to do with motorcycling for work[44].

An EU Quality labeling Scheme for Driver Training

In the absence of government regulation, the Advanced project looked at if a voluntary quality label scheme for post-licence driver training could meet the needs of consumers, course providers and policymakers[45]. In fact, positive and very constructive steps were taken to lay the groundwork for a proposal for a future European Quality Label in this area. Benchmarking is important in this sector due to the almost complete lack of standards for post-licence driver and rider courses across the EU (especially in terms of the instructors). With the exception of the UK, Luxembourg, Finland, Austria

and Switzerland there is no legislation regulating post licence driver training in the EU. Current knowledge on training needs and measures for drivers and riders were then seen as still insufficient to assess what "quality" is in reality (in terms of course content and instructors). However despite some reservations the Advanced Project concluded that a quality scheme would be useful, as long as it does not complicate any efforts to introduce standards at national level (for instance in Germany or the UK) and that its structure allows for ongoing change (research has been limited in this field until now). The project also worked out the principles of a labelling scheme and setting up such an organisation[46].

Recommendation to the EU

- Support the setting up of a quality labelling scheme for post licence driver training.

National Level Initiatives

At present there are only a few Member States that regulate post licence driver/rider training of other vehicle classes (car/van/PTW) in terms of course content and instructors. Non legislative standards governing this sector range from non-existent to elaborate and are either set internally by driver / rider training companies or by road safety bodies (such as the German Road Safety Council (DVR)[47].

Luxembourg

Training is provided for voluntary and company participants at the (track-based) Centre for driver training, where Luxembourg's obligatory 2nd phase course for novice drivers (and riders) is run. The instructors are the same for both voluntary and obligatory training, meaning that Luxembourg is one of the few countries, alongside Finland, Austria and Switzerland with legally required standards for post-licence instructors.

The Luxembourgish employers association conducted in 2002 a report on collisions at work showing that while such collisions were decreasing, the number of commuting collisions on the roads was on the rise, and that as much as 67% of work related collisions leading to deaths were in traffic. An agreement between a number of partners including the employers association, the insurers association, the labour inspectorate, trade unions,

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43   Multi-Phase Education Austria http://www.kfv.at/department-transport-mobility/safety-measures-in-austria/multi-phase-driving-license/
44   http://www.bikesafe-london.co.uk/motorcycling_through_work.pdf and http://www.bikesafe-london.co.uk/wrrr.htm
45   Advanced Project (2002) http://www.cieca.be/download/SummaryAdvancedEN.pdf
46   ibid
47   ibid

and the national road safety NGO, was therefore reached to launch a campaign called "Trajet: sécurisons-le!" (This would translate into: "let's make commuting safer"). The campaign, launched in 2003, aims at providing materials to employers to conduct simple training of their employees. The materials prepared for this campaign were fact sheets on 12 topics (one topic per month of the year) including a reminder of the traffic rules, information about the various risk factors (alcohol, speed, not wearing seat belts, mobile phones etc.) but also explanations about certain important laws of physics (such as braking distances), the impact of weather conditions on safety, or how to prepare for long journeys. The materials can be found on www.trajet.lu.

Portugal

In Portugal in 2000, there were many collisions with buses, coaches and minivans which performed the transport of children groups to school, cultural and leisure activities, sports, holiday camps. The Association for the Promotion of Child Safety (APSI) launched innovative training courses for drivers, including theory and practice on defensive driving, case simulation and circuit training. Besides the theory on Child Restraint Systems, drivers were given an intensive practical training on how to choose, fit and use them correctly. Courses also include specific norms and safety measures concerning children transport, general road legislation, first aid and acting in case of emergency, practical training to use a fire extinguisher, interpersonal relationship, psychological factors related to the specific transport of children, and at last evaluation of drivers defensive driving and ability to choose places to take and leave children in real traffic situations on public roads.

At the same time APSI tried to persuade the government to publish a law, and raised public awareness on this problem, since a first study, showed that in a period of 18 months (October 1998 to June 2000) there were 19 collisions that caused the death of 8 children and 192 injuries. A specific Law on the group transport of children was published in 2006 obliging 35 hours training courses for drivers, including all the topics mentioned above. A second study with the same methodology to evaluate the number and severity of collisions in the transport of children groups showed that from January 2004 to December 2007 there were 21 collisions that caused the death of 2

children and injuries in 131. This was for a longer period of time (4 years) there was an important reduction in the number of collisions, deaths and injuries. These global training courses, in which APSI has already trained more than 600 drivers, have had a very positive impact for the safety of Portuguese children and adolescents as vulnerable road users.

UK

In the UK demand for post licence training has risen over the last 5-10 years. There are two main reasons for this. Firstly, insurance companies are encouraging companies to send their employees for fleet driver training[48]. Secondly, strong UK legislation on Health and Safety at Work such as the first Act Health and Safety at Work 1974 requires the employer to ensure the health and safety of all employees while at work and that others are not put at risk by the employees work related driving activities. The Management of Health and Safety at Work Regulations 1999 set out the requirement for employees to manage health and safety effectively including a risk assessment[49].

A Fleet Driver Register was also introduced (in 2002), designed to allow the Driving Standards Agency to monitor the fleet driver training sector - and standards - more closely. Training is almost exclusively on-road. All trainers must be in possession of a (pre-licence) driving instructor qualification (ADI). In addition, future trainers will have to be specially trained by accredited training organisations in order to be included on the new fleet driver register. Course providers often offer full risk management services, based on a company audit and a tailored course to meet company needs.

In the UK the Institute of Car Fleet Management which was established in 1992 and aims to develop the capability and enhance the standing of fleet professionals. It provides a structured education and training syllabus and methodology designed to meet the needs of newly appointed as well as established vehicle fleet managers, administrators and fleet industry specialists leading to vocational qualifications. It also supports research and best practice which it communicates to members and stakeholders.

In the UK the Department for Transport has established an outreach programme to raise awareness of the importance of work related road

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48   ibid
49   Health and Safety Executive (2000) Driving at Work: managing work-related road safety http://www.orsa.org.uk/guidance/pdfs/hse_guide.pdf

safety in the business community and public sector. It uses advocates drawn from these communities to promote the business benefits of managing it effectively. Business champions, some of whom are featured in our PRAISE project constitute the central element of the Driving for Better Business campaign. They are those firms that are prepared to step forward to champion good practice in work related road safety by taking a business message to business. Each Champion makes public a case study to demonstrate how driving on business is managed. The studies always centre on the business case and include the following elements on driver safety:

1. Provide a driver's handbook that includes road safety guidance and sets out individual driver responsibilities, in support of the company's policies and procedures, e.g. what to do in the event of an incident.

2. Ensure that all employees driving on behalf of the company are initially vetted, inducted and regularly assessed, to establish that they are properly licenced, competent, suitably trained and medically fit to do so.

The UK's Health and Safety Executive has also been involved in a pilot project whereby certain Metropolitan Police officers have been given powers under the Health and Safety at Work etc Act, to supplement their powers under Road Traffic Law. These powers allow trained officers to follow up possible inadequacies in the management of risks by employers to those who drive at work. Feedback to date has been positive with early data suggesting that there is room for improvement, in many cases, and a belief that this can best be addressed by increasing awareness of employers' responsibilities under health and safety law and by advising them of suitable action.

In 2003, the UK Department for Transport and and Health and Safety Executive issued a guidance document on 'Driving at work: Managing work-related road safety'. It clarified that the vehicle is classed as part of the workplace under health and safety regulations, and that organisations need to have risk assessments in place for their drivers, vehicles and the journeys they undertake[50].

Research was also prepared and piloted for the UK's DfT on Company Incident Vehicle Reporting and Recording in 2002[51]. The aim of this project was to help companies and organisations which use vehicles ranging from motorbikes to lorries to work out how many collisions their vehicles are involved in, and why this is so. Information about the extent and causes of their collisions can help companies make informed decisions about the most effective measures to implement to reduce their collision rates. Such measures could be applied to organisational systems, people (including driver training), the working environment and the vehicles. The project provides a range of excellent tools for organisations to report, record and learn from their collisions, and use the information to guide the development of their driver risk assessment, monitoring and improvement initiatives.

Germany

The German sector differs considerably from other countries in that the German Road Safety Council (DVR) has developed a quality scheme of their own which was implemented in 2008 and is valid until 2011. The Quality Standard is called: Quality Certificate for recognized and controlled learning. One of the reasons for setting up the standard was to give to certify quality offers on the market and incentives training companies to reach certain criteria and standards. The aim of the standard is to offer clients seeking training an easily recognizable sign. This is to make clear that improving road safety is one of the key aims of the training offered. Quality certificates are given to those trainers who offer practical training seminars with driving on suitable practice areas and also on the road and in combination. Trainers must fulfill criteria which is evaluated qualitatively in the five areas of content, methodology, education and further education of the trainer, quality assurance as well as a further option on the place of training. The Quality Certificate is managed by the DVR project with input of a special working group on content and quality assurance, independent experts and auditors who observe training on site[52]. The DVR has also developed a manual on delivering driver and rider training[53]. Experts from DVR member organisations, aided by technical committees, develop DVR safety programmes for target groups including professional drivers tailored to different vehicle types:
http://www.DVR.de/download/safety_quality_cost_2007.pdf

50   Driving at Work http://www.hse.gov.uk/pubns/indg382.pdf
51   Company Incident Vehicle Reporting and Recording http://www.orsa.org.uk/guidance/pdfs/covir.pdf
52   For more information about how the Certificate works and for a full list of the criteria that the trainers are evaluated on look at:http://www.DVR.de/download/qualitaetssiegel_broschuere_05_08.pdf
53   DVR Manual on delivering driver and rider training http://www. DVR.de/download/QM_H_SHP_SHT_2009_03_10.pdf

Sweden

The Swedish Work Environment Authority has provided a brochure[54] for employers on occupational road safety including relevance of the Directive 89/391 on Health and Safety. It also includes advice on how to develop a road safety policy covering risk assessment.

Sweden is the home of the famous Vision Zero approach. A new Vision Zero Academy under the Vision Zero Initiative was launched. The role of the Academy is to generate knowledge based policy advice on innovation and implementation of traffic safety management systems, services and technologies. This aims to create a new centre that will inform stakeholders about the most effective and science based innovations and how they can be implemented to eradicate serious health losses due to road traffic crashes. The Vision Zero Academy will be set up by the Swedish Road administration and will focus on professional training, research and development adapted to specific target audiences. Legislation for employers, such as Occupational Health and Safety regulations or licences to operate, play a major role in the safety. Investigating how this legislation works so far is important and should be a main theme for the Academy. The Academy could also study the implementation and the effects of the introduction of the Traffic Safety Management System, ISO 39001. This will play a major role in shaping future road safety policy and is likely to be crucial for the understanding of market growth for traffic safety.

Poland

The Polish Road Safety Partnership, an NGO, runs a Fleet Safety Programme launched in 2006. The fleet safety initiative focuses on gaining commitment from senior management in companies operating vehicle fleets to implement programmes to improve the road safety performance of their drivers and vehicle fleets. As part of this programme

it published "Fleet Safety Guidelines" in September 2007. The 2007 edition consists of two safe fleet handbooks, one targeting management and the second aimed at drivers[55]. The handbooks were developed by partners using international good practice models and examples. The handbooks are supported by awareness raising and training seminars run regularly in fleet safety are offered by the Partnership.

Recommendations to Member States

- Member State governments should encourage initiatives which build capacity to ensure that driver training is tailor made to suit particular driver/trainer's needs.
- At the national level, including *'purpose of journey'* in the reporting and recording systems of road traffic collisions would allow a fuller understanding of the 'work driving' problem and better targeting of both road and health and safety resources including driver training.
- Governments should ensure that riders receive appropriate training when they start to use a motorcycle (or re-start after a period of not motorcycling) and that they receive further training as they progress from smaller to larger motorcycles. Motorcyclists should be made aware of the difficulties other road users have in detecting power two wheelers and evaluating their speed[56].
- Develop a common, practical collision data management framework to assist employers in managing the risks for 'at work' drivers and needs including driver training.
- Include training on fitting Child Safety Restraints to vehicles, how to use a fire extinguisher, and how to respond to an emergency with children during the transport (for bus and truck drivers as included in the Directive 2003/59).

This section has given an overview of initiatives taken at a national level to promote risk assessment and training taken to improve work related road safety.

54   Road Safety a Work Environment Issue-Swedish Work Environment Authority http://www.av.se/dokument/inenglish/broschures/adi_578eng.pdf
55   Fleet Safety Handbook for Management http://www.pbd.org.pl/fileadmin/Dokumenty/przewodnik_bezpieczna_flota.pdf
Fleet Safety Handbook for Drivers http://www.pbd.org.pl/fileadmin/Dokumenty/Przewodnik_kierowcy.pdf
56   PIN Annual Report 2008 http://www.etsc.eu/documents/copy_of_copy_of_2nd%20PIN%20Annual%20Report%202008.pdf

Part 4 Employer Level Initiatives

The fourth and final section looks at employer level initiatives to train drivers with some examples of best practice. It also includes some advice to employers such as a checklist for employers to select trainers. Although employers are only legally obliged to train drivers of certain vehicles under EU law as presented above they must also comply with its Health and Safety Directive. Moreover the private sector is keen to show how it is acting in a socially responsible manner, which in the field of fleet management very often means going beyond legal requirements. Also all non-private customers, such as governmental bodies, local authorities and companies can play an important role by setting examples for others. This means that both private and public employers should consider driver training as part of an integrated approach to improving road safety. If selected and run properly then driver training can be part of a strategy taken by an employer to reduce work related road risk. As stated earlier, the crucial starting point for employers is a risk assessment which includes the drivers. Part of this should also be to ask drivers themselves what they need; a self assessment. This can be undertaken in house or by an external organisation.

Employers should also look at which different courses exist but also look at what needs they will address and link these as closely to what their employees need. They should try and select courses which address each of the four levels of the GDE Matrix which form driver behaviour: basic vehicle control, mastery of traffic situations, trip related considerations, personal characteristics. A good course would also include the fifth level the organisational setting within which the driving takes place. Courses that place the participant at the centre to run the course should also be prioritised. The practical experience should build up risk awareness of the driver. The classroom sessions should include lots of time for discussion and feedback particularly at the very end of the course. In fact, interaction and interactive and reflective training methods are the optimal ones.

Johnson and Johnson

Johnson and Johnson is one of the multinational companies working in Europe which has one of the world's most proactive organisations with regards to occupational road safety[57]. In the Europe, Middle East and Africa (EMEA) region alone the company operates over 13,500 field sales, service and management vehicles. Its' SAFE Fleet programme has been in place for ten years and provides a standard framework that its subsidiary companies work to six key objectives. This includes that senior management support safe driving as part of the work culture though leadership, monitoring improvement, training and ongoing engagement. Local Safe Fleet teams are responsible for implementing measures such as training new drivers, reducing cases of high-risk driving and hiring field safety coordinators. Driver development including orientation, home study and behind the wheel training is one of these objectives as is meeting Health and safety objectives. These efforts have translated into real success SAFE Fleet has reduced injuries, collisions per million miles (APMM) and percentage of vehicles involved in incidents. Part of this success has also been due to a high-risk driver early detection system to identify drivers with the potential to drive unsafely. The company uses innovative tools and technologies, including Virtual Risk Manager[58], to identify risks in a proactive way and contribute to further decreases in collisions. J&J are also involved in the leadership of a pan-European fleet safety benchmark initiative and involvement in www.fleetsafetybenchmarking.net to exchange cross-company best practices and experiences. Finally their fleet safety does not end when engaging drivers to take the road safety message home to their families and friends.

Heracles General Cement Co.

Heracles General Cement Co. in Greece, a member of Lafarge group, has implemented a wide scale road safety programme including driver training. The success of the driver training component of the programme lies in its coordination within a wider road safety programme and policy developments, the continuous nature of the training, the collaboration with contractors and a marked accent on defensive Driving training. The company achieved the target of 0 roads deaths.

In 2007, training in defensive driving of subcontractor drivers and Head Quarters personnel was implemented, as well as training of new employees though trips with instructors. A series of regular road transport safety meetings with all the companys' drivers (more than 600 in total) were launched in 2008, providing an opportunity for discussion and collaboration on safety issues.

57   Case Study Summary adapted from http://www.fleetsafetybenchmarking.net/main/repeat/sidemenu/casestudies.php
58   Virtual Risk Manager http://www.virtualriskmanager.net/main/

Finally, GPS was installed in 2009 in almost 90% of the fleet, providing information for assessing drivers' performance and their profile. As a result speed limit violations were reduced from a number of 14000 on 1,2million km in Jan 09 to 20 violations on 2,2 million km in Dec 09.

In addition to all the above, road safety is enhanced in terms of technical equipment, by the new "safe pass" of each vehicle, which certifies that the vehicle has passed specific technical inspections in certified workshops ensuring its regular monitoring[59].

Wolseley UK

Wolseley UK is part of Wolseley PLC, one of the world's largest building and plumbing suppliers to both trade and private customers. Wolseley UK operates a fleet of around 3,000 commercial vehicles throughout the UK. Wolseley UK established the Fleet Safety Steering Group, aimed at reducing the number of collisions experienced each year. A number of different initiatives are being introduced at present including some related to driver risk assessment and training. Online driver risk assessment is run based on a scheme of the Risk Foundation and using the Safe Driving Pledge program. Plans are now in discussion for a UK roll-out to 4,500 drivers and a pan-European program for 8,000+ people; followed by a global roll-out to all of the current 74,000 employees who drive as part of their work. One important element of Wolseley's driver training approach is the online driving assessment programme, which has been developed in conjunction with their insurer Zurich, designed to enable the identification of potentially 'at risk' drivers, so that preventive measures can be taken prior to any such incidents occurring. The Risk Foundation section of the online driver risk assessment has taken 15 sections of the Wolseley UK fleet safety policies at random, and tests an employees' understanding of the procedures. An employee cannot complete the assessment or move onto the next section until all the questions are answered correctly and hence the policies both read and understood. Many organisations have road safety policies but few make their interaction with their employees so live[60].

Checklist for Employers to select trainers[61]

If employers are in a country where a validated accreditation system exists, this should be their first port of call when selecting a training course. We propose that employers refer to this checklist when choosing which training for their employees. For organisations considering the implementation of BTW (behind the wheel) training, the following good practice questions to ask the training supplier have been useful in many previous cases:

a. Can you undertake a full fleet audit to ensure compliance legal requirements on work-related road safety?

b. Can you carry out risk management analysis on costs, causes and collision numbers?

c. Can you provide validated risk assessment, monitoring and evaluation tools?

d. What research and experience is the programme based on?

e. What type of training are you offering (ranging from basic skills, through defensive driving to attitude/management culture based programmes)?

f. Can you administer the programme?

g. Can you train managers, supervisors and in-house trainers if necessary?

h. Will the recommendations/interventions/training be based on a detailed needs analysis or an off the shelf package?

i. Who are your other clients (successes and failures)?

j. Do you have long term performance evaluation data?

k. Will you run an initial small scale pilot programme?

l. What are your pricing mechanisms and are there any hidden 'back end' costs?

m. Will the training require 'work time' or can it take place 'on the job'?

n. What 'shift patterns' do you work to? Is it available 24/7/365?

o. Are you registered, qualified in OHS and risk

59   EU-OSHA (2011) Managing Risks to Drivers Involved in Road Transport, Bilbao http://osha.europa.eu/en/publications/reports/managing-risks-drivers_TEWE11002ENN
60   Source for Case Study http://www.drivingforbetterbusiness.com/casestudies/wolseley.aspx
61   Adapted from Advanced 2002 and Murray et al 2009a

management and what quality badges do you have?

p. Is driver training actually what we really need, or should we be focussing on wider management culture or mobility management programme?

q. Can the solution offered cope with our volumes of drivers and data?

r. What Management Information, data warehousing and integration with our other systems is provided and how secure will our data be?

s. What long term supplier support is available?

t. How is the driver feedback and feedback to line managers managed?

u. How will the service support our Corporate Social Responsibility (CSR) and brand enhancement needs?

v. How will you support our union and change management initiatives?

w. Can the programme be implemented beyond the UK, or for international visitors to the UK, and in what languages is it available?

x. How are privacy issues managed, particularly around very sensitive data such as collisions and licence violations.

Training for Grey Fleet Drivers?

Some employees drive their own vehicles for work this is what is the so-called 'grey fleet'. A gap analysis risk assessment should be undertaken to ensure that if drivers use their own vehicles on work business that they are also included in the employers work related road safety policy. Employers need to specify minimum standards of vehicle safety features, maximum age, etc if they are being driven for work purposes. Managing the grey fleet should respect the same requirements as other company cars. Training, following a driver risk assessment, should therefore be offered to all who need to drive for work, regardless of if they are using their own cars or vehicles of the company. Also in case of an incident involving a vehicle being driven on company business must be reported and investigated for risk management purposes.

Training of others?

As well as the training of drivers, employers should also look to integrate road safety requirements into other aspects of their business. This includes training fleet managers themselves but also vehicle purchasers to integrate safe vehicle into their purchasing policies (PRAISE Thematic Report 2). In case of a transport sector training should also include those responsible for setting up scheduling to take fatigue into account. Finally training should also include educating the leadership and management of an employer to raise the understanding of integrating road safety into their management practices.

Recommendations to Employers

- Recognise and apply the business case to implementing risk assessment and training.
- As a minimum comply with aforementioned Directives.
- At the interview stage explore past collision or prosecution history and attitudes towards road safety.
- Undertake driver/rider assessment on recruitment, this should also include checking documentation; licences, driver training records and fitness to drive records and assess driving competence and attitudes.
- In case of Powered Two Wheeler also ensure for appropriate training including provision and proper use of protective equipment and clothing and check that this is being implemented by the riders (Directive 1989/391 EEC Article 13.2b).
- Integrate training needs and assessment in an ongoing system of driver monitoring.
- In case of a collision or driving incident (even when driving own vehicle for work purposes), undertake an in depth driver assessment should take place.
- Fully train drivers in all relevant aspects of their jobs. Refresher training to ensure that drivers will maintain a high level of performance over a prolonged period of time.
- Provide adequate training if the driver is required to drive a new or different type of vehicle or with in-vehicle safety technology.
- Choose accredited trainers, if this system exists, use a checklist to choose their training provider and ensure that the training delivered to tailored to the needs of the driver.
- Ensure that training sessions include reference to specific company policy on driving for work.

- Subject drivers using their own vehicles to the same recruitment, induction, assessment and training procedures as company-car drivers.
- Integrate road safety relevant themes into the professional development of other staff such as schedulers, vehicle purchasers and of course management and leadership.

Conclusion

Applying risk assessment and appropriate driver and rider training is a key part in improving road safety whilst driving for work. Examples of what can be done also illustrate the benefits of this approach. This Thematic Report has presented the main ingredients for employers to put into practice and take note of when setting up the system for driver risk assessment and training. It has also presented room for further action on the European and Member State level for improving existing legislation and initiatives.

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Preventing Road Accidents and Injuries for the Safety of Employees

Fitness to Drive

ETSC
European Transport Safety Council

PRAISE
Work-Related Road Safety

PRAISE
Work-Related Road Safety

PRAISE is a project co-funded by the European Commission and implemented by ETSC on Preventing Road Accidents and Injuries for the Safety of Employees (PRAISE). The project aims to advance work-related Road Safety Management and provide the know-how to employers who have to take on that challenge. It also aims to present the work-related road safety standards of EU Member States and carry out advocacy work at the EU level: work-related road safety is an area of road safety policy that clearly needs renewed political commitment.

Fitness to Drive
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ETSC
European Transport Safety Council

Introduction

Driving is a demanding task and the risk of crash is high when individuals are not physically or mentally fit to drive. This is especially true when looking at work related driving, since conditions such as work related stress or sleepiness resulting from driving long hours come to play a role. This report looks into Fitness to Drive in the work-related context. The first part looks at Workplace Health Promotion (WHP). Improving the health and well-being of employees is of paramount importance for employers and can play a significant role in reducing road risks. It is thanks to general well being and healthy lifestyles that significant threats to safety risks such as sleepiness, addictions to alcohol or illegal drugs or medicines and stress can be avoided. The report then zooms into three specific areas that pose specific challenges: sleepiness, alcohol, and illegal drugs and medicines. This report covers existing legislation, examples of initiatives and case studies, and recommendations to the EU, to EU Member States, and to employers.

Part 1: Workplace Health Promotion

Workplace health promotion (WHP) is of paramount importance, but it is also a real challenge for employers. Indeed workplace health promotion taps into matters such as lifestyle, work/life balance, and general wellbeing. The challenge therefore stems from the fact that lifestyle is a private issue, and employees can therefore only be encouraged to change certain behaviours, but can never be forced to do so[1]. The starting point for employers to address road risk of their employees is always to conduct a risk assessment in order to identify and list the factors that can lead to collisions and understand their magnitude (this is also a legal requirement following the European Directive 89/391[2]).

Employers are very likely to find that a large number of driver related risk factors are related to health: stress, sleepiness, distraction, ageing staff, unhealthy diet, consumption of alcohol, illegal drugs or prescription medicine, pre-existing diseases, smoking and lack of exercise. When it comes to professional drivers, a number of sector-related health conditions are also frequent: lower back pain, being overweight, cardiovascular and respiratory disease, and work-related stress[3]. This is also amplified by the fact that the population of professional drivers is an ageing group. Drivers have to work under time pressure in a highly competitive environment providing a broad spread of tasks required by clients[4]. Alarming for example is a European survey on stress indicating that the steepest growth in the number of employees under acute work-related stress between 1995 and 2000 was recorded in the transport and communication sector: from 27.2% to 36.9%[5]. Such conditions are of course undesirable in themselves, but can also lead to collisions resulting in material damage or casualties.

Specifically, truck driving is a stressful job. This is due to the long and irregular working hours, pressure to deliver on time as well as the physical demands of driving and managing the traffic related context. Such pressures can have short, middle and long term implications for the physical and psychological impact on behaviour. A new project in Germany surveyed over 500 HGV drivers on the influence of work stress and individual management of stress[6]. Results showed that the driver works on average more than 63.2 hours a week, of which 46.6 are purely for driving. More than a third of drivers (36%) have problems respecting the driving and rest times set by legislation. According to the survey the main cause of stress is the driving environment, followed by a lack of parking and resting areas, risky and aggressive behaviour of other drivers, bad roads, traffic density and traffic jams. With the increasing working hours, the driver is away from home for longer hours and expected to fulfil other non driving tasks which build up the levels of stress. Recommendations of the BAST Study, such as respecting EU legislation on driving times, are supported in this ETSC report.

WHP encompasses everything done by employers, their employees, and society to improve the health and well-being of people at work. Here are examples of a few WHP measures that employers can implement: enabling flexible working times; offering teleworking when appropriate; offering

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1   EU OSHA European Agency for Safety and Health at Work (2010), FACTS 94 *Workplace Health Promotion for Employees* http://osha.europa.eu/en/publications/factsheets/en_94.pdf

2   For more information see PRAISE Thematic report on Risk Assessment and Driver Training: http://www.etsc.eu/documents/PRAISE%20Report%202.pdf

3   EU OSHA European Agency for Safety Health at Work, (2009), FACTS 47 *Health Promotion in the Transport Sector* http://osha.europa.eu/en/publications/e-facts/47.pdf

4   Eurofound European Foundation for the Improvement of Living (2004) *EU road freight transport sector: work and employment conditions* http://www.eurofound.eu.int/publications/htmlfiles/ef03102.htm

5   Eurofound European Foundation for the Improvement of Living and Working Conditions (1997), http://www.eurofound.europa.eu/publications/htmlfiles/ef9726.htm

6   Implications of the Stresses and Strains on Traffic Behaviour of HGV Drivers (BAST) 2010.

healthy canteen food; offering sport and relaxation classes; offering courses on social competence like dealing with stress. WHP requires commitment from both sides, employers and employees[7], and as with every safety endeavour WHP works best when it is part of a safety culture endorsed at all levels of an organisation, starting with senior management.

Drivers should be aware that it is their responsibility to refrain from driving if they recognise that they are impaired. Employees should also be expected to inform their employer if they are under medication that could temporarily impair their driving. This information should be transferred by the medical doctors. This must at the same time respect doctor-patient confidentiality and privacy protection. If the medical condition requiring the need to take medicine persists then work should be adapted to take different ability, including possibly refraining from driving into account. There is considerable variation in response among individuals to many classes of medication. The user has the major role in self-monitoring. A higher level of precaution is required for drivers of large vehicles, in the emergency services and for some workplace drivers. Employers, such as bus and truck companies, police and fire services, may place additional obligations on drivers to report medication use to the organisation´s occupational health adviser or to their supervisor before commencing duty[8].

Absence of illness does not mean fitness

Significant health conditions that impair the driving task can prevent a driver from obtaining or renewing a driving licence. Yet the absence of illness does not necessarily mean matching all the conditions required for fulfilling those to be fit to drive. Medical checks performed when obtaining a driving licence or offered by the employer can help in detecting specific medical conditions or illnesses. Fitness or well being are conditions that need to be promoted through WHP measures and checked with appropriate means and measures.

Business Case

Beyond duty of care and legal obligations, a successful organisation will benefit in a number of ways from WHP, and it therefore makes sound business sense to ensure that employees are fit to drive. This can be illustrated by: reduced absenteeism; fewer collisions resulting in material damage or even casualties; enhanced motivation; improved productivity; easier recruitment; increased turnover; a positive and caring image. Research shows investment in WHP yields a return on investment of one to 2.5 – 4.8 in reduced absenteeism costs[9].

Existing EU legislation with relevance for drivers' health

Two EU Directives have important implications also for work related driving and drivers' health. A new EU Driving Licence Directive was adopted in 2006 (2006/126/EC). This legislation plays a role in influencing road safety at work in two ways: by setting questions related to fitness to drive during theory tests to obtain a licence; and by harmonising medical checks and minimum standards of physical and mental fitness needed to obtain and renew licences. Questions on the following subject must be included in theory tests (Annex II of the Directive):

- Point "2.1.2." of the Directive (to obtain all licences):
§ *Importance of alertness and of attitude to other road users;*
§ *Perception, judgment and decision-taking, especially reaction time, as well as changes in driving behaviour due to the influence of alcohol, drugs and medicinal products, state of mind and fatigue.*
- Point "4.1.1." of the Directive (only to obtain licences in categories C, CE, C1, C1E, D, DE, D1, D1E: Group 2 drivers):
§ *Rules on driving hours and rest periods as defined by Council Regulation (EEC) No 3820/85 of 20 December 1985 on the harmonisation of certain social legislation relating to road transport; use of the recording equipment as defined by Council Regulation (EEC) No 3821/85 of 20 December 1985 on recording equipment in road transport.*

This legislation also notably harmonises the minimum frequency of medical examinations for the renewal of driving licences in categories C, CE, C1, C1E, D, DE, D1, D1E (Group 2 drivers). Indeed, as from 19 January 2013, licences issued by Member States for such categories shall have a maximum administrative validity of 5 years (Members States

7 EU OSHA (2010) *OSH in figures - Occupational Safety and Health in the Transport Sector* - http://osha.europa.eu/en/publications/reports/transport-sector_TERO10001ENC
8 Carter, Tim (2006) *Fitness to drive. A guide for health professionals.* The Royal Society of Medicine Press Limited London, 103-107
9 Kreis, J. and Bödeker, W. (2004) IGA Report 3e *Health-related and economic benefits of workplace health promotion and prevention* http://www.iga-info.de/fileadmin/texte/iga_report3e.pdf

can opt for less than 5 years if they wish so). Obtaining the licences and renewing these licences after this maximum 5 years administrative validity is subject to the continuing compliance with minimum standards of physical and mental fitness for driving set out in Annex III of the Directive (this includes indications regarding a range of abilities, health conditions, or health deterrents including: sight; hearing; locomotor disability; cardiovascular diseases; diabetes mellitus; neurological disorders; mental disorders; alcohol addiction; systematic use of drugs and medicine products; renal disorders; and other miscellaneous requirements).

A Directive on Driver Training of professional bus and truck drivers (2003/59/EC) also recently came into force. This aims to provide better training for professional drivers who must now pass an initial qualification and undergo hours of periodic training. An Annex to this directive includes a number of subjects that must be incorporated into the initial qualification and periodic training of drivers, including:

- Point "3.3" of the Annex 1 to the Directive, with the objective to prevent physical risks: ergonomic principles; movements and postures which pose a risk, physical fitness, handling exercises, personal protection.
- *Point "3.4" of the Annex 1 to the Directive with the objective of raising awareness of the importance of physical and mental ability: principles of healthy, balanced eating, effects of alcohol, drug or any other substance likely to affect behavior, symptoms, causes, effects of fatigue and stress, fundamental role of the basic work/rest cycle.*

The European Commission Road Safety Unit has set up working groups of experts meeting regularly to discuss a number of topics relevant to "Fitness to Drive". One of those is the working group on alcohol, drugs, medicines and driving. The group will provide the Commission with science-based recommendations for possible measures to be implemented in order to reduce drink/drug-driving, including the appropriate use of alcohol interlocks systems, rehabilitation schemes, and classification of medicines according their impact on driving capacities.

The Commission has a regulatory Committee dealing with Driving licence issues, in which all Member States participate. The Driving Licence Directive contains a special medical Annex (III) on minimum standards of physical and mental fitness. One of the tasks of the Committee is to regularly update this Annex according to technical and scientific developments, as it was the case with the driving licensing possible to patients affected by diabetes, epilepsy and eyesight problems. At present the Commission had asked for a similar revision concerning drivers affected by cardiovascular diseases.

EU Level Initiatives

The European Agency for Health and Safety at Work[10] included health and safety of transport workers as a main element of its work programme for 2008-2010. The objectives are to support the exchange of good practice information in the sector and the sharing of experience by providing examples of preventing occupational risks in road transport and how to promote OSH good practice and raise awareness of OSH issues within the sector.

Resources include a web feature and a database of links to good practice; case studies[11] on preventing occupational risks in road haulage and bus driving; review of good practice information available for taxi drivers, motorbike and bicycle couriers; and a review of some specific collisions in the sector and lessons learnt from them.

This work includes a broad range of occupational risks to transport drivers, not just road safety issues and driving hazards, but also: loading, unloading vehicles; falls climbing in and out of cabs; rest and toilet facilities; vehicle design and maintenance; musculoskeletal and vibration related disorders; hot and cold cabs; stress; violence from members of the public.

The EU OSHA project also recognises that drivers are not a homogenous group and will consider older drivers, young drivers, women drivers.

National Level Initiatives

A lot can be done at the national level to encourage employers to undertake WHP. Governmental schemes, via financial incentives or simply via the provision of information and services, are vital to get employers on board, including small and medium size companies that might otherwise not be willing or even able to identify WHP as one of their concerns.

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10   http://osha.europa.eu/en and http://www.virtualriskmanager.net/main/aboutus/niosh/written-paper_eu-osha.pdf
11   EU OSHA has published a number of Case Study Reports (2008) on the Protection of Drivers from different sectors which are included in this report.

Finland: investigation of truck drivers' health

Despite the current requirement for medical examinations of professional drivers (Group 2) based on the EU Driving Licence Directive (above), the Finnish Institute for Occupational Health (FIOH) found that the physical condition of truck drivers is poorer than that of employees in most other occupations.

FIOH therefore ran a project[12] to find an optimal set of screening tests – either questionnaires or physical tests – that can be used to detect truck drivers' health problems. They examined the health status and well-being of 65 male long-distance truck drivers in a Finnish truck company in 2005-2006 and obtained the following results: 50% of the drivers complained of sleep deficit or other problems in alertness; 20% had a clinically significantly impaired lung function, which was related to tobacco smoking; 50% of the drivers were at increased risk of cardiovascular disease (2/3 had high blood pressure); and 40% of the drivers fulfilled the criteria for metabolic syndrome. These results led to the following recommendations:

- Attention should be paid to the very first, however slight, signs of risk factors of cardiovascular disease and alertness and sleep disorders, which demand early intervention.
- Improving the lifestyle of professional drivers requires attention in areas such as exercise, smoking, healthy meals and snacks, alcohol use, and sleep deficit. Standardised and tailor-made questionnaires and physical examinations and laboratory tests are needed to assess the individual health risk of drivers.

Photo 1: Transport enterpriser Pentti Koskinen[13]

These findings lead to the conclusion that the EU Driving Licence Directive medical requirement should be interpreted as an absolute minimum requirement. The drivers need knowledge about the physical effects of inactivity and long working hours on their health and their alertness and work performance. Health condition or risks should be detected early, the reasons of risks should be examined, and interventions should be directed to the reasons of risk to support work capacity.

Germany: DocStop

The medical support for drivers of heavy goods is a problem. Heavy goods vehicle drivers are often on the road for a long time and have limited possibilities to consult a doctor, which can lead to the driver driving with health impairments or taking medicine which is not specially prescribed.

The aim of DocStop is to improve medical care of haulage drivers in transit on European transportation routes by building up a medical information and supply network for drivers. Drivers who need medical attendance should have the possibility to consult a doctor while being on the road. DocStop was established as a pilot project in 2007, based on a survey carried out in Germany in which suggestions to improve the situation were made. A network of contact points at truck stops has been established. These are located within 4 kilometres of medical facilities. Good support for the project has enabled the provision of a medical care system for haulage drivers throughout Germany. Information and communication methods to promote the project such as TV, radio, flyers, trade organisations and personal dialogue with drivers are used. The project was initially run in Germany and is offering information for transit HGV drivers on the availability and location of physicians in several languages. The project and is now being implemented at the European level.

DocStop is supported by many organisations and enterprises in Germany and Switzerland e.g. Germany's Statutory Collision Insurance for the vehicle operating trade, BGF, BGL, ADAC, MAN, Mercedes Benz, Swissdrivers etc. About 200 contact points have already been created, situated at rest areas along the highways. Docstop appears to be well accepted by drivers and has support from the sector[14].

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12   EU OSHA Programmes, Initiatives and Opportunities to reach drivers and SMEs in the Transport Sector (2008) http://osha.europa.eu/en/publications/reports/campaigning-transport_TEWE10005ENN
13   Photographer Olli Blomberg. The picture is not related to the research described above
14   For more information: http://www.docstoponline.eu.

"Get the Risk Out" Campaign, Germany

Also in Germany a new campaign called "Get the Risk Out" to reduce the collision risk whilst driving and transporting goods has been launched in January 2010 by the German Social Collision Insurance, and will be run in co-operation with the German Federal States and the German Road Safety Council (DVR), and will run for two years. The central theme of the campaign is for drivers to focus on the driving task. Many of the causes of the collisions relate to carelessness and overestimation of one's own abilities. The campaign aims to stress the need to improve working conditions so that time pressure and stress don't come into play in the first place and generally to increase risk awareness and more thoughtful working. It targets employees, trainees, school pupils, as well as employers, leaders of companies and those responsible in business for health and safety and teaching at school and at vocational training colleges.

Furthermore, the German Road Safety Council has developed a chapter of a website for young drivers entitled "Move on"[15] in the context of its work-related road safety activities. It aims to inform young drivers on issues relating to fitness to drive and to work including drugs and alcohol and sleepiness. A recent article includes for example precautions to take if driving when diagnosed with diabetes[16].

United Kingdom: Department for Transport's cycling to work scheme

The advantages of more walking and cycling for public health and environment (reduced mortality and healthy lifestyles through regular exercise) outweigh their disadvantages (the risk of death or injury)[17]. In the UK to promote healthier journeys to work and to reduce environmental pollution, the 1999 Finance Act introduced an annual tax exemption, which allows employers to loan cycles and cyclists' safety equipment to employees as a tax-free benefit. The exemption was one of a series of measures introduced under the Government's Green Transport Plan. Guidelines[18] clarified how organisations can take advantage of the exemption to implement a Cycle to Work scheme that encourages employees to cycle to work and allows employers to reap the

benefits of a healthier workforce. This means that an employee can purchase a bike and associated safety equipment (helmets, high visibility clothing, lights etc.), from their gross income, payable as instalments over a 12 month period.

Recommendations to EU and Member States

- Remind employers that employees' ill-health should be considered as part of their risk assessment under Directive 89/391, and promote WHP as the most efficient tool to combat ill-health.
- Promote the Business Case for WHP to employers.
- National Health and Safety strategies should include measures to combat the health risks associated with road transport, for professionals in the road transport sector in particular.

Recommendations to Employers

Employers have an important role to play in promoting health in the workplace. Clearly this can be boosted with the understanding of the business case for health promotion. Ill-health invariably means reduced productivity and increased absenteeism, and should therefore be a core concern for employers. Healthy lifestyles can be promoted in a number of ways, but it is important not to invade employees' private life and consult them when taking decisions and offering new services. It is important for employers to understand that complying with health and safety regulations are only minimum requirements, and is not necessarily enough to reap the benefits of having a healthy workforce.

Good practice

"Rahtarit ry" in Finland

Rahtarit ry, the Finnish organisation of truck drivers, which is a member of the international organization, UICR (Union Internationale des Chauffeurs Routiers) together with the Finnish Health Association and the Dairy Nutrition Council in Finland ran a campaign entitled: "A Healthy Driver Can Cope"[19]. The goal of this campaign has been to promote the health and well being of employees in the transport sector. Two different approaches were used, one aimed at drivers and the other aimed at service providers.

15 http://schueler.nextline.de/webcom/show_softlink.php/_c-18/_cmt-23cc0473613e5fa21e1f9f22a66c3101/i.html.
16 http://schueler.nextline.de/webcom/show_article.php/_c-5/_nr-274/i.html
17 Sælensminde, K., 2004. Cost-benefit analyses of walking or cycling track networks taking into account insecurity, health effects and external costs of motorized traffic. Transportation Research Part A 38, 593–606.
18 http://www.dft.gov.uk/pgr/sustainable/cycling/cycletoworkguidance/
19 EU OSHA Protection of Passenger Road Transport Drivers (2008).

There is coherence between the health of the drivers and traffic collisions and so the objects of attention were healthy nutrition, physical education, and other topics including also the moderate use of alcohol. Parts of the campaign included informing drivers via the membership magazine of the Truck Driver organisation. Also over 500 truck points/resting places all around Finland participated in the project by providing healthy meal alternatives for truck drivers and by distributing health-education materials. Multiple fit-to-drive events were organised in the truck points/resting places and in connection with various trade fairs all around Finland. These events comprised measuring the public's cholesterol, blood pressure, and carbon monoxide, as well as personal health education. Part of the projects have been incorporated into the everyday practice of many truck points/resting places. This project also serves as an excellent example of how collaboration between different organisations in health promotion can benefit truck drivers. The long-term impact is difficult to measure, because of the general raising of health awareness.

Bertschi AG, Germany

A chemical transport company Bertschi AG[20], has a strategy to reduce the number of road traffic collisions and workplace collisions involving heavy goods drivers. They set a 50% reduction target to be reached in 5 years, as well as to ensure a high effectiveness of the system with constantly checking the observance of safety rules. Regular individual training sessions are held. During these training sessions drivers are made aware of a number of policies Bertschi AG have developed to improve safety. Alongside a policy of no phone calls during driving, constant use of seat belts, a zero alcohol principle is included. The training is followed up as the driver has to pass an individual check at regular intervals - either on the road or at the loading or unloading places. The respective head of department follows the heavy goods vehicle with his own car and observes the mode of driving and loading/unloading of the driver in question. In line with the practical side of checking the driving, drivers are tested for alcohol at regular intervals.

Recommendations to Employers

- Require medical examinations when employing new staff, and periodical examinations for existing staff. Regarding commercial drivers of group 2 vehicles, the respect of the medical requirements of the Driving Licence Directive should be interpreted as a strict minimum and not necessarily a definite indicator of fitness to drive.
- Implement WHP measures in the workplace which may include: enabling flexible working times; offering teleworking when appropriate; offering healthy canteen food; offering sport / relaxation classes; offering courses on social competence like dealing with stress / training on proper sitting position when driving.
- As a minimum provide information to employees about the occupational health risks associated with their job and preventative measures.

Part II Sleepiness

Scope of the problem

The human body's natural sleep wake cycle means that most people feel sleepy twice a day (at night and in the afternoon), drivers are therefore more likely to fall asleep when operating vehicles at that time[21]. Crashes caused by tired drivers are most likely to occur on long journeys on monotonous roads, between 2am and 6am, between 2pm and 4pm, especially after eating or drinking even one alcoholic drink[22]. A small part of the general population (3-5%) also has to cope with obstructive sleep apnoea, a sleeping disorder which contributes to above average day-to-day sleepiness[23]. However, in Finland results from a survey involving 1097 heavy vehicle drivers indicated that one fifth of drivers suffered from sleep apnoea[24]. Sleepiness manifests itself in slower reaction time, diminished steering performance, lesser ability to keep distance to the car in front, and increased tendency to mentally withdraw from the driving task. The withdrawal of attention and cognitive processing capacity from the driving task is not a conscious, well-planned decision, but a semi-autonomic mental process of which drivers may be only dimly aware. The causes of sleepiness are sleep loss, time awake, circadian phase, and time on task, and not sleeping enough. Sleepiness can also be linked to alcohol, stress, obesity, medicines, and sleep apnoea as mentioned above. It has also been observed that problems of

20   EU OSHA Protection of Road Haulage Drivers (2008).
21   TIRF Traffic Injury Research Foundation, (2009), *The Facts About Fatigued Driving in Ontario A Guidebook for Police* http://www.tirf.ca/publications/PDF_publications/2009_Facts_Fatigue_Driving_Ontario_Police_Guidebook.pdf
22   ROSPA Royal Society for the Prevention of Collisions, *Fatigue Facts* http://www.rospa.com/roadsafety/advice/driving/fatigue_facts.htm
23   http://ec.europa.eu/transport/road_safety/specialist/knowledge/fatique/index.htm
24   Millies, B.A., *Truck and Bus Driving,* ILO, Encyclopedia of Occupational Health and Safety, 4th Edition, Vol.3, pt XVII, Ch. 102 , 1998. http://www.worksafesask.ca/files/ilo/tra09ae.html
Partinen, M., Hirvonen, K., Unikuorma ,(2005), Final report from the Finnish Work Environment Fund (100344), 24.3.2005.

sleepiness are greater among young drivers.

While it is difficult to detect sleepiness and therefore estimate the number of collisions caused by it, sleepiness is an important contributory factor in a large proportion of road crashes (range 10-20%). Sleepiness is associated with increased risk. A person who drives after being awake for 17 hours has a risk of crashing equivalent to being at the 0.5 g/l blood alcohol level (i.e. twice the normal risk)[25]. The increased risk often results from a combination of biological, lifestyle, and work-related factors. In Great Britain research shows that up to 20% of collisions on monotonous roads, such as motorways, are fatigue related[26]. In the United States it is believed that up to 20% of serious crashes may be due to fatigued or drowsy driving[27].

Importantly, drivers do not seem to be using the best options to reduce sleepiness. For example, a public opinion survey in Canada concluded that drivers rely upon: opening windows or turning on the air conditioning (43.7%), talking to passengers (34.2%), stopping to eat or exercise without sleeping (31%), and changing radio station or CD (30.4%)[28]. Employers need to deter their employees driving for work from relying on such techniques. The only viable solution it to adopt a proper sleep pattern and, when experiencing sleepiness to stop and have a nap. This should be embedded within an employer's Driving at Work Policy, with clear limits of both time and distance and an encouragement to use hotels or alternative transport.

Sleepiness in the professional transport sector

A major risk factor affecting driving for work is sleepiness. Working in this sector is not characterised by the typical "9 to 5" working hours. Research shows that driver sleepiness is a significant factor in approximately 20% of commercial road transport crashes. Surveys show that over 50% of long haul drivers have fallen asleep at the wheel. Increased crash risk occurs at night (peak levels at night can be 10 times daytime levels), the longer the working day and with irregular hours. Those sleepiness factors that

have been shown to influence road safety need to be better controlled in regulation policy and risk management. The most important factor that will ensure safety is to effectively implement and enforce regulation[29].

There are several scientific studies reporting the negative health effects of non-standard working hours and possible psychosocial problems, both short-term effects and long-term associated health effects. Night work also has an impact on traffic collisions: if a collision occurs at night, the risk for a serious collision is much higher. According to the European Survey on Working Conditions[30], workers in the sector transport over land seem to work shifts more than the average European worker (about 26.8% of the transport workers reported they work shifts against 16.1% of the average working population). They also seem to work more often on Saturdays and Sundays than workers of the average working population. They also work more often more than 10 hours a day than the average worker: 43.1% declared never working more than 10 hours a day (against 59.7% for the normal working population), 14% declared working more than 10 hours a day 11-20 times a month (against only 5.9%), and 6.8% more than 20 times a month (against 4.2%).

While working times have been discussed extensively for road transport, a lot still remains to be done regarding the other transport subsectors, and public transport. While there is specific European legislation in place for professional drivers of heavy goods vehicles, groups including self-employed drivers, non vocational drivers who nevertheless work on the move (for example plumbers) and drivers of vans or company cars do not have to comply with this legislation. Such drivers are however often exposed to very long distances or long hours of driving and are therefore particularly at risk.

Sleepiness and other vehicle drivers

Sleepiness is a major source of concern for the transport sector but it affects other driving groups too. Shift workers are a particular group that should not be overlooked. Collisions are particularly frequent on journeys home after

25 http://ec.europa.eu/transport/road_safety/specialist/knowledge/fatique/index.htm
26 ROSPA Royal Society for the Prevention of Collisions, Fatigue Facts http://www.rospa.com/roadsafety/advice/driving/fatigue_facts.htm
27   Horne, J.A., (2000), *Time of Day, road characteristics and awareness*. In T. Akerstedt, P-O. Haraldsson (Eds.) *The Sleepy driver and pilot, Book of Abstracts*. Institute for Psychosocial Medicine, Karolinska Institutet, Stockholm, pp. 10-11
Horne, J.A., Reyner, L.A., (1995), *Sleep-related vehicle collisions*. British Medical Journal, 310: 565-567
28 TIRF Traffic Injury Research Foundation, (2009), *The Facts About Fatigued Driving in Ontario A Guidebook for Police* http://www.tirf.ca/publications/PDF_publications/2009_Facts_Fatigue_Driving_Ontario_Police_Guidebook.pdf
29 ETSC, (2001), The Role of Driver Fatigue in Commercial Road Transport Crashes   http://www.etsc.eu/documents/drivfatigue.pdf
30 Eurofound European Foundation for the Improvement of Living and Working Conditions, (2005), *Data extracted by Prevent for OSH Data Collection 2007*, http://www.eurofound.eu.int/working/surveys/index.htm

night shifts[31]. Shift workers work irregular hours and their sleep patterns are therefore disrupted, they also do not always work the same shifts which can be particularly confusing for their body clock. Night time workers are particularly prone to be tired on journeys home returning from work even if they sleep enough hours during the day. Employers of shift workers should therefore particularly be aware of the risks of sleepiness.

Many drivers who drive for work are not covered by all the regulations, such as driving time (e.g. company car drivers or van drivers) but are nevertheless on the road for many hours. Vans for example are not regulated like heavy goods vehicles and this might be a drive that encourages transport companies to shift their loads to vans. Non-vocational drivers aren't required to have vehicle equipped with tacographs either. However, through the deployment of telematic systems, it is possible to record and maintain a record of an individual's driving hours. This can enable companies to adopt and enforce internal policies on working hours for all their drivers, irrespective of which type of vehicles they drive.

European legislation and initiatives

The Working Time Directive (Directive 2002/15/EC) which applies to all mobile workers (excluding the self employed) performing road transport activities limits weekly working time to 48 hours, although weekly hours may increase exceptionally to a maximum of 60. The Directive also entails restrictions on night working and enforces rest breaks. The Driving Time and Rest Period Regulation (EC 561/2006) aims to introduce clearer and simpler rules about driving times, breaks and rest periods for professional drivers operating both in national and international transport. The basic principle is that by requiring a regular weekly rest period at least once per two consecutive weeks and a daily rest period, social conditions for drivers and road safety should be improved.

Legislation covers recording equipment (tachographs) with Regulation EEC 3821/85 amended in 1998 to introduce digital tachographs. Directive 2006/22/EC identified minimum levels of enforcement required to secure compliance with the rules set out in the Driving Times and Rest Periods and the Tachograph Regulations. It provides common methods to undertake roadside checks and checks at the premises of undertakings

as well as promoting cooperation between Member State authorities in charge of road transport enforcement. The European Traffic Police Network (TISPOL) for instance runs targeted campaigns throughout Europe to enforce traffic rules concerning trucks, including driver's hours & tachograph offences[32].

EU legislation covering vehicle safety has also an impact on work related road safety as under the new Vehicle Safety Regulation 661/2009 trucks and other heavy vehicles must be fitted with Lane Departure Warning (LDW) Systems as of 2013. Lane Departure Warning devices can be effective in managing drivers experiencing sleepiness. Lane changing represents 4 to 10% of all crashes. Here too the emphasis is on heavy vehicles.

As part of the European ITS package, a Directive includes developing specifications for ITS applications and services. Appropriate measures on secure parking places for trucks and commercial vehicles and on telematics-controlled parking and reservation systems is one of only four chosen priorities. Once in place this will better allow commercial drivers to plan their journeys and resting.

National level initiatives

A lot can be done at the national level, both in terms of targeting the professional transport sector but also the general population of drivers. Raising awareness about this matter is particularly important as most drivers are unaware of the risks associated with sleepiness. One further aspect of this problem is that drivers do not feel they are infringing any traffic rule (as opposed to more conventional traffic offences like drink driving, speeding, or not wearing one's seat belt). Below are some examples of national initiatives.

Italy

"Geososta" is a website created by the Fondazione ANIA (a road safety foundation created by insurance companies) that provides information regarding the location of rest areas and secure parking sites on the Italian road network[33]. It is meant for professional drivers of heavy good vehicles but anyone can use this website. It also contains information about the parking capacity and facilities available on the sites to allow drivers to plan their journey. Digital maps containing the

31   ROSPA Royal Society for the Prevention of Collisions, *Fatigue Facts* http://www.rospa.com/roadsafety/advice/driving/fatigue_facts.htm
32   For information about the 2008 'Operation Truck' campaign visit: http://www.tispol.org/node/3602
33   http://sosta.smaniadisicurezza.it/

location of rest areas can be downloaded from this website onto GPS, and satellite pictures of the rest areas are also provided on the website (using "google earth") so one can see what the areas look like when you planning the trip ahead. Further, by registering on the site one is able to modify or add information regarding the amenities of the sites already visited. Geososta aims to provide information to drivers on where to rest, but also importantly on where they are likely to be safe and avoid theft while resting, as this is a recurrent source of concern among professional drivers in Italy as elsewhere.

United Kingdom

In the United Kingdom driver sleepiness is estimated to account for around one fifth of collisions on major roads, and is responsible for around 300 deaths per year. The March 2008 THINK! Driver tiredness campaign was therefore launched as part of a wider Driving for Work campaign. Research has shown that people who drive for work behave in a risky way on the road, including driving while tired. The campaign has been developed with the work driver as a key target audience. Video clips, audio clips, posters and adverts, and publications about this campaign can be accessed online: http://think.dft.gov.uk/think/mediacentre/237144/drivingforwork1

Photo 2: Source www.businessdriver.eu

Germany, Austria, Spain and Poland Computer Based Training Programmes for Sleepiness

The EU co-funded project[34] ERIC has adapted a Computer Based Training Programme (CBT) on sleepiness and driving (and driver physics) for drivers in Austria, Spain and Poland. The programmes were already developed by the German Road Safety Council and were translated (including audible and written components), and adapted to the drivers and the different driving conditions in the other countries. They were then tested at several seminars involving different types of drivers in each partner country. The CBTs were further adapted based on the input during the pilots. The programme covers different aspects of sleepiness explaining for example the origins, how one can recognise sleepiness and what can be done to counter it including hints for everyday life. This is followed by a test. The project also assessed the availability of teaching and learning materials concerning sleepiness and the physics of driving and will publish a state of the art review. The final CBTs are being disseminated throughout the partner countries; a special effort is also being made to reach SMEs.

Recommendations to the EU and the EU Member States

- Target professional drivers with measures to combat sleepiness. This can be achieved through information, education and training about the dangers of driving when tired. Efforts should be made to target transport subgroups such as self-employed workers, drivers of vans and other non-heavy vehicles.
- Ensure there are consistent levels of enforcement of working time across the EU with penalties designed to strongly influence behaviour towards compliance.
- Extend the fitting of lane departure warnings that can pick up sleepiness also to non-heavy vehicles (more details can be found under PRAISE Thematic Report 2 on in-vehicle safety technologies: http://www.etsc.eu/documents/PRAISE%20Report%201.pdf
- Invest into research and development of technical devices to detect when drivers are feeling sleepy and provide warnings to them or even take control of the vehicle whilst restricting the levels of distraction that such devices could bring about.
- In the future, legislation concerning working and rest hours may be further improved and vehicles can be equipped with devices that detect sleepiness-related decrements in driver performance.
- Roads may be equipped with edgelines or centrelines that provide audio-tactile feedback when crossed over.

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34   Experiencing CBT Programmes in Road Safety in the European Community http://www.uv.es/proeric/index.wiki

- To prevent head-on collisions the installation of median barriers on two-lane main roads with a speed limit of 80 km/h or higher should be considered[35].
- Provide information regarding the location of rest areas and secure parking sites to allow transport workers to plan their journeys.

Company level initiatives

Companies, especially transport companies, are encouraged to ensure that prevention measures are incorporated in their operations to combat driver sleepiness. This can be done in many ways such as applying strict internal policies (such as maximum driving hours or distances allowed while on duty), or providing information to their employees and drivers about the risks associated with driving sleepiness and the ways to combat it.

Tyvi Freight, Finland

An operations online management system has been developed and used by the Tyvi freight transport company for the management of regular working hours and working shifts along many other operations management applications. It is an intranet and internet-based system and enables to combine all information needed in the company in real time and therefore allow real-time management through bi-directional communication between the employer and the driver. Although the online system mainly helps Tyvi to improve its service to customers, it also enables improved drivers' working hours, and is thus a tool for enhancing workers' well being at work. In particular this allows the company to plan more "normal" working hours for drivers, i.e; shorter working days and more predictable, regular shifts. The system includes work and customer instructions, service instructions, laws and regulations concerning the transport business, and instructions for drivers on giving daily reports to the company[36].

Swisscom Schweiz AG

Swisscom has launched a fatigue and distraction campaign in 2010 targeting all employees (4,000 fleet cars). It has adopted a Vision: 0 serious and fatal collisions. The goals are to improve road safety of employees; prevent damage to their image and operational disturbance and reduce vehicle damage. The measures adopted include disseminating information to all employees, sending a newsletter fleet car drivers, education and instruction of multipliers. This includes branch managers and safety agents. Exhibition with panels in buildings are also arranged as are quizzes and prizes, involving all employees and apprentices, some of whom attend the exhibition.

United Kingdom

A major UK mobile telecommunications provider has a specific policy working around tired driving. Below is an extract from their current Driving at Work policy:

- Tiredness kills – Take breaks at least every 2 hours or 100 miles, get out of car and walk about for at least 10 minutes.

- When travelling on a long haul flight you should not drive on arrival at your destination until you are absolutely sure that you are over "jet lag" or the general tiredness brought on by travel. It is recommended that you take a taxi or are met by a friend, colleague or family member.

- Driving excessive distances in one day (e.g. 3hr drive with 6-8 hours in the office then a further 3 hour drive), journeys of this type should be avoided; make an overnight stay to break the working day.

Recommendations to Employers[37]

- Where long journeys cannot be undertaken without a significant risk of sleepiness, consideration should always be given to alternatives such as videoconferencing or alternative transport modes.
- Written guidelines on eliminating driver sleepiness are included in the health and safety management policy and driver handbook.
- Limits are to be set on acceptable driving durations and distances through consultation with employees.
- Drivers are made aware of the dangers of sleepiness and are advised on strategies to manage it. This should include line managers to ensure drivers are made aware of the need to get an adequate amount of good quality sleep before starting to drive, and asking drivers to take a 15 minute break every 2 hours (journeys should therefore be planned accordingly to allow for that).

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35 Lintu Reports 3/2006: www.lintu.info
36 EU OSHA (2008) *Protection of Road Haulage Drivers*, TC WE 2008 Task 1.3.4 Case Studies Report
37 Partly adapted from Will Murray, Interactive Driving Systems, Fleet Safety Gap Analysis; ROSPA Fatigue Facts; ROSPA 2002

- Employees should be reminded of the dangers of common practices such as 'moonlighting' (having a second job in the evenings), spending too long engaged in evening hobbies, etc. Most important, employers must stress that when feeling sleepy drivers must stop in a safe place as soon as practicable.
- The current shift patterns, journey planning, employment contracts and work schedules do not contribute to driver sleepiness and stress. As a minimum journey schedules, appointments and routes must enable drivers to stay within the Law.
- Employees should be asked to report to their managers when their sleep may be interrupted, for example by having to care for young children or sick or elderly relatives at home during the night, etc. They should be reassured that this will not lead to discrimination.
- Consideration should always be given to allow employees to 'overnights' away from home when on a work trip.
- Reactive monitoring: drivers should be encouraged and thanked for reporting instances when they felt tired at the wheel, and crashes while driving for work should be investigated to determine whether sleepiness may have been a contributory factor.
- Particular consideration should be given to night shift workers especially regarding journeys home after work, for example providing taxis home or sleeping facilities on site.
- Based on priorities identified in the risk assessment include in-vehicle technologies to combat sleepiness.

Part III Alcohol and Work Related Road Safety

Scope of the problem: drink driving

Driving whilst under the influence of alcohol contributes annually to around 10,000 deaths on EU roads. In the EU as a whole, at least 1% of journeys are associated with an illegal Blood Alcohol Content (BAC)[38]. National data show that typically 15-25% of deaths are associated with alcohol impairment of an active collision participant. Even more dangerous, a combination of alcohol and drugs can represent an even more powerfully impairing combination further raising collision injury risk.

The business case for addressing alcohol impaired driving in the workplace is strong. The vast majority of citizens with alcohol problems are employed full time. Employers can reap productivity gains and savings from a reduction in alcohol-related vehicle crashes[39].

Drivers of HGVs

In terms of demographic characteristics, a consistent picture of characteristics over-represented among drink-drivers emerges across a number of studies. These drivers are more often than average male, aged 18-24 years old, coming from a low socio-economic grouping, single or divorced, in a blue collar occupation, of low education and limited literacy and of low self-esteem[40]. But neither of these characteristics should be taken for granted. Given these characteristics of drink-drivers, it can be argued that drivers of commercial vehicles tend to have a profile corresponding to a typical drink-driver. Many of them are relatively young, male, single, or divorced, with a low self-esteem and coming from low socio-economic grouping. They drive as part of their professional job and risk much more than private car drivers if stopped while drink-driving. Apart from the immediate results of the crash they may also face a driving ban which could mean a loss of job if driving is especially the main part of their work.

As far as commercial drivers of HGVs are concerned, studies from different countries and road side surveys indicate that the prevalence of alcohol among this group of drivers is low and lower than among drivers of light vehicles.

38   ESCAPE (2003) Enhanced Safety coming from appropriate police enforcement (Final Report)
39   Network of Employers for Traffic Safety NETS http://trafficsafety.org/
40   Bernhoft, I.M., Hansen, A.L.& Hels, T. (2008). Trends in Drink Driving Accidents and Convictions in Denmark, Traffic Injury Prevention, 9 (5), pp.395-403
GRSP (Global Road Safety Partnership) (2007). Drinking and driving: a road safety manual for decision makers and practitioners. Geneva

Campaign	March 2008	October 2008	March 2009	October 2009
Truck drivers checked	115,364	157,961	183,024	169,839
Drivers with illegal BAC	510	615	282	329
% with illegal BAC	0.44%	0.39%	0.15%	0.19%

Table 1 Prevalence of drink driving among HGV drivers according to TISPOL

Driving under the influence is thus less prevalent in commercial transport compared to individual transport. Yet, alcohol related road crashes in commercial transport result in more serious outcomes due to the vehicle crash incompatibility caused by increased size and mass of commercial vehicles. Besides, the number of people injured in such a crash may be high in case of vehicles operated by public transport companies. It can be concluded that it is of great interest to society and to individual companies to minimise the occurrence of alcohol-related crashes in commercial transport.

EU Level Legislation – Initiatives and Guidance

On drink driving the EU published in 2001 a Recommendation on the maximum authorised level of alcohol in the blood of motor vehicle drivers. While the maximum authorised BAC level for passenger car drivers was set up as 0.5 g/l, the second reduced level of 0.2 g/l was recommended for drivers of heavy commercial vehicles (above 3.5 tons) and for novice drivers. However, Member States were left free to set their own levels and as a result, many Member States have not followed this recommendation (see Table 2). The Commission's EU Alcohol Strategy, led by DG SANCO, invites Member States to even consider a zero BAC limit for young and novice drivers and drivers of public transports and dangerous goods. Besides, the 2001 Drink Driving Recommendation and 2003 EC Recommendation on traffic law enforcement state that all of the Member States should adopt a system of random detection by analysing expelled air in order to dissuade drivers from drinking. Alcohol is also mentioned within the Directive 2003/59 on the initial and continuous training of commercial drivers transporting goods and passengers and the Driving Licence Directive as covered in Part 1 of this Report[41].

Moreover, the Community Strategy for Health and Safety at work 2007-2012, developed by DG Employment, aims to achieve a reduction of occupational collisions and diseases in the EU. Health and safety strategies of EU Member States developed within the scope of the EU Strategy should include information on drink-drive laws and penalties, effect of alcohol on driver ability, breath testing for employees who drive regularly.

Another tool included also in the ITS Action Plan that the EU should promote within the drink driving context are alcohol interlocks[42]. These are devices that require the driver to take a breath test before starting the car. Use of alcolocks in a work context might include the voluntary introduction either by public sector authorities or private commercial vehicle operators[43].

Recommendations to the EU

- Adopt a Directive for 0.2 BAC maximum limit for commercial and novice drivers.
- Launch an initiative for commercial transport companies to enhance safety of services by integrating prevention of drink driving as a competition factor into their business model.
- Gradually introduce alcolocks starting with target groups such as fleet drivers of, for example, dangerous goods.
- Integrate measures to address the impact of drink driving on work health and safety in the new Community Strategy for Health and Safety at Work 2013-2018.

National Level – Good Practice examples of government initiatives

Drink Driving Limit

Although all European countries have introduced a legal BAC limit only 15 have a limit of 0.2 or less for professional drivers and three of those only apply this lower limit to drivers of public transport. While in some countries (Czech Republic, Slovakia, Hungary and Romania), the limit was set at zero from the very beginning, in some others, notably Malta and the UK the BAC limit is still 0.8 g/l.

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41 See also Thematic Report on Risk Assessment to Training
42 For more info see our Thematic Report on In-Vehicle Technologies and a section on Alcohol Interlocks
43 Alcohol in Commercial Transport ETSC 2009 http://etsc.eu/documents/DrinkDriving%20in%20CommercialTransport%20ETSC.pdf

Legal BAC limit (g/l)	Standard	Professional
Belgium	0.50	0.50
Bulgaria	0.50	0.50
Czech Republic	0.00	0.00
Denmark	0.50	0.50
Germany	0.50	0.00
Estonia	0.20	0.20
Greece	0.50	0.20
Spain	0.50	0.30
France	0.50	0.50 (0.20)
Ireland	0.50	0.20
Italy	0.50	0.50 (0.20)
Cyprus	0.50	0.50
Latvia	0.50	0.50
Lithuania	0.20	0.20
Luxembourg	0.50	0.20 (0.50)
Hungary	0.00	0.00
Malta	0.80	0.80
Netherlands	0.50	0.50
Austria	0.50	0.10
Poland	0.20	0.20
Portugal	0.50	0.50
Romania	0.00	0.00
Slovenia	0.20	0.00
Slovakia	0.00	0.00
Finland	0.50	0.50
Sweden	0.20	0.20
Switzerland	0.50	0.50
United Kingdom	0.80	0.80

Tab.3. Legal BAC limits for car and professional drivers in EU-27 countries and Switzerland by 1.1.2009 (source: DG MOVE)

Note: Numbers in parentheses valid for public transport drivers.

The standard BAC for all motor vehicle drivers which should be adopted by all of the Member States is one not exceeding 0.5 g/l. At the moment most of the Member States have already adopted that BAC limit.

Enforcement and Follow Up

Drink-driving offences are in general punished very severely by courts of all Member States. The sanctions may involve temporary withdrawal of driving licences, conditional driving bans, obligations to participate in dedicated awareness raising programmes, and others. Commercial drivers are usually treated even more severely as professionals: they are expected to obey the law.

Education and Campaigns

Research suggests that factors such as public education about BAC limits and the dangers of driving while impaired can play a key role in enhancing the effectiveness of legislation which targets drink-driving (Bartl et al. 2000). This would also impact professional drivers.

Driving schools play a primary role in providing necessary information on the risk of drink-driving, but the education activities do not stop here, as the driving licence is not a life-time permit to operate commercial vehicles. Two core education activities exist:

- Education programmes on alcohol in schools and in driver training (including for professional drivers);
- Programmes and initiatives run by employers and insurance companies.

Preventative Policies in the Member States

Belgium

In Belgium all companies are obliged according to a new law to develop and integrate in their working place a preventative policy for drugs and alcohol.

Ireland

Public authorities have a role to play when it comes to steering employers to provide adequate information and supporting material to employees. In Ireland, for example, two state agencies the Road Safety Authority supported by the Health & Safety Authority have cooperated together to inform employers of their responsibilities for driving for work and that specific information is provided on alcohol and drugs. The Road Safety Authority and the Health and Safety Authority hold joint seminars on a regional basis for employers which address road safety issues based on the driver, the vehicle and the journey. Both authorities have published a "Driving for Work" CD for employers which is available on their websites[44]. Both authorities held a Driving for Work conference in 2009 for employers on the theme of "Driving for Work".

United Kingdom

The UK's 2007 annual drink drive campaign focussed on the risk of loss of licence, mobility and ultimately also possibly employment as a result of drink driving. The message of the campaign, which was run by the Government's THINK! campaign, was 'Don't let a drink-drive conviction come between you and Christmas'. The campaign was launched by a real life case of a 20 year old, Luke Noon, who lost his licence, job and girlfriend after his drink-drive conviction in 2006[45].

Germany

The local region of Guetersloh and the Collision Insurance Association of Westfalen-Lippe (GUVV) support a road safety action: „Young Driver"[46]. This community project is run together with the local Police and Traffic Watch Volunteers and aims to reduce collision risk of 18-24 year olds. The programme is run at vocational schools through the departments of Road Traffic together with the other partners through targeted practical driving exercises and discussions on the potential danger of road traffic. Included in the one day programme is a theoretical part led by a Police safety advisor and includes topics such as speed, alcohol and drugs. The young drivers are also able to test within an alcohol driving simulator what it's like to drive with 1.0 BAC. A total of 2,600 young adults have participated in the project since 2005.

Switzerland

An anti drink driving campaign was run in 2008 and 2009 by the Swiss Council for Collision Prevention. It was run together with the Police in Switzerland and Liechtenstein and enforcement was stepped up. More than 3000 safety delegates in companies were also involved in the implementation of the campaign. The aim was to reduce the number of alcohol related casualties increasing the subjective likelihood of controls due to increased police surveillance and intensified public relation campaigns. The second aspect was to improve risk awareness through education. The campaign targeted all drivers aged 18 to 44 years, especially men and new drivers. Road side posters were reinforced by also being displayed in the workplace. Cinema spots were shown and public events with alcohol simulators were organised. A new campaign is planned for 2010.

Photo 3 Poster asks: Fit for the Road?

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44   www.rsa.ie, www.hsa.ie
45   http://www.dft.gov.uk/think_media/241033/241066/howmuchposter.pdf
46   http://www5.jungefahrer.de/040/sr_seiten/112170100000001784.php

Recommendations to Member States

- Adopt a 0.2 BAC limit for commercial drivers.
- Increase enforcement of drink-driving and promote 'targeted' testing of those driving for work and systematically allow for a breath test in all police checks relating to driver behaviour and for all collisions dealt with by the Police.
- Run drink driving public campaigns linked to workplace health promotion (targeting also professional drivers) based on scientific research and linked to enforcement.

Employer Level - Good Practice

Employers of commercial drivers have an important role to play in increasing the awareness of drivers about the risks of drink driving. Employers and fleet operators should be strongly encouraged to set up their own initiatives. This should form part of a holistic approach in setting up a road safety plan. One helpful set of guidance is set out in the ILO's Code of Practice on Management of Alcohol and Drug-Related Issues in the Workplace[47]. This recommends that every employer should, in cooperation with employees and their representatives, develop in writing the enterprise's policy on alcohol and drugs in the work place. In some countries, for example in Belgium, all companies are obliged by law to develop and integrate in their working place rules a preventative policy for drugs and alcohol[48].

The elaboration of such a policy could follow a five step approach. Firstly, an inventory of issues related to alcohol (and drugs) should be listed including an anonymous survey for employees including questions such as where and when is alcohol consumed at work, what support would be necessary and what is expected to prevent alcohol at work. Secondly, a declaration of intent could be drawn up with different actors in the organisation to demonstrate the importance of the preventative policy. Thirdly, rules and procedures should be drawn up dealing with alcohol (and drugs). These written rules should clearly show what is permitted at work and explain procedures in case of breaking the rules and presenting solutions in case of problems. Fourthly, the organisation could offer information and training around the topic of alcohol (drugs) and health. Finally the policy should be evaluated and followed and adjusted according to suggestions and also experience.

This policy should include specific measures on alcohol which should be developed in discussion with the employees. The aim would be to spread a Zero tolerance approach to drinking in the workplace and whilst driving for work from the management level throughout the organisation. To implement, these employers may adopt a number of measures starting with education and information about the risks of drink driving to their own enforcement and follow up measures. Employers can also motivate drivers to comply with road traffic legislation by rewarding drivers respecting regulations and applying measures against those breaking the rules. The existence of safety culture and motivation programmes can also bring about a difference. Employers should also be committed to communicate to staff that crashes of commercial vehicles have additional negative side effects, the public image of a company involved in a serious crash can be damaged.

To increase the levels of deterrents employers could also run their own random alcohol tests. Another element is also to set up procedures. Alcolocks as part of an integrated alcohol policy can also form part of this solution. Alongside information about the risks, alcohol interlocks can also be a good preventative tool for deterring drink driving for drivers still affected by alcohol the morning after drinking has taken place (see Thematic Report 2).

Azienda transporti Veneto Orientale, Italy

The Azienda transporti Veneto Orientale public bus company[49] from Italy ran a campaign entitled: "Zero alcohol at work. Safety above all". The aim was to promote abstention from consuming alcoholic drinks in the workplace, both before and during work, in order to prevent collisions, improve the working environment, reduce absenteeism due to health problems. It also aimed to improve shift organization and increase productivity and improve the image of the company. The campaign was realised with information channelled by displaying information posters at the offices of ATVO and on its buses. Information sessions for bus drivers were given by experts from the Alcohol Related Operating Unit from San Donà di Piave, which deals with the prevention and treatment of alcohol dependency in the workplace. Leaflets were also distributed on alcoholic drinks and their effects, in particular in relation to driving buses.

47   http://www.ilo.org/public/libdoc/ilo/1996/96B09_297_engl.pdf
48   Royal Decree of June 28 2009 that all employers must introduce a preventative policy for alcohol and drugs in their companies. Published July 2009.
http://www.mensura.be/news_detail.aspx?id=4677&terms=alcool+et+drogues
49   EU OSHA Protection of Passenger Road Transport Drivers (2008)

Recommendations to Employers

- Inform and educate employees about the risk of drink driving and adopt a Zero tolerance approach to alcohol in the workplace and whilst driving for work.
- Apply procedures and run programmes motivating drivers to comply with regulations.
- Develop clear written internal policies and procedures on drink driving and screening (e.g. before employment, after a collision and randomly) these should be an integrated part of general company workplace health promotion polices.
- Supervisors, line managers and drivers should be trained on the effects of alcohol on driving, and how to identify the symptoms of alcohol misuse.
- As part of a holistic road safety policy consider installing alcohol ignition interlocks in commercial vehicles.

Part IV Driving under the influence of illegal drugs and prescription medicine and Work-related road safety

Scope of the Problem of driving under the influence of illegal drugs

The use of illegal drugs is a cause for concern. The prevalence of illicit drugs in drivers killed in traffic collisions can be estimated in the order of 8.8% in Spain[50] and 8.1% in Sweden[51]. An increasing trend has been identified in the UK (24% in 2001 compared to 8.5% in 1989), The Netherlands (15.7% in 2004 compared to 7.2% in 1985) and Norway (22.8% in 2002 compared to 12.4% in 1989)[52]. The range of psychoactive substances available for illicit use is widening, and the latest studies which look for evidence of their use in drivers are indeed finding it. Drivers are being discovered with a range of drugs in various subsets of the motoring population, whether while being tested randomly, upon suspicion, in hospital or after a fatal collision[53].

Drivers driving for work may, as for alcohol, still be under the influence of illegal drugs from an evening before. They may also have been or be taking legal or illegal drugs to counter sleepiness. As for alcohol time pressure, stress and peer pressure may lead to drug and alcohol use[54].

Scope of Problem Medicines

The use of psychotropic medications (e.g. benzodiazepines, opiates) and some over the counter medicines (e.g. antihistamines, cough and cold remedies) whilst driving is also a cause for concern.

Medicines are generally used:

- Through a medical prescription, with the advice of a medical practitioner;
- "Over the counter" in pharmacies or drugstores with the advice of a pharmacist/ collaborator by self medication, with only the recommendations printed on the package insert, plus an external warning printed on the box like in France (3 levels of warning), or Spain (1 level).

An increasing number of medicines are used without medical prescription and this evolution justifies the proposition of implementing a harmonised external warning on boxes of medicines inducing side effects on driving. In France this type of warning showed positive effects due to a better dialogue between patients and health professionals.

Much medicine influences the driving fitness by lowering concentration, alertness and reaction rate and can even be the cause for collisions[55]. Field studies reveal that benzodiazepines are the most frequently detected medicines in all driver populations and some have concluded that using them approximately doubled the risk of motor collisions. In addition this risk was higher for drivers older than 65[56]. Also in some cases the fact that professional drivers don't have the possibility to consult a doctor while on the road may cause drivers to take over-the-counter medicines that may influence their driving activity.

50   Del Rio et al. (2002) (Source: EMCDDA Report)
51   Holmgren et al. (2005)
52   Source: Sweedler and Stewart, 2009. (From SWOV Powerpoint)
53   ECMDDA Insights 8 http://www.emcdda.europa.eu/html.cfm/index65875EN.html
54   Millies, B.A., *Truck and Bus Driving*, ILO, Encyclopedia of Occupational Health and Safety, 4th Edition, Vol.3, pt XVII, Ch. 102 , 1998. http://www.worksafesask.ca/files/ilo/tra09ae.html
Partinen, M., Hirvonen, K., Unikuorma ,(2005), Final report from the Finnish Work Environment Fund (100344), 24.3.2005.
55   Deutscher Verkehrssicherheitsrat, *Auch freiverkäufliche Arzneien können die Fahrtüchtigkeit erheblich beeinträchtigen*, Presseinformationen, November 2008. http://www.dvr.de/site.aspx?url=html/presse/informationen/903.htm
56   ECMDDA Insights 8 http://www.emcdda.europa.eu/html.cfm/index65875EN.html

EU Level Legislation – Initiatives and Guidance

As part of the 3rd Road Safety Action Programme and in recognition of the growing problem of driving under the influence of psychoactive substances, the European Commission proposed a range of measures designed to improve and share information on driving under the influence of drugs. The DRUID project, reporting in 2011, aims to fill gaps in the knowledge base, thereby enabling the development of harmonised, EU-wide regulations for driving under the influence of drugs and medicine. Some work carried out so far on road-side oral fluid screening has led to recommendations on the need to develop devices and procedures to be used in road-side testing by the police.

EU Level Legislation – Initiatives and Guidance Illegal Drugs

The EU has legislated on the use or abuse of psychotropic substances which may affect physical and mental fitness to drive. Annex III of the Driving Licence Directive states that "driving licences shall not be issued to or renewed for applicants or drivers who are dependent on psychotropic substances or who are not dependent on substances but regularly abuse them".

Also in 2003, the European Council called on the Commission to ensure that the current programme on road safety is followed up by a set of actions to combat the impact of psychoactive substance abuse on road collisions. Driving under the influence of drink, drugs and medicines is also targeted in the EU drugs strategy 2005-2012 and the EU drugs action plan 2009-2012[57].

EU Level Recommendation for Illegal Drugs in the Workplace

- Implement effective campaigns on the working place to inform about the danger of driving under the influence of illegal drugs.

Prescription Medicines

For prescription medicines the Driving Licence Directive states that: "Driving licences shall not be issued to, or renewed for, applicants or drivers who regularly use psychotropic substances, in whatever form, which can hamper the ability to drive safety where the quantities absorbed are such as to have an adverse effect on driving. This shall apply to all other medicinal products or combinations of medicinal products which affect the ability to drive."

Most of the current information for patients to decide whether or not to drive is presented in medicine package inserts. However this information is not clearly stated with advice as to when not to drive or how to decide whether driving is possible under treatment. There is a need to improve this information to the patient: a new categorisation system proposed by the DRUID researchers and recently accepted by the European Medicines Agency is available[58].

In order to have this information accessible for patients in the correct way, health care providers should play a significant role in ensuring that the patient can make the best use of the medicines without endangering their participation in traffic. Therefore there is a need to implement prescribing and dispensing guidelines to improve the medical and pharmaceutical practices based on the application of the categorisation system.

One way to establish a safe use of driving impairing medicines is the application of a clear labelling system, e.g. the use of pictograms in the medicine box and in the leaflet, as proposed by the DRUID research team.

Recommendations to the EU

- Develop a drugs and driving code of practice to enable health professionals to provide advice to the public about the likely effects of medication on driving.

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57 http://ec.europa.eu/justice_home/fsj/drugs/strategy/fsj_drugs_strategy_en.htm
58 *4.7 Effects on ability to drive and use machines*
"On the basis of the pharmacodynamic and pharmacokinetic profile, reported adverse reactions and/or specific studies in a relevant target population addressing the performance related to driving and road safety or using machines, specify whether the medicinal product has a) no or negligible influence, b) minor, c) moderate influence or d) major influence on these abilities. Effects of the disease itself on these abilities should only be discussed in exceptional circumstances. Other important factors that affect the liability to drive and use machines should be considered if relevant, e.g. duration of the impairing effect and the development of the tolerance of adverse reactions with continued use. For situations b, c, and d, special warnings/precautions for use should be mentioned."
European Medicines Evaluation Agency in article 4.7 of the Summary of Product Characteristics (SmPC) http://www.ema.europa.eu/

- Work towards an appropriate classification and labelling of medicines that affect driving ability.
- Implement prescribing and dispensing guidelines to improve the medical and pharmaceutical practices based on the application of the categorisation system.
- Implement specific guidelines following which drivers under medical treatment asked to operate their vehicles should be considered by the workplace occupational physician in order to adapt either treatment or working conditions.
- Implement effective campaigns on the working place to inform about the danger of driving under the influence of prescription medicines.

National Level – Good Practice examples of government initiatives

Countries have tightened their laws as regards drug driving in the past decade, increased penalties or altered national road safety or drug strategies to address the problem[59]. However, individual countries' legal responses to drug-impaired driving vary greatly, from zero-tolerance laws (sanctioning detection of the substance per se) to impairment laws (sanctioning if the person is deemed unfit to drive). Possible penalties are also markedly different between countries[60]. There are many factors to be taken into account including the availability of practical and reliable drug testing, the impact of drugs and driving on public safety and countries' attitudes towards consuming illegal drugs.

Prevention programmes that address drugs and driving are in place in the form of training in driving schools as well as various public safety campaigns, though these may not always be effectively targeted.

Workplace drug testing

Much of the legal framework, where it exists at all, comes from interpretations of a combination of various national laws, including those on Labour Codes, privacy, data protection, and health and safety at work according to an overview compiled by the ELDD[61]. Only Finland (2003), Ireland (2005) and Norway (2005) report legislation that clearly and specifically addresses the issue of drug testing in the workplace. There is often a clearly qualified

level of risk / response, though qualified in various different ways: many countries state that testing can take place when there is a health, safety or security risk or when there is suspicion of drug-taking.

Recommendations to Member States

- Disseminate effective information on the effects of illegal drug driving.
- Ensure that drivers are aware that driving after use of illegal drugs will lead to detection and severe sanctions.
- Disseminate effective information on the effects of driving under the influence of prescription medicines.
- Stress the role of doctors in advising drivers on the impact of prescription medicines on driving.
- Support a better communication between patient, company and health professional, for instance developing a card for professional drivers or employees in dangerous workplaces, informing the patient and the health professional about special precautions required by their working or driving situation.
- Take measures to control the use of stimulants in professional drivers through harmonisation and regulation of their prescription and delivery procedures across Europe.

Employer Level

As for alcohol, employers of commercial drivers have an important role to play about the risks of drug driving. Employers and fleet operators should be strongly encouraged to set up their own initiatives and written internal policies to tackle the risk of drug-driving. As mentioned previously, in Belgium. All companies are obliged to develop and integrate in their working place rules a preventative policy for drugs and alcohol. This could follow a five step approach elaborated as for alcohol and follow the guidance of the ILO's Code of Practice on Management of Alcohol and Drug-Related Issues in the Workplace[62]. Equally this policy for drugs should also be developed in discussion with the employees. The aim would be to spread a Zero tolerance approach to illegal drug taking whilst driving for work. Employers should take measures, e.g. information, education, training and the improvement of working conditions,

59   European Monitoring Centre for Drugs and Drug Addiction (2007) *Drugs and Driving* Lisbon
60   ELDD Topic overview http://emcdda.europa.eu/publications/legal
61   http://eldd.emcdda.europa.eu/html.cfm/index16901EN.html
62   http://www.ilo.org/public/libdoc/ilo/1996/96B09_297_engl.pdf

to prevent alcohol- and drug-related problems from occurring in the workplace[63]. It should also be made clear that where the use of medication may result in significant impairment, the individual should consult a doctor and give notice to the supervisor according to normal procedures for absence for health reasons. Specific conditions under which drivers are asked to operate their vehicles should be considered by the occupational physician in order to adapt either treatment or working conditions. Employers also have a responsibility to create and maintain a safe working environment and employees have a responsibility to adequately inform their employers about their health and the consequent use of prescription medicine.

Recommendations to Employers

- Adopt a Zero tolerance approach to illicit drug use in the workplace and whilst driving.

- Develop clear written internal policies and procedures on illegal drug driving and screening (e.g. before employment, after a collision and randomly) these should be an integrated part of general company workplace health promotion polices.
- Supervisors, line managers and drivers should be trained on the effects of illegal drugs on driving, and how to identify the symptoms of illegal drug misuse.
- Inform employees on the effects of prescription medicines whilst driving.
- Develop clear written internal policies and procedures on prescription medicine.
- Supervisors, line managers and drivers should be trained on the effects of prescription drug use on driving, and how to identify the symptoms of prescription drug use.
- Set up a procedure to adapt working conditions to workers who have been prescribed medicine that causes impairment, with the involvement of the occupational doctors.

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63   http://www.ilo.org/public/libdoc/ilo/1996/96B09_297_engl.pdf

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Preventing Road Accidents and Injuries for the Safety of Employees

Safer Commuting to Work

ETSC
European Transport Safety Council

PRAISE
Work-Related Road Safety

PRAISE
Work-Related Road Safety

PRAISE is a project co-funded by the European Commission and implemented by ETSC on Preventing Road Accidents and Injuries for the Safety of Employees (PRAISE). The project aims to advance work-related Road Safety Management and provide the know-how to employers who have to take on that challenge. It also aims to present the work-related road safety standards of EU Member States and carry out advocacy work at the EU level: work-related road safety is an area of road safety policy that clearly needs renewed political commitment.

Safer Commuting to Work
Contents

ETSC
European Transport Safety Council

Introduction

This thematic report aims to present how measures taken by employers to mitigate the commuting risk of their employees can improve road safety. It gives an overview of the scale of commuting related road deaths within the EU and the legal responsibility to make commuting safer in different countries. The report provides an introduction to travel plans, which include parts on commuting and presents tips on how to set these up. It then examines each mode of travel, the associated risk and measures that can be undertaken to reduce risk both by employers as well as local and central government. The report also covers other related issues that affect commuting and road safety such as land use planning and site location and flexible hours and shift work. There is finally a section giving an overview of what can be done by national governments and the EU to promote employers' taking initiatives to improve safety of their commuting employees.

1. The Business Case

Duty of care, health and safety compliance are legal necessities in most EU Member States, and are an essential consideration for employers. In some countries employers have a legal obligation to compensate, through their insurance, road traffic collisions also occurring during commuting time (see France for example in the section below on national initiatives). This means that they also have a very strong interest to apply measures to prevent these collisions from occurring. In many workplaces, the trip to and from work is the most risky part related to occupational safety. This is the case for instance in office work. Commuting collisions also lead on average to longer absences from work compared to other occupational accidents. Moreover, it most often also makes sound business sense to draw up and implement a travel plan that includes safety of employees commuting to work.

Employers can benefit from Travel Plans through:

- Reduced costs and time spent on commuting and business travel;
- More cost-effective use of car parks and reduced congestion around the site;
- More effective use of land (through reduced car parking);
- Higher staff retention and recruitment and improved staff fitness levels;

- Protection of the environment and enhancement of the company's image with the community and the clients;
- Improved productivity;
- Improved staff health and reduced absenteeism;
- Reduced journey times to work and improved staff punctuality by reducing congestion delays and supporting more reliable means of transport.

Travel Plans that apply safety measures to reduce risk whilst commuting can also lead to:

- Fewer working days lost due to injury;
- Reduced risk of work-related ill health;
- Reduced stress and improved morale / job satisfaction;
- Less need for investigation and paperwork;
- Less lost time due to work rescheduling;
- Fewer missed orders and business opportunities, reduced risk of losing the goodwill of customers.

Travel plans often involve only limited capital expenditure, on items such as new cycle shelters, improving footpaths, bus stops or car park barriers. Mostly they concentrate on improving existing travel choices whilst giving the incentives to use more sustainable travel and disincentivising solo car use. This is backed up by information campaigns to inform staff about travel alternatives that offer them realistic options. Good travel plans have typically succeeded in cutting the number of people driving to work by 15%[1].

2. Commuting overview

At present there is little data covering commuting collisions in the EU Member States and this remains somewhat of a grey area. Some countries do not collect such data, or are only starting to collect it (by including "purpose of journey" information in traffic collision datasets). It is therefore difficult to compare road risk associated with commuting across the whole EU. However, data for a number of countries is available, and this can be used to demonstrate the importance of this topic. A report from 2009[2] on occupational road safety including collecting and comparing work related road safety data from five EU Member States was published by Eurogip[3] and suggests that commuting is an important road safety risk factor that organisations should focus on as part of their occupational road safety programs to protect the safety and wellbeing of workers.

1   Department for Transport (2002) Making travel plans work: lessons from UK case studies
2   Eurogip (2009). Le risque routier encouru par les salariés en Europe, Actualisation du rapport Eurogip-05/F publié en 2003 August, Eurogip-40/F, www.eurogip.fr/en/docs/Eurogip_risque_routier_2009_40F.pdf
3   _Eurogip is a public interest grouping (GIP) set up in 1991 by the Occupational Injuries and Diseases Branch of the French Social Security system

Country	Year	Commuting road accidents as % of fatal occupational accidents	Number of commuting deaths	Number of commuting deaths on the road (and % out of all modes)
Austria	2007	32.3%	62	62 (100%)
Belgium	2007	36.6%	79	64 (81%)
France	2007	34%	407	350 (86%)
Germany	2008	41.5%	475	463 (97.5%)
Spain	2007	26.1%	341	305 (89.4%)

Eurogip (2009)

This report makes very clear the fact that commuting accidents are a very significant proportion of all fatal occupational accidents, and that most commuting accidents are, unsurprisingly, road collisions.

In Germany more recent data shows that in absolute terms, reportable occupational accidents numbered 886,122 in 2009, 8.8% fewer than in the previous year. The number of reportable commuting accidents rose slightly to 178,590, an increase of 1%. New disability pensions resulting from an occupational or commuting accident numbered 22,534. The occupational accident insurance institutions recorded 456 fatal occupational accidents and 362 fatal commuting accidents[4].

The issue of commuting accidents and their impact on the workers' compensation system was also reviewed in detail for Germany and several other countries in an earlier report by the Munich Re Group (a reinsurance company) in 2004. The report concluded that commuting accidents are a financial drain on the worker compensation systems due to their higher frequency and severity. The commercial Motor Third Party Liability might also be affected in case neither the employee nor the company car was damaged, but only the Third Party. The report also cites that as populations decentralise and travel further distances to work, commuting collisions increase as a proportion of road fatalities in many countries. It found that:

- 45% of deaths and 10% of occupational accidents in Belgium involve commuting.
- 45% of deaths and 13% of occupational accidents in Finland involve commuting.
- 47% of deaths and 10% of occupational accidents in France involve commuting.
- 43% of deaths and 15% of occupational accidents in Germany involve commuting.
- 21% of deaths and 6% of occupational accidents in Italy involve commuting.
- 16% of deaths and 6% of occupational accidents in Portugal involve commuting.
- 29% of deaths and 8% of occupational accidents in Spain involve commuting.

However, comparison between countries is difficult because of very different legal definitions of commuting accident. While in some countries the definition is broad and detailed, other countries have a very narrow definition. For example, a very detailed and encompassing definition is applied in France where it is considered that an accident is a commuting accident if it occurs[5][6][7]:

1) Between the first place of residence, or a secondary place of residence that has a 'stability character', or any other place where the employee goes regularly for family purposes, and the place of work. The route to work may not be the most direct one when it is necessary to take a longer route as part of a car sharing habit.

2) Between the place of work and the restaurant, the canteen, or in general where the employee usually takes his/her lunch, and as long as the journey has not been interrupted or modified for any other personal purpose unrelated to any everyday life necessity or work related necessity.

In practice this means that an accident will be considered as a commuting accident even when an interruption or detour is justified by the essential requirements of everyday life. This includes buying food, obtaining medicines, drawing money from a cash dispenser or posting a letter. Detours and interruptions that are in some way connected to

4   Source: Deutsche Gesetzliche Unfallversicherung German Social Accident Insurance http://www.dguv.de/inhalt/zahlen/au_wu/wu_toedlich/index.jsp
5   MRG (2004) Commuting accidents. A challenge for workers' compensation systems, Munich Research Group, www.munichre.com/publications/302-04092_en.pdf
6   CNAMTS, (2004), Prévenir les accidents routiers de trajet, texte adopté le 28 Janvier 2004 par la Commission des Accidents du Travail et des Maladies Professionnelles
7   CNAMTS is the French National Health Insurance Fund for Salaried Worker.

work are also included. Someone who regularly gives a colleague a lift home, buys work equipment, organises flowers for a staff party or visits the doctor following an accident at work, is therefore covered under the insurance[8].

In contrast in Spain the legal definition is worded very concisely and merely states that an accident suffered by a worker on his/her way to or from work will be treated in the same way as an occupational accident. The following conditions are laid down:

1) The "normal" journey between the place of residence or usual starting point and the place of work.
2) The shortest and most suitable journey.

Detours are only covered if the employee can give good reasons such as traffic jams, or avoiding a dangerous route[9]. Portugal is also an example of a country where the law interprets commuting accidents very narrowly[10]. In Germany commuting accidents are defined by the law covering insurance for work. These are accidents that occur on the most 'direct' route between home and the place where the insurance is taken out, this is mostly the place of work but this can also include a place of education. The direct route choice is left open thus the driver can decide depending on geography or time and can also choose mode: car, public transport or bike.

To gain a better understanding of the different national regulatory and legal frameworks covering the issue of work related safety, and in order to provide information needed for comparative analysis at EU level, ETSC conducted a survey involving the 27 Members States and Switzerland in the context of the PRAISE project. Regarding commuting the following question was asked: "If a vehicle is used for commuting, is this also covered in the employer's risk assessment?". Twenty one countries responded to this question (at the time of publication): 13 answered No (Czech Republic, Belgium, France, Greece, Latvia, Lithuania, Netherlands, Poland, Slovakia, Spain, Sweden, Switzerland, UK) and 8 answered Yes (Austria, Cyprus, Estonia, Finland, Ireland, Luxembourg, Romania, Slovenia). Hence, in a number of countries (8) there is a legal obligation to include commuting in the risk assessments that have to be conducted according to occupational health and safety legislation. Commuting accidents are not covered by occupational injury insurance in the Czech Republic, Latvia, the Netherlands, Slovakia and the UK. However, out of the countries that answered "No", 4 of them commented that when the vehicle belongs to the employer then it also has to cover commuting in its risk assessment (France, Greece, Lithuania, Poland).

In Germany the German Social Accident Insurance is a branch of Germany's social insurance system. The responsible institutions, i.e. the accident insurance institutions for the private and public sectors, insure around 75 million people in Germany against occupational and commuting accidents, accidents in educational establishments, accidents suffered by volunteers, and occupational diseases. The table below shows the number of fatal commuting accidents by sector and industry branch between 2006 and 2008.

Germany: Fatal commuting accidents by sector and branch of industry[11]

	2006	2007	2008	Change in %
Accident insurance in industrial sector	475	460	412	- 10.43
of which in branch of industry				
Mining	1	1	2	x
Pit and quarry	9	7	3	x
Gas, district heating and water	2	2	3	x
Metal	68	64	53	- 17.19
Electrical/precision engineering, textiles, leather	42	38	51	+ 34.21
Chemicals	21	20	18	- 10.00
Timber	13	11	6	- 45.45
Paper and printing	14	8	6	x
Foods	44	51	34	- 33.33

8   MRG (2004) Commuting accidents. A challenge for workers' compensation systems, Munich Research Group, www.munichre.com/publications/302-04092_en.pdf
9   Ibid
10   Ibid
11   Source: German statutory accident insurance association http://www.dguv.de/content/facts_figures/au_wu/wu_toedlich/index.jsp

	2006	2007	2008	Change in %
Construction	45	47	46	- 2.13
Commerce and administration	140	149	129	- 13.42
Transport	34	29	21	- 27.59
Health service	42	33	40	+ 21.21
Accident insurance in public sector	60	43	46	+ 6.98
Total	535	503	458	- 8.95

The modal split for commuting is also a source of information that can be of tremendous help for making policy decisions. Member States and employers should be encouraged to run surveys to learn more about the modes commuters use. For example, a survey conducted in Finland indicates that the car is still by far the preferred commuting mode in that country. It also shows that most of those commuting by car are drivers (only about 6% of commuters are car passengers compared to 61.5% who are car drivers) emphasising significant room for improving car pooling.

Commuting trips	Of all commuting trips	Of distance travelled to commute
Walking	8.8 %	0.9 %
Cycling	10.3 %	2.8 %
Bus, coach	6.6 %	7.3 %
Train	2.1 %	3.8 %
Metro, tram	1.7 %	1.1 %
Taxi	0.2 %	0.2 %
Aeroplane	0.0 %	0.0 %
Ferry	0.0 %	0.0 %
Car (driver)	61.5 %	73.2 %
Car (passenger)	5.9 %	6.2 %
Other private motorised	3.0 %	4.5 %
Total	100.0 %	100.0 %

Source: The Finnish National Travel Survey 2004-2005[12]

Data about the causes of commuting accidents is also scarcely available but would be of great help to inform policies and actions on commuting safety. Risk factors such as fatigue, stress, alcohol (morning after effect), and speed (rushing to be to work on time) might be particularly relevant when considering commuting accidents. Only for a few countries do we have data for the causes of commuting accidents. The example below for Finland indicates that fatigue is the leading risk factor while commuting in that country.

Risk Factor	Percentage of cases
Falling asleep, reduced alertness	15.0 %
Fitness (sudden attack of illness)	11.6 %
Failed to perceive the other party/situation	11.6 %
Incorrect line of driving (approaching the bend, etc.)	11.0 %
Incorrect estimation of own possibilities of moving	8.7 %
Incorrect manoeuvre (sudden, slow, etc.)	8.7 %
Combination of incorrect manoeuvres	8.1 %
Others	25.4 %

Source: Fatal accidents investigated by the Finnish road accident investigation teams (2002-2008)[13]

12 http://hlt.fi/english/results/6_21_mode.xls
13 Finnish Motor Insurer's Centre, Traffic Safety Committee of Insurance Companies VALT.

2.1 Working Hours and Commuting Risk

A study conducted in Germany[14] revealed that the risk of being involved in a commuting accident is double during darkness and early morning hours. Between midnight and 5:59 AM 1.8 more drivers per 1 million km driven are involved in a commuting accident than between noon and 19:59 AM. Beside the factor of fatigue, the study showed that the drivers have the subjective feeling of being less at risk due to less traffic during night commuting. Due to darkness, the weather conditions and the traffic and road circumstances are not interpreted in an appropriate way by the drivers.

The study showed also that the risk is higher for young commuters up to 25 years of age (2.5 higher than for commuters between 25 and 50 years) and for women. Women are frequently involved in accidents as pedestrians (including accidents where they trip, which are also registered as commuting accidents but are not real traffic accidents). Men have a higher risk than women while using bicycles for commuting. As car drivers, women are at a higher risk, probably because they tend to use smaller cars, they have shorter trips but travel more on rural roads which are more dangerous.

A subsequent study undertaken by Geiler and Pfeiffer in 2007[15] showed a relationship between the amount of working hours and the accident risk while commuting. Commuting after a very short period of work or after 6-8 hours of working time presents a higher risk of being involved in an accident. This can be attributed to the fact that women, who have a higher risk of being involved in commuting accidents tend to work less hours as they are more likely to hold part-time jobs. Also after 7 to 8 hours of working time, employees commute during the rush hours which are more risky. For working time between 9 and 13 hours the commuting accident risk is much lower.

Commuting also depends on the personal situation of the employee. The higher the income the longer the average commute and the more 'own car' is chosen as the main transport mode. Part-time workers are less ready to take on long journeys. Women's average commuting time is shorter than men.

Data indicate that the most significant amount of time people spend on the roads is for getting to or returning from work, reinforcing the need to improve commuting safety.

2.2 Aggravating trends?

As already noted, the risk of being involved in commuting accidents might be increasing as populations decentralise and people live further away from their place of employment. Data from the Fourth European Working Conditions Survey[16] on "commuting time", an indicator defined as the percentage of workers living 20 minutes or less away from work, demonstrate that the percentage of workers living more than 20 minutes away from work has increased.

Countries	2000	2003	2005
AT	27	24	35
BE	33	28	23
BG		32	24
CY			24
CZ		30	26
DK	28	26	23
EE		34	15
FI	31	23	25
FR	27	23	23
DE	32	28	12
EL	25	21	31
HU		30	26
IE	34	21	26
IT	24	21	31
LV		26	17
LT		35	18
LU	25	16	22
MT		16	25
NL	30	33	19
PL		34	31
PT	34	21	33
RO		34	22
SK		26	21
SI		28	29
ES	34	27	25
TR		34	30
UK	30	24	23
EU-15	30	25	22
EU-25		26	23

Percentage of workers living 20 mins or less away from work[17]

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14 Geiler M, Musahl,H.-P. (2003): Zwischen Wohnung und Arbeitspaltz. Eine Untersuchung zum Arbeitsweg und zum Wegeunfallgeschehen. Zeitschrift für Verkehrssicherheit 49
15 Geiler, M., Pfeiffer,M. (2007) Das Unfallgeschehen im Wirtschaftsverkehr: Verletzungsrisiken bei beruflich bedingter Teilnahme.
16 Eurofound (2005) Fourth European Working Conditions Survey http://www.eurofound.europa.eu/publications/htmlfiles/ef0698.htm.
17 Eurofound (2005) Fourth European Working Conditions Survey http://www.eurofound.europa.eu/publications/htmlfiles/ef0698.htm.

Commuting time however is not the same as distance travelled, nor does this tell us about the chosen mode of travel. While it is therefore difficult to infer from such data the precise change in exposure to road risk while commuting, it can be assumed that decentralisation and urban sprawl have a negative impact on commuting accidents.

Another risk factor to be aware of is the increase in the use of two wheelers (bicycles, mopeds, motorcycles) that are environmentally less harmful than the passenger car, but suffer from a higher road risk (see section below on Powered Two Wheelers and cycling). In the centre of Paris, for example, the number of people using PTWs has increased by 50% over the past ten years while at the same time the number of people using public transport has decreased by 16%. In the whole of France 50% of people who use PTWs to commute to work were previously commuting with public transport, whereas only 25% of them previously used an individual transport mode[18].

In Germany, every 4 years the Federal Statistical Office undertakes a survey regarding the commuting behaviour of employees[19]. The last survey from 2008 showed that 62% of employees travel to work by car or motorbike. Corresponding to high levels of public transport the numbers who drive to work are lowest in urban areas. Cycling and walking to work is higher in the east German regions. Cycling and walking is also lower in urban areas where many commuters make use of public transport. The number of cyclists and pedestrians relates to commutes of under 10km. The use of public transport varies between 8 and 42% in the different regions.

3. Risks across the modes

Road travel has by far the highest death risk by distance travelled. Rail and air travel are the safest modes by distance travelled, followed by bus. The passengers of trains, bus/coach and planes within the EU have the lowest death risk per passenger kilometer. For the average passenger trip in the EU, bus travel has death risk that is 10 times lower than car travel[20].

4. Employee Travel Plans including Commuting

4.1. What is a Travel Plan

A travel plan is a package of practical measures to reduce the cost and environmental impact of work-related travel by offering staff realistic and cost-effective alternatives to using their car[21]. Travel plans promote flexible and sustainable transport solutions, such as car share schemes, working from home or cycling, tailored to businesses' individual needs but they are not anti car. When drivers were surveyed in the UK, about half said they wished to drive less and of these, over a third said they had already made some effort to curtail their car use[22]. Thus, travel plans primarily work with this group of willing and interested people. Cars are still part of the picture, but the idea is to cut their unnecessary use where alternatives are easily available[23]. A travel plan is about encouraging people to use cars more wisely and offering them better alternative travel choices. Travel plans should also include the encouragement of safe and fuel efficient modes of transport. Travelling less while still doing the same amount of business, cuts fuel use, fleet risks and operational costs[24].

4.2. Commuting as part of a travel plan

A travel plan should have a specific focus on commuting. The goal of this would be to decrease the amount of individual traffic created by movements between home and work. The plan generally has three parts.

- A commuting and access profile is drawn up: who is coming to work, when and by which mode of transport? What is the transport situation close (public transport, cycling facilities etc) to the company location? What are the key bottlenecks in terms of transport for the company?
- A number of viable alternatives are suggested: better access to public transport; the promotion of more collective forms of transport, such as car-sharing or transport organised by the company and better facilities to promote the use of bicycles and walking.
- The social partners negotiate and work out the

18 Comité de Pilotage pour la Prévention du Risque Routier Professionnel (2009). Table Ronde « Mieux prévenir les accidents de trajets » 9 octobre 2009, Paris. http://www.risqueroutierprofessionnel.fr/Publication-des-Actes-de-la-table.html
19 www.destatis.de; Mikrozensus 2008
20 ETSC (2003) Transport Safety Performance in the EU, A Statistical Overview
21 Derbyshire County Council (2008) Derbyshire Business Travel Plan Pack
22 Scottish Executive (2006) Public Perceptions of travel awareness Phase 3
23 Department for Transport (2008) Essential Guide to Travel Planning
24 Murray, W. (2010) Travel/Mobility Planning Interactive Driving Systems

details of the alternative options, going into the nature of the arrangements decided and defining the practicalities for the company.

Commuting schedules should be adapted as far as possible to encourage compliance with speed limits, working time regulations, and avoiding times when falling asleep at the wheel is more common. Commuting schedules alongside other journeys should be optimised to minimise the need to travel, journeys should also be shared or consolidated and public transport should be used wherever practical. Journey planning software can be used to optimise journeys. Route planning of commuting could then identify and evaluate issues such as terrain and infrastructure. Traffic conditions (which can vary as regards time of day) should also be taken into account. Moreover, weather conditions and seasonality (such as light and darkness) are also issues to be considered when choosing the route. Driver stress and fatigue can also affect driving and route choice and should be taken into account.

4.3. Staff Involvement

Senior management support for the travel plan is crucial. With management backing staff time can be allocated to develop, promote and run the plan and a budget can be secured. One person should be made responsible for the overall coordination of the travel plan. However, management will need to consult widely to gain the support and views of others in the organisation, for example via a travel plan steering group. To succeed, a travel plan must gain the acceptance of staff, through consultation and active involvement to help foster a sense of ownership. Employers should publicise all new initiatives, and successes. Also, to maintain the interest, they should use a variety of approaches to present their message. Above all they need to make sure that all staff know about the travel plan and what sustainable travel options are available to them.

4.4. Model to increase safety and reduce environmental risks in commuting and work related traffic
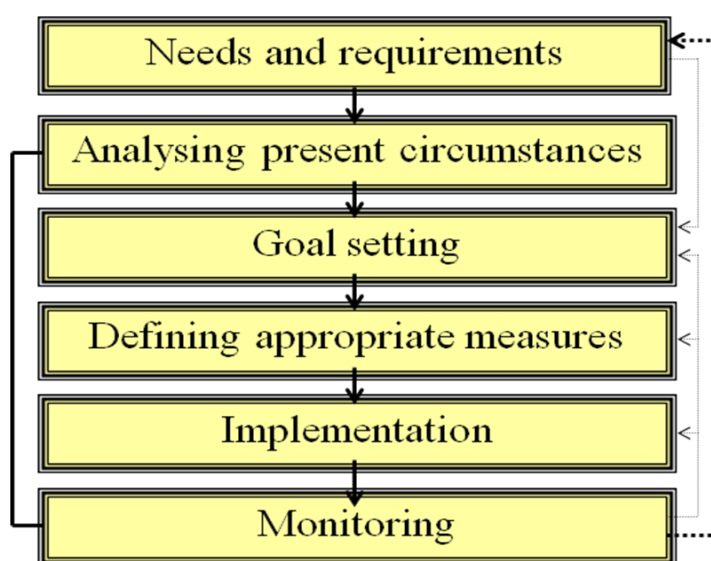
This model was developed in a Finnish Study[25] to increase safety and reduce environmental risks in commuting and work-related traffic. A similar model is used for many developments in companies. The process is started by identifying a need or a requirement. This can come for instance from changes in legislation, from a company's strategy or from problems which need to be resolved. The process continues with analysing what the situation is at the moment: how many collisions occur, how many kilometres are travelled daily by company cars, what are the safety and environmental characteristics of the fleet. Goal setting includes both goals for safety and environment (such as reducing the number of collisions per kilometer travelled and reducing fuel consumption) as well as getting the company committed to these goals. The next step is to define appropriate measures. The two last phases are implementation and monitoring. In implementation it is important to know who is responsible for what. Also, good planning and tailoring of the chosen measures to fit the company helps to achieve good results. Monitoring is the last step in the diagram, but this has a connection to all the other phases and will allow successes to be identified thus making it an important part of the process (Pollanen et al, 2003).

25 Pöllänen, M., Lind, S., Kalenoja, H. and Mäkelä, T. (2003). Improving traffic safety and reducing environmental effects of work-related traffic – traffic safety and mobility management measures in companies (in Finnish). Tampere University of Technology. Institute of Transportation Engineering. Research Report 50. Rassmussen, S. (2010).

4.5. Good Practice - Travel Plan Essentials

The table below presents a checklist of what is needed to develop implement and monitor a successful travel plan[26].

Travel Plan Coordinator	A person is named, with clarity about how they engage with decision makers in the company.
Travel Plan Document	The Plan is published and made available to the public.
Concrete Measures	Evidence is given that the measures involve tangible outputs, e.g. cycle storage, showers.
Smart Targets	The travel plan contains targets that are specific, measurable, attainable, realistic and time-bound.
Committed resources	Specific allocation of resources, financial and non-financial, has been committed for the implementation of the travel plan.
Baseline Data	A staff travel survey and a site audit have been undertaken
Monitoring Mechanism	Evidence is given of a systematic approach to measuring the performance and thus the impact of the travel plan.

4.6. Working In Partnership

Organisations can also benefit from linking into other actors around them. Local authorities can do a great deal to make travel plans more effective through offering advice and funding infrastructure improvements. They can also co-ordinate travel plan networks for local employers. Setting up Travel Plan Networks with other employers can also be helpful. They offer a chance to share ideas and co-operate in local initiatives. Particularly for smaller organisations linking with other employees can give more weight in negotiations with, for example, public transport operators[27].

5. Making Modes Safer for Commuting

Having undertaken a travel plan to cover commuting, employers will have identified appropriate modes and associated risks for the journey to and fro from work for each employee. This section presents the different modes used for commuting including the car, public transport, Powered Two Wheelers (PTW), cycling and walking and looks at what employers can do to make their use safer. It should be borne in mind that safety is a very important criterion, however many criteria influence the decisions of commuters and it is vital to cater for the needs of every mode.

5.1. Company Cars

5.1.1. Future Visions for Business mobility and Company Car Fleets

Car drivers mainly cause the road traffic death of other car occupants, motorised two-wheelers, cyclists and pedestrians. Trips by public transport including before and after walking or cycling are collectively safer than car trips[28]. Yet, in the short term, business car provision is sure to continue to be a key factor in employees' modal choice. Company car registrations account for 50.5% of the 11.6 million passenger cars registered across 18 EU Member States in 2008[29] [30]. If an employee has a company car and a petrol allowance then the natural choice, notwithstanding all the possible disadvantages of driving to work, may still be to simply drive to and from work. Distance rates, vehicle allocation rules and incentive schemes should aim to minimise vehicle use and any schemes that may encourage artificially high vehicle use should be revised in order to reduce unnecessary on-road exposure[31]. These factors will also have an impact on commuting. In this regard there is a need to review what the employer criteria for allocating company cars are[32].

As regards fuel costs, only a few Member States ask employees to account for the fuel received from employers for private use. In Belgium and the Netherlands pure business use represents only 20-

26   Department for Transport (2008) Essential Guide to Travel Planning
27   Department for Transport (2002) Making travel plans work: lessons from UK case studies.
28   ETSC (2003) Transport Safety Performance in the EU, A Statistical Overview.
29   Polk (2009) Copenhagen Economics Company Car Taxation.
30   However, the share of company cars in total registrations varies between countries. It is lowest in Greece (24%), highest in Germany (60%).
31   Murray, W. (2010) Travel/Mobility Planning Interactive Driving Systems.
Murray, W. (2010) Interactive Driving Systems Commuting Checklist
32   Cooke (2002) Rethinking the Business Car Overdrive Business Solutions, Birmingham, England

30% of company car use, the rest being pure private use and home-work commutes. When looking at fiscal treatment of company cars as benefit in kind, employees in many MSs receive benefits that are undertaxed relative to alternative salary remuneration. A recent study carried out for the European Commission estimated that tax revenue losses may approach 0.5% of EU GDP (54 bln EUR)[33].

Company cars can absorb a lot of capital and, in the current business climate, economics will also play a big role in deciding the size and type of a company fleet. "The company car will have to earn its keep economically in the future more than it had to in the past"[34]. Other important drivers for choice of mode are government tax regimes, both those regulating company cars and personal cars.

Risk management, which has already started to rise as an important issue, will continue and be linked to strategies to cut overall business mileage. In the short to medium term there will be a move towards 'City Cars' in some urban situations to minimise and avoid congestion charges. Company, or departmental pool cars, locally hired against a contract may be used to replace "grey fleet" use (see below) and, over time, other company cars. Total business mileage is already under scrutiny and will be cut further by reduced face-to-face contact replaced by electronic communications[35]. In light of this, a current fleet car provider's role may change, taking on a different role with clients and becoming more of a provider of the total personal business mobility mix.
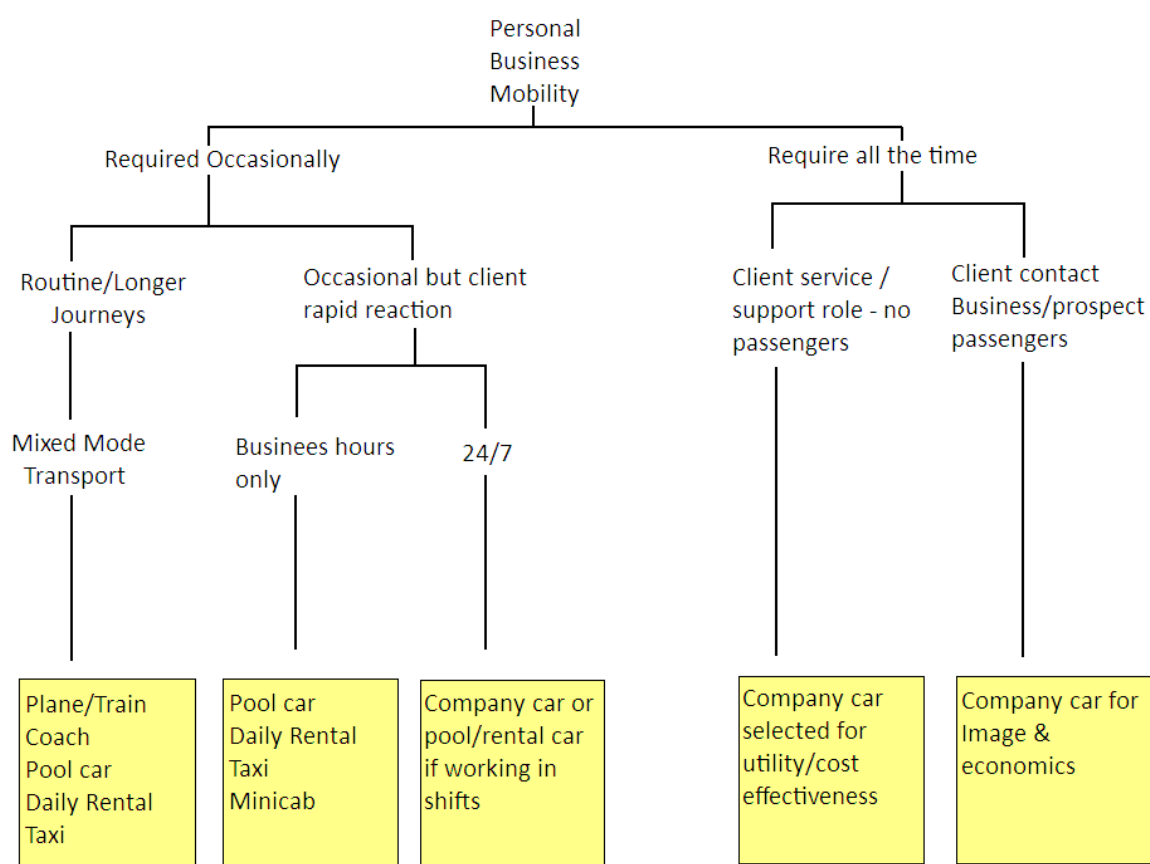
Business Mobility Decision Tree[36]

Having gone through the travel planning process and, if the conclusion is that company cars are still the best option, clear steps should be taken to ensure that the vehicle and the driver are as safe as possible. A comprehensive risk management programme should be in place that also covers those who do use company cars to drive to work. Employers should specify minimum standards of vehicle safety features and EuroNCAP star rating.

5.1.2. Grey Fleet

"Grey fleet" vehicles are employees' own, 'private', vehicles when used for work. They may also be used for commuting. There are additional concerns that need to be considered here. A gap analysis risk assessment should be undertaken to ensure that if drivers use their own vehicles to commute then they are also included in the employers' work related

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33 Polk (2009) Copenhagen Economics Company Car Taxation.
34 Cooke, P. (2008) Duty of Care and Best Practice Cars on Business University of Buckingham
35 Ibid
36 Cooke (2002) Rethinking the Business Car Overdrive Business Solutions, Birmingham, England

road safety policy. The vehicle itself should be 'fit for the task': it should be fully insured, serviced and maintained to a high standard. Employers could also specify minimum standards of vehicle safety features, such as maximum age, if they are also being driven for commuting purposes. As far as risk assessing the driver, this is discussed in detail in the PRAISE Report 'Fit for Road Safety'[37]. Training, following a driver risk assessment, should be offered to all who need to drive for work, regardless of if they are using their own cars or vehicles of the company. Employers could consider extending the driver risk assessment and relevant training to employees who use their own vehicles to drive to work.

National level Recommendations

- Consider tax regime changes to the vehicle and mileage undertaken to incentivise reducing vehicle use and on-road risk.

Employer level Recommendations

- Distance rates and incentive schemes should aim to minimise vehicle use and any schemes that may encourage artificially high vehicle use should be revised in order to reduce unnecessary on-road exposure.
- Undertake a risk assessment which covers route choice for travel to work and mode of transport.
- Run campaigns to raise awareness about regularly maintaining company and grey fleet vehicles.
- Offer driver risk assessment followed up by relevant training to improve driving skills and integrate eco driving training that also tackles correct driving speeds.
- Ensure that grey fleet vehicles used to commute to work are fit for purpose and well maintained and insured.

5.1.3. Car Pooling

Car pooling is a way of reducing the number of cars in cities without restricting individual mobility. Road users who commute along the same route get together to travel together. They use their private car but share the seats available in their car with other commuters, typically colleagues, and they tend to share the petrol price. This can be as simple and informal as "giving your colleague a lift" or facilitated through the setting up of an information network to find out which people commute along

the same route and get them to car pool. For all but very small companies, an online car sharing database will prove useful. This allows people to enter their journeys so that the database can automatically search for colleagues whose journeys match. While some schemes enable staff to find a car partner through the organisation's intranet, others rely on a coordinator who administers the service. A number of software packages exist to help companies set up their car pooling scheme[38].

Integrated into a car sharing system should also be a way of checking the level of maintenance and safety of the car pool fleet, be it 'grey fleet' or belonging to the company itself. Moreover, personal safety implications of sharing lifts home should also be considered. Developed as an environmental measure, car pooling also offers a number of benefits to road users including cheaper commuting costs, reduced congestion, and a reduction of exposure to risk.

Recommendations to Member States

- Promote car sharing by providing less congested lanes to car-poolers (e.g. Madrid).

Recommendations to Employers

- Set up an information network to help employees get involved in car pooling. This can be done via the company/organisation's intranet and through the purchase of software packages
- Provide priority parking or exemptions from parking charge for car pooling employees.
- Set up a guaranteed taxi ride home in case of need to overcome concerns that a car sharer might be stuck at work.

5.2. Powered Two Wheelers

Motorcyclists face a much higher risk of being killed than other road users. For the same distance travelled, the risk of riders being killed is much higher on average than the risk of being killed in traffic for car drivers. In 2006 at least 6,200 Powered Two Wheeler (PTW) riders were killed in road crashes in the EU25 representing 16% of the total number of road deaths while accounting for only 2% of the total kilometers driven[39]. There is also a trend of modal shift towards PTWs for commuting to work to avoid issues such as congestion, congestion charging and parking. In Europe the PTWs circulating parc has increased by 69% between 1994 and 2004[40]. Between the years

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37   http://www.etsc.eu/PRAISE-publications.php

38   Department for Transport (2002) Making travel plans work: lessons from UK case studies

39   ETSC (2008) 2nd annual PIN report, Reducing Motorcyclists Deaths in Europe http://www.etsc.eu/documents/copy_of_copy_of_2nd%20PIN%20Annual%20Report%202008.pdf

40   ACEM http://www.acem.eu/cms/ptwfatalities.php

of 2003-2008 the circulating parc of passenger cars increased by 7.4%[41] while in the same period the circulating parc of PTWS increased by 10.2%[42].

While riding a motorcycle will inevitably carry more risk than driving a car, evidence shows that the implementation of dedicated safety measures can substantially improve PTW safety. The measures should aim at improving the behaviour of motorcyclists, but also the behaviour of other road users and providing a safer environment for PTW riders as well as tackling PTW vehicle safety. The rider's skills, training, experience and attitudes are fundamental to safe motorcycling. Riders should receive appropriate training when they start to use a motorcycle (or re-start after a period of not motorcycling) and receive further training as they progress from smaller to larger motorcycles. Motorcyclists should be made aware of the difficulties other road users have in detecting PTWs and evaluating their speed[43]. PRAISE Thematic Report 3 entitled 'Fit for Road Safety'[44] details good practice on post licence training for PTWs in the driving 'for work' and 'to work' context. As for company and grey fleet used for commuting to work, employers should include use of PTWs under their risk assessment and cover both the rider and the vehicle itself.

National level Recommendations

- Enforce the compulsory wearing of helmets.
- Install speed cameras able to detect speeding riders and enforce motorcyclists' compliance with speed limits.
- Improve rider and driver training. Rider training should focus on hazard recognition and risk assessment as well as vehicle control skills. Driver training should ensure that candidates understand the vulnerability of motorcyclists and "look out for them" when driving.
- Educate riders regarding the importance of proper fastening and provide consumer information regarding helmet safety.
- Develop minimum standards regarding protective clothing.
- Ensure that road design and maintenance address the specific needs of PTW users (provide good winter maintenance, use of anti-skid surfaces, forgiving roadsides).

Employer level Recommendations

- Undertake a risk assessment which covers

route choice for travel to work followed up by relevant training to improve skills.
- Consider what facilities are provided for PTW parking and if they are secure, well lit and maintained.
- Provide facilities for PTW riders such as lockers.
- Include safety criteria when purchasing PTWs.
- Run campaigns to raise awareness about regularly maintaining PTWs.
- Ensure that company and grey fleet PTWs used to commute to work are fit for purpose and well maintained and insured.

5.3. Offering Targeted Public Transport

The core public transport modes (bus and rail) are the safest modes of transport. Employers can play a key role in offering targeted public transport as an option to commute to work. There are also benefits from other perspectives with public transport as there is less need for cars which results in less congestion and parking problems. At present the majority of commuting trips are undertaken in cars. The public transport system has its best level of service at typical rush hour time (starting and ending time of working hours). Access to information such as timetables and real time information concerning disruptions is also vital to ensure users are not discouraged from using public transports (see the "Smart Bus Stop" case study below). Modern information systems such as websites, SMS-services and real time information at stops and in vehicles support a positive image of public transport and are appreciated by the users[45]. Key to ensuring that public transport services are a viable option for commuting is ensuring that targeted and reliable public transport is available on commuting routes. As well as reaching safety targets for their employees, employers can also reach the goals for environmental and quality management. All three are important for company image and job retention and satisfaction. Employers would also benefit by needing fewer spaces for parking which would reduce related costs.

When public transport is available for commuting, one barrier can also be the cost (commuting by train for example can be expensive). In this case, discounted ticket deals for companies that encourage their employees to use public transport can be sought. This is likely to please staff, having season tickets also bring in the advantage for them of being able to travel during weekends or evening trips at no extra costs[46].

41 ANFAC (2008), European Motor Vehicle Parc http://www.acea.be/images/uploads/files/20100427_EU_Motor_Vehicles_in_Use_2008.pdf
42 ACEM, circulating park http://www.acem.eu/media/d_Circulating_Park_2217.pdf.
43 ETSC (2008) 2nd annual PIN report, Reducing Motorcyclists Deaths in Europe http://www.etsc.eu/documents/copy_of_copy_of_2nd%20PIN%20Annual%20Report%202008.pdf
44 http://www.etsc.eu/PRAISE-publications.php
45 GUARD (2010) Cluster 3 Cycling and Walking, CIVITAS Project

In Germany, so called "Job tickets" are offered to employees of some organsations, such as the German Road Safety Council. These are monthly or annual season tickets, purchased en block from a regional transport association by public or private organisations for use by their staff. Job tickets usually require the purchasing organisation to buy a large number of tickets (typically 20 or more), and for at least 50% of their workforce. In return job tickets offer a large discount on the price of individual season tickets. Many organisations further reduce the cost of the season tickets to their staff by charging a reduced price, or passing the tickets on free of charge-effectively subsidising their employees' travel to work. Purchasing organisations are also responsible for ticketing administration, such as issuing of the photocards and the actual tickets. While, SMEs are sometimes not able to fulfill the minimum amount of tickets required by the regional transport associations to be purchased, they can build partnerships with corresponding interest associations.

Interchanges and interoperability with other modes should also be taken into account. A transport network that encourages the non-motorised mode options such as walking and cycling (see section below) is also particularly important in terms of enabling access to urban public transport and interchanges[47].

5.3.1. Shuttle Services

When there is no or insufficient public transport available, employers might consider providing their own alternative by setting up shuttle services, for example between train stations and the place of work. Shared shuttle buses are safer than individual car use as explained in the public transport section above. In Italy[48], public administrations (Municipalities/the Ministry of Environment) have set up a scheme to allocate funds and provide support to companies cofunding company shuttles services. Companies with a Mobility Manager (see section below on national initiatives, the experience of Rome) can submit applications for the co-funding of shuttles: this includes the reimbursement of up to 50% of the total costs of management for a period of two/three years. There is also the possibility for a group of employers located in the same area to submit a project to obtain co-funding for a shared service.

Company Shuttle (Roma Servizi per la Mobilità)

5.3.2 The "Smart Bus Stop" case study: Rome

The so-called "Smart Bus Stop"[49] tells the waiting time for the bus: citizens can thus decide whether to wait or do something else during the minutes available. This service, which is active on about 200 bus stops in the city of Rome, has also had a widespread diffusion via its application for mobile phones. The service is free (only the operator's cost for connection is applied).

Companies can request to include in their own intranet a specific link to the neighbouring bus lines/ bus stops. Employees can therefore know in real time when "their" bus is getting to "their" bus stop without waiting for it outside. Many companies and institutions opened to the public linked this service to screens to be consulted by customers/clients.

Recommendations to Member States

- Promote the extension, quality, marketing and use of public transport.
- Annually asses the level of service and use of public transport.
- Assess routes (direct routes without changes), suitability of timetables (related to the starting and ending time of working hours), journey times to take commuting with public transport into account.
- Ensure good access to information about public transport (timetable and real time information).
- Encourage the centralisation of work activities so that they can be served better by public transport.
- Improve infrastructure: raised kerbs; priority measures such as bus lanes; better quality bus stops and waiting areas in the places where staff travel.
- Promote employer-subsidised public transport tickets (for example annual season tickets).

Recommendations to Employers

- Offer employees subsidised annual season public transport tickets.
- For larger employers, provide on-site travel centres offering comprehensive information.
- Put travel information, such as timetables, on company intranet sites.
- Seek dialogue with public transport operators in order to ensure they provide schedules and routes that are fit for the staff.

46   Department for Transport (2008) Essential Guide to Travel Planning
47   EEA (2008) Time for a Climate Change: TERM 2007 Indicators tracking transport and environment in the European Union. EEA, Copenhagen
48   Information provided by Roma Servizi per la Mobilità
49   Information provided by Roma Servizi per la Mobilità

- Offer shuttle services to work when there is poor or no public transport alternative available (for example shuttle from train station to place of work).

5.4. Walking and Cycling

Efforts should be made to make walking and cycling safer travel modes for citizens for commuting to and from work. In 2008 6.7% of all road deaths were cyclists and 20.4% of all road deaths were pedestrians[50]. It is often claimed that cycling or walking should not be encouraged as they are less safe transport modes than cars. But research emphasises that the advantages of more walking and cycling for public health and environment (reduced mortality and healthy lifestyles through regular exercise) outweigh their disadvantages (the risk of death or injury)[51]. For the individuals who shift from car to bicycle, it is estimated that beneficial effects of increased physical activity are substantially larger (3-14 months gained) than the potential mortality effect of increased inhaled air pollution doses (0.8-40 days lost) and the increase in traffic accidents (5-9 days lost)[52]. Many also choose to cycle or walk out of financial reasons. It has also been shown that, when cycling levels reach a certain critical mass, collisions become fewer and fewer. This is evidenced in cities with a high modal share such as Amsterdam and Copenhagen which have seen a decrease in collisions in conjunction with an increase in cycle numbers.

Fear of traffic is often cited as a reason for not walking or cycling. Especially in the Nordic countries slipperiness is a major concern during the wintertime; winter maintenance and anti-skid shoes as well as studded tyres for bicycles are some of the solutions for this particular problem. Reluctance to take up these health promoting and sustainable forms of transport is one element of the obesogenic environment[53]. Encouraging cycling and walking to work can also be part of workplace health promotion. Health aspects are also discussed the fourth PRAISE Report on Fitness to Drive[54]. For example one study shows that employees cycling to work are more productive:

- Cycling reduces stress and depressions;

- Cycling reduces sleeping problems and tiredness while increasing stress tolerance and confidence (feeling of freedom and independence);
- Time reliability: cyclists know at what time they arrive at work or for an external meeting.

5.4.1. Cycling

Employers can implement a number of measures aimed at increasing safety of their employees who choose to cycle to work. One is within the first needs assessment, to look at routes to work and work together with the employees to choose the safest routes. A map with these routes can then be published by the employer and included on their website. Internet tools can also be used to help cyclists make best use of the cycle network[55]. Employers can also hold 'Bike to Work' days with promotions such as cyclists' breakfasts, bike clinics, and police bike tagging. According to the UK study 'Making Travel Plans Work', which draws on different case studies, such actions can raise cycling levels by five or even ten times. Their popularity suggests good potential for increasing regular cycling if barriers such as local road danger can be effectively tackled[56].

Organisations can also try to negotiate with local cycle shops to provide staff discounts on cycling equipment, repairs and servicing including safety equipment such as functioning lights. Employers can also consider incentives such as cash payments for each day cycled, or accumulation of daily tokens which can be used in local cycling shops. Another option could be building up a company bike fleet. The use of such a fleet could be promoted through salary bonuses. A bonus could be given to employees who do not spend their entire allotted amount for fuel on the company car because they cycled to work.

Efforts should be made by local administrations and governments to create a safer environment for walking and cycling. The provision of additional cycle lanes and facilities (often in conjunction with other measures) is generally associated with increased cycle flows and increased percentage of trips made by cycling[57]. Experience from some cities also showed that strong and very visible promotion of cycling, in conjunction with significant improvements to infrastructure, changes the minds of planners, politicians and

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50   http://ec.europa.eu/transport/road_safety/pdf/statistics/2008_transport_mode.pdf
51   Sælensminde, K., 2004. Cost-benefit analyses of walking or cycling track networks taking into account insecurity, health effects and external costs of motorized traffic. Transportation Research Part A 38, 593-606
52   Hartog, Boogaard, Nijland, Hoek, Do the Health Benefits of Cycling Outweigh the Risks?, June 2010 Hendriksen, I. (2010) TNO: Fietsen is groen, gezond en voordelig, pp. 9 -10
53   PACTS (2007) Beyond 2010: A Holistic Approach to Road Safety in Great Britain, London, UK
54   http://www.etsc.eu/PRAISE-publications.php
55   GUARD (2010) Cluster 3 Cycling and Walking, CIVITAS Project
56   Department for Transport (2002) Making travel plans work: lessons from UK case studies
57   GUARD (2010) Cluster 3 Cycling and Walking, CIVITAS Project

travel habits of citizens[58]. Employers can play a key role in channeling feedback from their employee travel survey, on bike routes and safety concerns, back to the actors responsible for infrastructure. Some local authorities may have specific cycling officers to respond to such requests.

Training needs to be approached sensitively because learning to cycle is associated with childhood and adults can be reluctant to admit that they are not confident. New cyclists would benefit from a buddy whereby a more experienced rider accompanies them and shows them the best low traffic routes and also how to cycle on routes where no specific facilities are provided. New software also exists to match people for bike journeys in the same way as car pooling databases match up car journeys[59]. Cycling in groups has the advantage of making cyclists better visible to other road users, and therefore decreases number of collisions. Electric bikes are also increasing: training is recommended to adapt cyclists to the different requirements of electric bikes.

5.4.1.2. Example of an Employer that took Measures to Improve Cycling for Commuters

The Society for Technical Cooperation (GTZ) in Eschborn, Germany (about 1,000 employees) is participating in a project "bike + business" which aims to increase the share of cycling in the modal split of commuter traffic[60]. In addition to measures at company level, the concerns of the GTZ were also drawn into the development of local train stations, and developing the inner city cycling concept for the town. Activities included conducting a staff meeting to "bike + business" and improving bicycle facilities (parking, quality, location, lighting, access roads, showers, lockers). Cycle websites were created on the corporate intranet. Another key outcome was the creation of a cycle map for commuting which was developed in close cooperation between the metropolitan planning organisation Frankfurt Rhein-Main, the ADFC Hessen, the city of Eschborn and GTZ. The map was designed to display the cycling network routes of the city from all directions in Eschborn and was based on the experience of cyclists of the GTZ commuting to work.

5.4.1.3 Commuting by Bicycle in Copenhagen

Copenhagen, with a population of 500,000, is an example of a city where 37% of workers reach work or educational establishments by bike and 60% of citizens use their bikes everyday and for all of their trips. It was also calculated that, if cycling increased by a further 10%, 8 million EUR would be saved annually in health costs. Efforts by Copenhagen authorities have led to a 50% reduction of killed and seriously injured cyclists from 2000. To continue having these high levels of cycling and improving safety records, a number of policy interventions have been applied that also improve safety of commuting cyclists. These include for example restrictions for HGVs over 18 tones and recommended routes for HGVs through the city. To further minimise HGV and cyclists collisions LED technology informs HGV drivers if a cyclist is approaching at junctions. So-called "Green Cycle routes" have been developed for cyclists identifying safe routes. Green waves for cyclists, where traffic lights are set at the speed of cyclists, were also created. A so-called "cycle bus" system whereby cyclists meet at set places and times on a route map to commute in and out of town together have also been set up. These improve safety and increase the feeling of security of the cyclists themselves[61].

5.4.1.4 Using the Paris Public Bike System Vélib to commute

The Vélib public bike system was launched in Paris in 2007 as part of the City of Paris's aims to decrease individual car traffic and promote alternative means of transport including public transport, walking and cycling. Paris now has 20,600 bikes deployed at 1,451 stations with a station every 300 meters. In Paris 61% of long term subscribers use Vélib to go to work or school, 40% as the main mobility means for these trips. Around 61% of people think that Vélib is a service which is easy to use, practical, fast and available. Also 84% of citizens think that Vélib completes the offer of transport. Average duration of a trip is 18 minutes. Road Safety doesn't curb the use of Vélib, only 10% of users name it as a downside. The bikes themselves are fitted with safety features including lights that come on as soon as the bike is used and reflector strips on the wheels. In response to the road safety aspects of the increase in cycling, the Paris City Hall prepared a communication campaign including flyers distributed to all new subscribers of the service describing the safety rules with good advice for cycling in Paris. This was linked by the Police carrying out enforcement of these rules. The results for road safety show that the rate of collisions has not increased but that the overall rate of deaths, particularly involving HGVs, are still too high and need to be tackled. A special campaign around blind spots was developed and run in 2007 targeting both drivers and cyclists.

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58   Ibid
59   Department for Transport (2008) Essential Guide to Travel Planning
60   http://www.bikeandbusiness.de/pilotprojekt.htm
61   Rassmussen, S. (2010) Traffic Safety in Copenhagen a City with Many Cyclists Presentation City of Copenhagen POLIS

5.4.2. Walking

As with cycling, safety is a key consideration for employers wanting to encourage walking as part of workplace health promotion. Site location is also an important factor, walking can be an important mode of a choice especially when employers are based in towns or close to residential areas. As with cycling, employers can work with local authorities managing infrastructure to improve pedestrian safety. Issues such as route choice and creating a pedestrian friendly map are critical. As with cycling, maps showing pedestrian friendly routes can be drawn up and publicised on the employer's website.

Recommendations to Member States

- Improve the safety of unprotected road users within the context of workplace health promotion.
- Promote walking and cycling for commuting but with the emphasis on safe use of the roads.
- Set up cycle buddy and cycle bus schemes to encourage cycling safely.
- Improve infrastructure and especially make roundabouts safer for unprotected road users by reducing the width of the circulatory carriageway, increasing deflection on entry and improving signing, road markings and conspicuity.
- Tackle speeding and set 30km/h as the standard speed limit in urban built-up areas as appropriate.
- In areas where speed limits are over 30km/h, provide dedicated infrastructure for cyclists.
- Provide shorter and safer routes for pedestrians and cyclists by ensuring that routes are direct and that the quickest routes are also the safest.
- Provide benefits such as fiscal stimuli to promote cycling and walking to work and reduced VAT for cycle repairs.

Recommendations to Employers

- Improve the quality of off-site cycle and pedestrian access by working in partnership with other employers in the area, local authorities and cycling groups.
- Provide training for those who are not confident cyclists and introduce a cycle buddy scheme.
- Encourage use of safety equipment.
- Create site specific cycle/walking maps identifying safe routes

- Guarantee free use of company bikes for commuting with the chance to try different models such as folding and electrically assisted bikes.
- Provide financial or in kind incentives for those agreeing to cycle or walk to work.
- Organise events to encourage cycling and walking also focusing on safety issues such as cycle maintenance and visibility.
- Provide showers, changing and locker facilities for cyclists and walkers: these can also be used by joggers during lunch breaks.
- Provide cycle shelters for parking that are secure and are situated close to building entrances. Access to parking needs careful consideration to avoid conflict with other site traffic.
- Engage with local authorities to improve infrastructure safety for pedestrians and cyclists.

6. Factors Influencing Commuting

This section will present three other factors influencing commuting times and routes: working patterns, land use and route planning.

6.1. Flexible Time and Shift Work

Flexi-time gives the possibility to work more freely and plan the journey accordingly. This means that employees can choose to travel at times that link in with better transport choices. For example, they can drive by car but avoid the rush hour or they can car pool and share with other family members. Flexitime also has other advantages, as it can improve job satisfaction and motivation. Flexi-time can also be used to work longer days and create compressed weeks and then employees can take days off which in turn also reduces the days that they commute into work. This makes particular sense for those travelling longer journeys to reach work and for those balancing childcare, for example. However, flexitime is not possible for all types of work such as in the service sector.

Some employers and employees could also consider telecommuting or home working, for example one or two days a week-and thus reduce the need for commuting into work every day. However, there is also the possibility that home working will encourage people to live further from work so that they may reduce trips but increase miles. Organisations using home working to cut travel need to monitor the effect on car commuting distance and check they are not exchanging fewer trips for more miles[62].

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62   Making travel plans work: lessons from UK case studies, Department for Transport, 2002

Commuting for shift workers can pose other problems linked to time and circumstances of travel. Their journeys to and from work may be affected by fatigue. Employers of shift workers should therefore be particularly aware of the risks of fatigue when commuting. Employers should make it possible for workers to rest (even at the workplace) before going into traffic. They should pay attention to individual needs and make alterations if possible considering the individual situation. Moreover, if employees choose public transport, attention should be paid to security concerns of travelling late at night or early in the morning. This issue has been dealt with in more detail in the PRAISE report on Fitness to Drive[63].

Recommendations to Member States

- Adopt employment policies that enable teleworking and flexi-time and can result in differentiated commuting patterns and a better work/life balance.
- Invest in public transport also at off peak times.

Recommendations to Employers

- Introduce flexi-time arrangements if the business model allows to enable employees more choice in mode of transport and to avoid peak travel times.
- Offer home working if business mode allows but monitor length of journey.
- Provide particular support in offering modal choice for shift workers taking safety and also security issues into account.
- Make sure that shift workers work the same shifts as much as possible to engender more regular sleep patterns.
- Give particular consideration to night shift workers especially regarding journeys home after work, for example by providing sleeping facilities on site.
- If cost effective, provide taxi rides to workers who occasionally work extra hours/overtime and have to return home late.

6.2. Safer Routes

Commuters do not necessarily choose the safest routes to commute. This can be addressed either by reducing the road risk along commuting routes (especially via infrastructure measures) or by providing information to help commuters choose safer routes whichever mode they are using. Commuters typically prefer the quickest route to work (not necessarily the safest), it is therefore necessary to ensure that the road risk on their commuting routes is minimised. There are still many infrastructure deficiencies that can lead to collisions while commuting to work.

Traffic management through ITS can also be of use, for example with the use of tools such as dynamic speed limits that change during peak hours. Helping commuters choose the safest routes to work should also be considered. Road users are not typically aware of the safer alternative offered to them. Safe routes to school programs for children have proven successful and such initiatives should be extended to commuting more generally. Key to this is the involvement of employers. A number of IT tools can be used for that, integrating information such as the location of high risk sites and real time information to avoid congestion or to inform road users of locations where a collision has just occurred.

Recommendations to Member States

- In designing new infrastructure, responsible authorities should make sure that new roads are built without dangerous street furniture and, when this is not possible, street furniture should be designed to be more forgiving.
- Mandatory road safety audits should remove roadside hazards within the design stages of a scheme.
- Responsible authorities should identify a road hierarchy according to the functions of different roads.
- Authorities should create attractive and convenient routes for journeys on foot or by bicycle that people would actually like to make routes with less proximity to motor traffic and safer provision for crossing roads.
- Reduce speed limits where motor vehicles still travel in proximity of people walking and cycling.

Recommendations to Employers

- Promote initiatives to help commuters in their route planning/information about safer routes such as EuroRAP (EuroRAP is a programme that aims to provide independent, consistent safety ratings of roads).
- Support employees in route planning to prioritise safe routes to and fro from work.
- Display real time information about congestion and collisions that is posted on the intranet or screens at the place of work.

63   http://www.etsc.eu/PRAISE-publications.php

6.3. Land Use

Integrated land use and transport planning is a key tool in managing the demand for travel and transport and in influencing road safety and mobility patterns across the EU. Urban design affects travel patterns. Today the aim is often to reduce the movement of non-essential traffic through new housing areas, towns and cities, whilst increasing accessibility to and viability of public transport services. To deliver integrated land use and transport planning there is a need at the national level for greater collaboration between the Transport Ministry and other ministries that influence transport, such as Finance, Planning, Environment and Industry. Without high-level coordination, the delivery of integrated transport and land use planning will rest in the hands of pioneering authorities rather than being a common deliverable across Europe[64].

An example of good practice can be the setting up of collaborations between public authorities and local employers (local employer associations/chambers of commerce/industrial zones/Business parks etc.) who know best what the needs of their employees are in their local surroundings and can therefore have a positive influence on the land use planning process. Local employers can also agree among themselves to group common areas together, such as sharing car parks, to reduce unnecessary trips.

Recommendations to Member States

- Authorities should encourage the integration of road safety into land use and transport planning.
- Work activities should be centralized so that they can be served better by public transport.

Recommendations to Employers

- From the onset when employers consider site locations commuting and ease of access should be considered.
- Employers should be encouraged to get together to inform public institutions of their local needs, or even ask for public funds to coordinate projects.

7. National Level Actions

A number of positive actions can be taken at national level by relevant authorities. A first step should be the collection of reliable commuting data, lacking in many countries. Depending on the legal compensation system in place, the definition of what constitutes a commuting accident will differ from one country to another (see commuting overview above), and therefore influence the collection and availability of data. Measuring the extent of the problem (as we have seen commuting accidents are a very significant proportion of occupational accidents) and monitoring the patterns/trend is vital to facilitate actions at the national level. Such actions can include the adoption of guidelines and incentives for employers, or the funding of mobility projects as detailed in the examples below.

7.1. France

In France in 2008, out of 956 fatal occupational accidents that occurred, 333 were commuting accidents[65]. The situation is well known in great part due to the fact that in France commuting accidents are insured by the public occupational injury scheme, and a small part of the compensation paid in case of commuting accidents is also borne by the employers as these accidents are considered when the insurance premiums are calculated. For this reason the decision was taken to draft a working text on the prevention of commuting risk ("risque trajet" in French). The text was adopted in 2004 and serves as guidelines to employers. This follows from an earlier text adopted in 2003 on the risk while driving during work hours ("risque mission") that had as a reference the European Directive 89/391 on health and safety in the workplace.

The text on the prevention of commuting accidents[66] states that such accidents represent an enormous social and economic burden, about 45% of occupational deaths, and that a number of measures taken by employers and local actors can significantly reduce commuting risk.

As a priority, measures should be taken to avoid or reduce the exposure to risk:

- Reducing unnecessary journeys, including providing a canteen for lunch breaks and, for certain occupations setting shifts that do not provide long breaks that might encourage employees to return home in the middle of the day.
- Prefer public transport modes by providing incentives to employees, or providing shuttles financed by the employer if needed.

When this is not possible:

- Improve the local access to the place of work

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64   EEA (2008) Time for a Climate Change: TERM 2007 Indicators tracking transport and environment in the European Union. EEA, Copenhagen
65   CNAMTS, (2010) presentation by Thierry Fassenot at the PRAISE Seminar in Barcelona 14th June http://www.etsc.eu/documents/Thierry%20Fassenot%20Work%20Related%20Road%20Safety%20in%20France.pdf
66   CNAMTS, (2004), Prévenir les accidents routiers de trajet, texte adopté le 28 Janiver 2004 par la Commission des Accidents du Travail et des Maladies Professionnelles

and provide better parking facilities for employees.

- Encourage employees to ensure their vehicles are well maintained and meet technical standards.
- Help employees to maximise their safety when they are about to use the roads, through adapting working hours accordingly, providing information about the traffic conditions to help employees prepare their trip (weather condition, road works, etc.), providing maps on the best way to reach the place of work.
- Inform and raise awareness of employees about the risks while commuting (via campaigns/info days/training programmes).

The text also encourages local employers to get together, as these measures can be more efficiently achieved when they are taken together by a number of employers, and especially to collaborate with the local authorities.

Importantly, this text is the building block for ongoing work by the Steering Committee for the Prevention of Work Related Road Risk (an organisation made up of all the French public health insurance entities). A round table on the prevention of commuting risk was held in Paris, and a White Paper on commuting risk was prepared[67]. In particular the topics focused on include the setting up of local networks and actions, the merging of safety and environmental goals of improved commuting, and a focus on the risks caused by modal shifts to new modes: car pooling, cycling, powered two wheelers.

Finally, an online tool was created to help employers evaluate their organisations' work related road risk. This tool is called PEDRO[68] and two different PEDRO modules were created (one for road risk during working hours and one for commuting risk). The "PEDRO Trajet" evaluation, on commuting, is divided in three sections that contain information to help employers assess their employees' commuting patterns and collisions, their road safety management, and the actions they have in place. Essentially this is a questionnaire asking questions such as "Do you have this in place?" or "Did you do this?" for a number of items in each of the three sections, and providing information to employers. The "PEDRO Trajet" tool can be accessed online.

7.2.   Italy

In March 1998 a Decree introduced the new figure of the Mobility Manager. Private Companies as well as public institutions with more than 300 employees in a single premise or with over 800 employees in more than one premise can nominate a Mobility Manager, responsible for the personnel mobility. Mobility Managers play the role of interface between the Institutions and Decision Makers in the field of urban mobility and the requirements of the company they represent. A number of incentives, such as reduced annual public transport tickets or the possibility to apply for the co-funding of mobility projects, induce companies to nominate a mobility manager. The Mobility Manager's main goals are:

- The reduction of the use of private car for commuting in favour of public transport and/or optimisation of modal shift.
- Promotion of communication and awareness of issues regarding mobility.
- Fostering the gradual introduction of low environmental impact vehicles.

Project of shuttle cofunded by the Municipality of Rome (Source: Roma Servizi per la Mobilità)

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67 CNAMTS, (2010) presentation by Thierry Fassenot at the PRAISE Seminar in Barcelona 14th June http://www.etsc.eu/documents/Thierry%20Fassenot%20Work%20Related%20Road%20Safety%20in%20France.pdf
68   Plan d'Evaluation et d'Actions du Risque Routier Professionnel (Evaluation and action plan for professional road risk) http://pedro.artifrance.fr/trajet/

The establishment of a home to office Commuting Plan is also one of the Mobility Managers' main tasks. The mobility of employees is first surveyed through questionnaires asking information about both their present commuting mode of transport, and their willingness to adopt more intelligent commuting habits if a number of measures/tools/incentives are made available. A commuting plan is then drafted, including notably the company's best practices on fostering the use of public transport or its integration with the private car. Appointed Mobility Managers often lack some of the specific technical skills needed for their role, and are therefore guided by a public figure appointed in their region: the Area Mobility Manager. Area Mobility Managers assist all the Mobility Managers and companies with advisory activities and technical support. The Interaction between Area Mobility Managers and Mobility Managers include:

- Fostering active participation
- Training activities including kick-off initial meeting, events, workshops
- Fostering and creating networks of Mobility Managers, considering that Firms/Companies operating in the same urban areas share similar problems (difficulty of parking, some inadequacy of public transport, etc.)
- Updating Mobility Managers on their activities
- Finding specific solutions for specific cases
- Finding special formulas to foster commuting and integrate companies fleets with car sharing vehicles
- Technical assistance (engineering, planning and design)
- IT support
- Data analyses
- Validation of commuting plans
- Monitoring active projects

Area Mobility Managers are a link between companies and municipalities and public administrations and therefore also provide technical/administrative assistance to municipalities through the following tasks:

- Setting up of administrative acts
- Sharing decision making aspects
- Facilitating contact and meetings with companies on specific topics
- Supporting in the definition/allocation/reform of funds
- Participation in technical commissions

Also, since 2000, a Decree stated that all activity

poles generating/attracting traffic can be included in the measures/incentives for urban sustainable mobility and can submit projects for co-funding to the relevant public authorities. Potential candidates include: commercial malls, hospitals, universities, auditoriums, etc.[69]

7.3.   Switzerland

Some public and private companies have introduced a mobility program for all their employees. The focus is on reducing traffic congestion caused by employees commuting, to promote walking and cycling to work and the use of public transport. The mobility structure of the company is analysed, goals are fixed and measures are suggested. Information, awareness raising, organisation, enforcement and promotion measures enhance health and safety of the employees. For instance, companies who join the mobility program receive a financial incentive of 2,000 CHF (1,400 EUR) from the Canton Tessin (in southern Switzerland) and free advice from the municipality. The cantons (states) of Geneva and Vaud have also developed a mobility plan together with very concrete recommendations for employers. In the mobility plan a list of measures is proposed and for every measure a clear distinction is made between how the measure is applicable to commuting (called "trajet pendulaire" in Switzerland) or travelling during working hours. Some of the measures proposed, such as providing company shuttle services, are actually only intended for commuting. The mobility plan can be accessed online: http://www.unige.ch/ses/geo/oum/doc/Plan%20de%20mobilite.pdf

7.4   United Kingdom

According to the UK Health and Safety Executive commuting is not included in the legal responsibilities of occupational risk assessment. However, actions are being taken to promote the travel planning concept which also integrates safety issues surrounding use of different transport modes for commuting.

At a national level the UK Department for Transport has set up a National Business Travel Network[70] (NBTN) which is hosted by 'Business in the Community' giving access to over 4000 organisations employing one in four of the UK workforce. This is a business-to-business network which enables companies to share good practice and promote the rationale for travel plans.

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69   All information in this section provided by Roma Servizi per la Mobilità
70   http://www.nbtn.org.uk/

Through research and practical case studies, NBTN is developing and demonstrating a strong business case for workplace travel planning. It organises regular meetings to explore relevant issues in travel planning and has developed free information and guidance for employers on topics including tax and travel plans, motorcycling, cycling and walking. They have also developed practical tools to create personalised access maps for site locations and access for pedestrians and cyclists. This is part of the Cycle to Work Guarantee website[71].
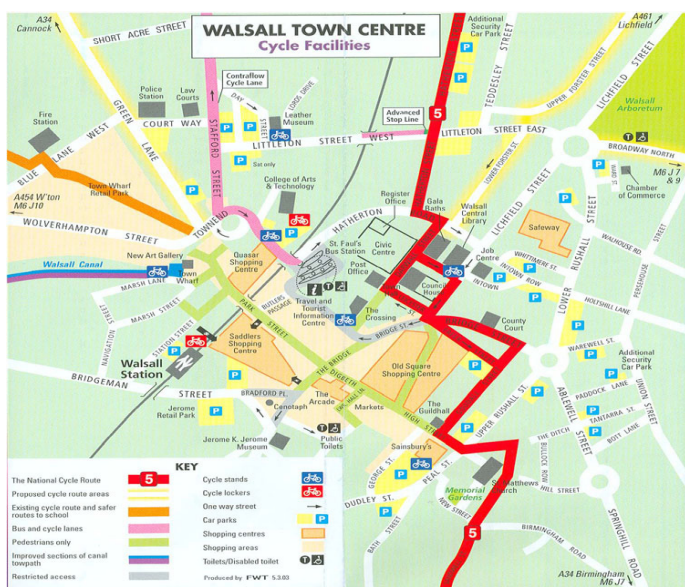
Example of a map for Cyclists to plan a safe route to work (NBTN)

Local Authorities are promoting travel plans which can also include commuting and safety issues. Many local authorities have appointed travel plan coordinators who can provide advice and support to employers who are interested in developing their own travel plans. Some have also prepared packs and guidance which set out the steps taken to develop travel plans.

Another example of good practice from the UK is to promote healthier journeys to work and to reduce environmental pollution. The 1999 Finance Act introduced an annual tax exemption which allows employers to loan cycles and cyclists' safety equipment to employees as a tax-free benefit. The exemption was one of a series of measures introduced under the Government's Green Transport Plan. Guidelines[72] clarify how organisations can take advantage of the exemption to implement a Cycle to Work scheme that encourages employees to cycle to work

and allows employers to reap the benefits of a healthier workforce.

7.4. Luxembourg

The Luxemburgish employers' association conducted in 2002 a report on accidents at work showing that, while such accidents were decreasing, the number of commuting collisions on the roads was on the rise, and that as much as 67% of work related collisions leading to deaths were in traffic. An agreement between a number of partners including the employers' association, the insurers' association, the labour inspectorate, trade unions, and the national road safety NGO, was therefore reached to launch a campaign called 'Trajet: sécurisons-le!'[73] (this would translate into: "Let's make commuting safer). The campaign, launched in 2003, aims at providing materials to employers to conduct simple training of their employees. The materials prepared for this campaign were fact sheets on 12 topics (one topic per month of the year) including a reminder of the traffic rules, information about the various risk factors (alcohol, speed, not wearing seat belts, mobile phones) but also explanations about certain important laws of physics (such as braking distances), the impact of weather conditions on safety, or how to prepare for long journeys.

7.5. Germany

In Germany the "bike+business"[74] in the area of Frankfurt-Main aims to link the interests of cycling employees with their employers to improve the image of the bike as a modern form of transport. It highlights that the bike can form part of the transport picture alongside public transport particularly as a daily form of transport within local and regional transport planning. It is run by different partners including the ADFC (German Bike Club Hessen) and the Frankfurt/Rhine-Main Conurbation Planning Association. Bike+business contributes to efforts to motivate commuters to cycle to work and increase the modal split of cycling commuters. Commuting cyclists make up 12% of the commuter traffic in towns between 50,000 and 500,000 inhabitants which drops to 6% in cities larger than 500,000 inhabitants[75].

The project is made up of different modules including infrastructure, communication and access where the project team advises employers

71 www.nbtn.org.uk or directly through www.cycletoworkguarantee.org.uk/
72 http://www.dft.gov.uk/pgr/sustainable/cycling/cycletoworkguidance/
73 www.trajet.lu
74 http://www.bikeandbusiness.de/
75 National Cycle Plan 2002

Safer Commuting to Work

on how they can make their business friendlier for those who want to commute there by bike. The second module covers use of the bike and looks at issues such as route planning. The third module consists of a workshop for employees and their employers to discuss different issues around cycling to work. The next stage is the implementation of identified measures. The project also helps to organise information days around mobility and health. Finally, an evaluation of the impact is undertaken. The project has also developed a comprehensive handbook which covers all aspects of cycling to work[76].

Typical prevention activities provided by the Institution for Statutory Accident Insurance 'Berufsgenossenschaften' for their insured companies focus on several areas, including prevention of commuting accidents. DVR, the German Road safety Council has been assigned, and is funded by the Statutory Accident Insurance to develop and certify driver/safety officer training and materials such as posters, booklets, brochures, flyers, billboards, videos and computer based training. DVR also provide road safety seminars with the use of mobile and static simulators. Topics include the business case for safety, safe loading, vehicle (car, bus, coach, four wheel drive, van, truck, tanker and blue light) specific issues and fuel efficient driving. The DVR website contains a great deal of material covering road safety at the company level. DVR develops the materials and provides access for the company safety officers (some materials are free). The companies paying their insurance premium to the respective Statutory Accident Insurance (according to their risk status) also have an obligation to organise prevention measures in the workplace. DVR supports such company activities. For example, when chemical company BASF organised a road safety week employees participated in simulator training and a seminar. DVR provided the mobile simulator, brochures and a trainer. The Statutory Accident Insurance provided BASF financial support to cover the costs for the simulator and the trainer.

7.6.   Belgium

'Bike to Work' is a continuous support programme run in Belgium to get more people cycling to work more often, possibly in combination with another means of transport (e.g. train, bus or car). Bike to Work is part of LifeCycle which is a project supported by the European Union through the European Agency for Health and Consumers (EAHC). Companies wanting to encourage cycling give bike points to their employees, which entitle them to interesting benefits such as discounts for bikes and equipment. Part of the campaign is also 'Friday Bikeday' where on Friday employees leave their car at home and cycle instead. Employers are encouraged to provide staff who cycle to work with a free breakfast when they arrive or choose another way of giving them a special treat. Friday Bikeday is an initiative of Brussels-Capital Region, Fietsersbond, Gracq and Pro Velo. At a national level in Belgium employers can pay their employees (tax-free) for every km cycled from home to work and back. After the introduction of this incentive, 50% more commuters cycled to work. Along with a few other EU countries, Belgium applies a reduced VAT rate (6%) when it comes to repairing bikes in bike shops.

8. EU Level Actions

The EU can also take action to improve the safety of commuting in some areas such as road safety data collection, employment law and within the context of its action plan on urban mobility and on ITS with its related Directive 2010/40/EU.

8.1.   Data Collection and Analysis

The EU could support efforts undertaken to make commuting safer by improving data collection through its CARE database enabling a clearer picture of the number of commuting accidents. Through this, decision makers could determine how to manage the greatest risks.

8.2.   Employment Policy

In the field of employment law to protect workers' health and safety, minimum rules on working time are set in all EU Member States under the EU's Working Time Directive (2003/88/EC). Each Member State must ensure that every worker is entitled to a limit to weekly working time, daily rests and breaks and annual leave. Measures to encourage flexible working hours are left up to the Member States. Yet, in terms of achieving a work/life balance for workers in the EU, the Commission presented in 2008 a framework Communication in order to provide "stronger support for reconciling professional, private and family life" and to achieve the Union's growth and employment objectives. This Communication cites flexible working time as one of the key components in the policy mix.

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76   https://www.secure.europarl.europa.eu/parliament/public/visit/secured/request.do?language=EN

8.3 ITS to support management of commuting risk

The EU ITS action plan and its related Directive 2010/40/EU suggest a set of concrete objectives laying down the framework for the implementation of ITS Under Area 1 of the ITS Action Plan including provisions for the optimal use of road, traffic and travel data. This covers the definition of procedures for the provision of EU-wide real-time traffic and travel information services and optimisation of collection and provision of road data and traffic circulation plans, traffic regulations and recommended routes. Another short term application identified in the ITS Action Plan is the promotion of the development of national multimodal door to door journey planners, taking due account of public transport alternatives. This could also be very helpful to inform commuters about their way to work. Under Area 2, the continuity of traffic management, ITS services are covered to manage rising traffic volumes. Progress in both of these areas can also be useful input to managing road risk for commuters.

8.4 Urban Mobility

In Europe, a very large proportion of fatal road accidents happen in urban areas. Lost time and environmental damage caused by traffic jams cost the European economy nearly 100 billion EUR, or 1% of the Union's GDP, according to the Commission. The action plan on urban mobility proposes twenty measures to help local and regional authorities improve the mobility situation in their area. The Action Plan suggests improving travel information including multi modal travel planners[77]. It also lists promoting Intelligent Transport Systems in the urban environment and enabling the exchange of best practice on pedestrians' and cyclists' safety. Under the chapter on 'optimising urban mobility', the Action Plan stresses that affordable and family-friendly public transport solutions are key to encourage citizens to become less car-dependent, use public transport, walk and cycle more, and explore new forms of mobility, for example in the form of car-sharing, carpooling and bike-sharing. It also adds that alternative means of transport, such as electric bicycles, scooters and motorbikes as well as taxis, can also play a role. Finally, it stresses that company mobility management can influence travel behaviour by drawing the employee's attention towards sustainable transport options. Employers and public administrations can provide support through financial incentives and parking regulations. Implementing these aspects of the plan should be extended also to cover safety aspects. Thus efforts to improve safe and sustainable commuting should also be promoted within the context of the EU's Urban Mobility policy.

Recommendations to the EU

- Improve data collection on commuting and collecting "purpose of journey" to inform policy decisions at EU and national level.
- Encourage Member States to promote flexible working hours to stagger commuting times of employees and improve road safety.
- Tailor ITS applications to support traffic management and travel planning for commuting to reduce congestion and improve road safety under the EU's ITS Action Plan and Directive
- Promote safe and sustainable company mobility management.

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77 European Commission (2007) Communication: Towards a New Culture of Urban Mobility http://eur-lex.europa.eu/LexUriServ/site/en/com/2007/com2007_0551en01.pdf.
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Preventing Road Accidents and Injuries for the Safety of Employees

Minimising In-Vehicle Distraction

ETSC
European Transport Safety Council

PRAISE
Work-Related Road Safety

Members

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Trygg Trafikk - The Norwegian Council for Road Safety (NO)
Transport Safety Research Centre, University of Loughborough (UK)
University of Birmingham (UK)

PRAISE
Work-Related Road Safety

PRAISE is a project co-funded by the European Commission and implemented by ETSC on Preventing Road Accidents and Injuries for the Safety of Employees (PRAISE). The project aims to advance work-related Road Safety Management and provide the know-how to employers who have to take on that challenge. It also aims to present the work-related road safety standards of EU Member States and carry out advocacy work at the EU level: work-related road safety is an area of road safety policy that clearly needs renewed political commitment.

Minimising In-Vehicle Distraction
Contents

ETSC
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1 Introduction

This report aims at offering employers insight on how to minimise distractions, but to offer a clear and specific scope it will focus on in-vehicle distractions associated with the use of electronic devices or so-called "nomadic devices" including mobile phones, smart phones, music players and portable navigation devices (PNDs). It aims to provide a source of information and recommendations to employers based on a recently completed longer study on the regulatory situation in the Member States regarding brought-in (i.e. nomadic) devices and their use in vehicles[1]. Vehicles are increasingly becoming "moving offices", an environment in which employees are likely to receive or make phone calls, check text messages or even check their emails, unappreciating the enormous road risk that this type of behaviour poses while driving for work.

2 Distractions on the roads

Distraction on the roads is a major source of concern. Driver distraction is thought to play a role in 20-30% of all road collisions[2]. There is a long list of distractions, be it in-vehicle distractions that undermine the driver or the rider's ability to perform the driving task. Distractions that concern pedestrians and cyclists[3] (listening to music players, making phone calls, etc.) are also a concern, especially as more people walk and cycle to work[4]. Research has shown that the use of devices whilst walking or cycling results in an increased crash rate. Furthermore, a survey amongst cyclists has indicated the use of devices increases the crash rate by a factor of 1.4[5].

This report will focus on the risk associated with the use of electronic "nomadic" devices by drivers. However, the risks covered in this report are by no means an exhaustive list of the distractions employers should manage. Employers should identify and manage all distractions linked to driving for work and ensure that drivers reduce risks by, for example: not eating or drinking while driving; presetting music/radio and climate controls; securing any loose objects; pulling over to adjust equipment, check maps or attend to personal grooming; asking passengers to help with tasks (e.g. checking maps), etc.[6].

According to a recent study commissioned by the European Commission entitled "Study on the regulatory situation in the Member States regarding brought-in (i.e. nomadic) devices and their use in vehicles", nomadic devices comprise all portable electronic devices for information, entertainment, or communication that can be used outside of the vehicle and inside the vehicle by the driver whilst driving[7]. This report will look at information and communication devices including mobile phones, smart phones, and portable navigation devices. Employers are however reminded that they should not underestimate the risks also posed by entertainment devices including music or video players or the entertainment applications of smart phones, personal digital assistants or navigation devices, and a ban on the use of such devices for the sake of entertainment whilst driving should be included and clearly mentioned in driving for work policies. Employers should also know their drivers, and in particular identify those most at risk such as young drivers whose technology friendly lifestyles make them prone to distraction while on the road. For example a recent survey of young drivers showed that nearly 60% of young drivers said they had been distracted by adjusting an MP3 player while driving[8].

The following Nomadic Devices Classification can be useful for employers in determining their purchasing and use policies[9]:

1   IGES Institut, ITS Leeds, ETSC (2010): Study on the regulatory situation in the Member States regarding brought-in (i.e. nomadic) devices and their use in vehicles. Study tendered by the European Commission, Berlin 2010.
2   Dews, F. A., & Stayer, D. L. (2009). Cellular Phones and Driver Distraction. In M. A. Regan et al., Driver Distraction Theory, Effects and Mitigation (pp. 169-190). CRC Press.
3   http://www.swov.nl/rapport/Factsheets/UK/FS_Use_of_media_devices_cyclists.pdf
4   http://www.etsc.eu/PRAISE-publications.php
5   ibid
6   TAC 2008 http://www.worksafe.vic.gov.au/wps/wcm/connect/wsinternet/WorkSafe/SiteTools/About+WorkSafe/About+WorkSafe/Safety+and+Prevention/
7   http://www.etsc.eu/documents/Report_Nomadic_Devices.pdf
8   AAMI (2007) Technology Drives Young People to Distraction: http://www.aami.com.au/sites/default/files/fm/special-reports/2007-young-drivers-index.pdf
9   IGES Institut, ITS Leeds, ETSC (2010) Study on the regulatory situation in the Member States regarding brought-in (i.e. nomadic) devices and their use in vehicles: http://www.etsc.eu/documents/Report_Nomadic_Devices.pdf

Definition	All types of information communication and entertainment devices that can be brought into the vehicle by the driver to be used while driving
Function	Primarily driving related NDs (e.g. PNDs) Non driving related NDs (e.g. mobile phones) Multifunctional NDs (e.g. Smartphones)
Distraction Form	Physical Visual Auditory Cognitive
Safety	Negative effects (e.g. mobile phones) Ambivalent effects (e.g. PNDs)

While there is research and road traffic collision statistics and investigations attesting to the negative safety effects posed by the use of nomadic devices (see section below), some devices have ambivalent safety effects (for example personal navigation devices), or even positive effects when used properly. Employers are therefore encouraged to adopt balanced policies based on clear scientific evidence and provide clear and easy to apply guidelines to their employees on acceptable use.

2.1 Adverse effects of Devices

There are a large amount of scientific articles documenting the risks associated with distracted driving. In terms of the impact of nomadic devices we can list a number of risk factors. To start with, in contrast to some originally fitted devices (e.g. In-Vehicle Information Systems), retrofitted nomadic devices are most often not designed for use in vehicles due to e.g. small sizes of keyboard and displays[10]. The use of these devices while driving may increase driver distraction due to the additional workload to the (primary) driving task[11]. Drivers can be distracted by the use of nomadic devices while driving in several ways[12]:

- **Physical distraction:** The driver has to use one or both hands to manipulate the device (e.g. dialling a number on the mobile phone) instead of concentrating on the physical tasks required for driving (e.g. steering, changing gear, etc.).
- **Visual distraction**: There are three different forms of visual distraction. The first form occurs when the driver's visual field is blocked by objects (e.g. a PND mounted on the windscreen) that prevents him/her from detecting or recognising objects on the road. The second type of visual distraction is caused by the amount of time that the driver's eyes are on the nomadic device and off the road (e.g. looking at the PND display). The third type involves a loss of visual "attentiveness", often referred to as "looking at the road but failing to see". This interferes with the driver's ability to recognise hazards in the road environment.

- **Auditory Distraction**: This form of distraction occurs when drivers momentarily or continually focus their attention on sounds or auditory signals rather than on the road environment. This can occur when the driver listens to e.g. the radio or when holding a conversation with a passenger, but is most pronounced when using a mobile phone.

- **Cognitive distraction**: This form of distraction involves lapses in attention and judgment. It occurs when two mental tasks are performed at the same time. Cognitive distraction includes any thoughts that absorb the driver's attention where they are unable to navigate through the road network safely and their reaction time is reduced. Talking on a mobile phone while driving is one of the most well documented examples of cognitive distraction; however it can also occur when trying to manipulate nomadic devices (e.g. operating a PND) or when paying attention to information conveyed by the devices.

Research Findings on Risks of Mobile Phone Use[13]

Much of the literature focuses on the safety implications of mobile phone use. Below are some of the main research findings:

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10   Gil-Castiñeira,F et al., (2009): Integration of Nomadic Devices with Automotive User Interfaces. In: IEEE Transactions on Consumer Electronics, 55 (1), pp. 34-41. http://enigma.det.uvigo.es/index.php?option=com_content&view=article&id=278:integration-of-nomadic-devices-with-automative-user-interfaces&catid=132&Itemid=530&lang=en
11   Santos J. et al., (2005): The interaction between driving and in-vehicle information systems: Comparison of results from laboratory, simulator and real-world studies - Transportation Research Part F: Traffic Psychology and Behaviour, 8 (2). pp. 135-146. http://eprints.whiterose.ac.uk/2027/2/ITS18_The_interaction_between_uploadable.pdf
12   Young, K. et al., (2003): Driver Distraction: A Review of the Literature, Monash University Accident Research Centre Report 206. Breen, J. (2009): Car telephone use and road safety: final report. An overview prepared for the European Commission. Available at http://ec.europa.eu/transport/road_safety/specialist/knowledge/mobile/car_telephone_use_and_road_safety.pdf (retrieved 22 February 2010).
13   This is a summary of a longer overview of research which can be found in (IGES Institut, ITS Leeds, ETSC (2010) on pps 22-26

Redelmeier and Tibshirani[14] (1997) estimate the effect of mobile phone use on the risk of being involved in a substantial property-damage-only crash. The conclusion was that phone use was associated with a *fourfold* increase in the risk of crash involvement.

A simulator study carried out by TRL[15] benchmarked use of a mobile phone while driving against impairment from alcohol. The overall conclusion was that driving behaviour is impaired more during a phone conversation than by having a blood alcohol level at the UK legal limit. Speed control (adherence to a target speed) and response time to warnings was poorest when using handheld phone, but even with a hands-free phone performance was worse than in the alcohol-impaired conditions. Drivers also reported that it was easier to drive when alcohol-impaired than when using a phone.

The U.S. 100 Car Study conducted by Virginia Tech[16] found that distraction was a major safety issue. Inattention was a contributory factor in 93% of the incidents with lead vehicles. Phone and PDA use was a major factor in the incidents.

As part of the 100 Car Study[17], various types of inattention were identified. Complex secondary tasks (tasks requiring multiple steps, multiple eye glances or multiple button presses) included dialing on a handheld device, locating/reaching for and answering a handheld device, operating a PDA and viewing a PDA screen were identified as increasing the risk of being involved in a crash or near-crash by three-fold. Moderate secondary tasks (defined as those requiring up to two glances away from the roadway or up to two button presses) included talking on, or listening to, a handheld device were identified as doubling risk as compared with attentive driving.

A more recent naturalistic driving study focused on driving in trucks[18]. Texting was the most risky behaviour identified: it was calculated to increase risk of being involved in a safety-critical event by a factor of 23.2. Dialing on a mobile phone increased

the risk by a factor of 5.9, whereas talking on or listening to a mobile phone had a negligible and non-significant effect on risk. Use of or reaching for other electronic devices such as a video camera or two-way radio increased risk by a factor of 6.7. The results in terms of population-attributable risk were somewhat different: texting, while highly risky, was not all that frequent, being associated with only 0.7% of all events, whereas dialing on a mobile phone was associated with 2.5% of the events and interaction with a dispatching device with 3.1% of the events. This underlines out the need to ensure that texting does not become more prevalent.

By combining estimates of increased risk from the use of mobile phones with observation data, it is possible to calculate the overall number of injuries attributable to mobile phones. Dragutinovic and Twisk[19] (2005) carried out such a calculation for the Netherlands: in 2004, 585 traffic injuries and deaths were attributable to mobile phone use. This represented 8.3% of the total, and constituted 4.5 times the estimated number for 1995.

Hands-free also poses significant risk

Of particular interest is the fact that different research from around the globe has identified talking on the phone with "hands-free" systems as posing a very significant risk while driving. According to Noble and Riswadkar[20] (2009) a number of studies have tried to make a distinction between the use of hands-free versus hand-held and for the most part "simulator and on-road studies have concluded that the use of hands-free devices did not reduce the impact on reaction time and driver distraction". This is because while hands-free may address the physical distraction, the interactive conversation on a mobile phone demands cognitive resources (this is the cognitive distraction mentioned above) "and this is believed to be primarily responsible for distracted driving"[21]. The same can be found in RoSPA's mobile phone guidelines on driving for work concerning hands-free: "using a hands-free phone while driving does not significantly reduce

14   Redelmeier, D.A. & Tibshirani, R.J. (1997): Association between cellular telephone calls and motor vehicle collisions. In: New England Journal of Medicine, 336(7), pp. 453–458. http://www.nejm.org/doi/pdf/10.1056/NEJM199702133360701
15   Burns, P.C. et al., (2002): How dangerous is driving with a mobile phone? Benchmarking the impairment to alcohol. TRL Report 547. Crowthorne, UK.
16   Dingus, T.A et al., (2006): The 100-car naturalistic driving study: phase II – results of the 100-car field experiment. Report DOT HS 810 593. National Highway Traffic Safety Administration, U.S. Department of Transportation, Washington D.C.
17   Klauer, S.G., et al., (2006): The impact of driver inattention on near-crash/crash risk: an analysis using the 100-car naturalistic driving study data. Report DOT HS 810 594. National Highway Traffic Safety Administration, U.S. Department of Transportation, Washington D.C.
18   Olson, R.L. et al., (2009): Driver distraction in commercial vehicle operations. Report FMCSA-RRR-09-042. Federal Motor Carrier Safety Administration, U.S. Department of Transportation, Washington D.C.
19   Dragutinovic, N. & Twisk, D. (2005): Use of mobile phones while driving – effects on road safety. A literature review. SWOV Institute for Road Safety Research Report R-2005-12. Leidschendam, 2005. http://www.swov.eu/rapport/R-2005-12.pdf
20   Noble, J. & Riswadkar, A.V. (2009), Cell Phone Liability for Employers. The John Liner Review, quarterly review of advanced risk management strategies 23 (1). PP 73-79.
21   ibid

the risks because the problems are caused mainly by the mental distraction and divide attention of taking part in a phone conversation at the same time as driving "[22]. Below, a number of additional research conclusions that have investigated the effect of hands-free:

• Research from Western Australia, published in the British Medical Journal[23], found that driving while talking on a mobile phone – whether hand-held or hands-free – increases the risk of a collision by four times.

• In the UK the Transport Research Laboratory (TRL)[24] identified the following stopping distances with different levels of impairment:
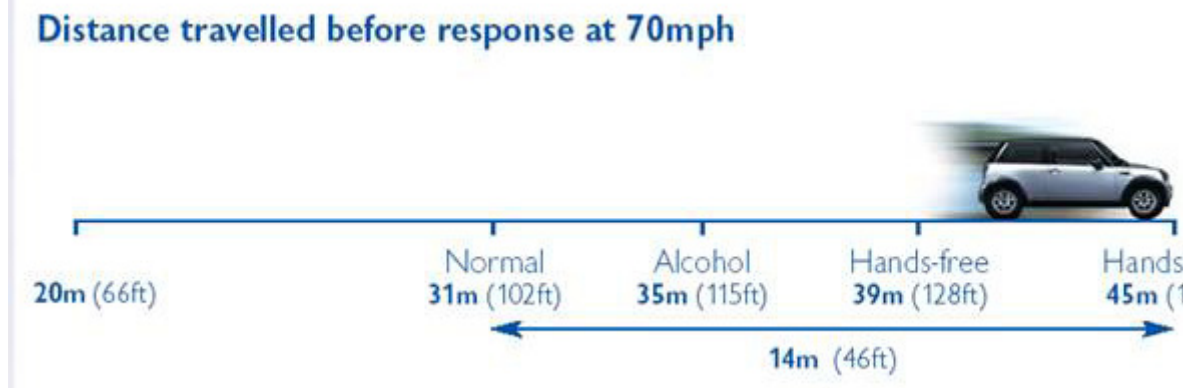
Distance travelled before response at 70 mph (113 kmph)

• More recent research by the Univeristy of Utah[25] shows that driving performance is dramatically impaired when using a hands-free mobile phone for 97.5% of drivers. Drivers on hands-free mobile phones took 20% longer to hit the brakes when needed.

• According to a survey undertaken in 2010[26] 20% of German drivers telephone whilst driving even whilst 90% were aware of the risks.

Very striking is the fact that talking on the phone, even with hands free, is identified as even more dangerous than drink driving which is now anchored in people's minds as something that is not only illegal but also very dangerous and socially unacceptable. While it will take some time for the general population of drivers to accept and internalise in a similar way the risk posed by the use of telephones while driving, it is very important for employers to be made aware of this risk, both of hand held and hands free mobile phone use. This should be reflected in their driving for work policies. There are already positive examples from companies who also ban the use of hands free phones.

2.2 Benefits and ambivalent effects

Portable Navigation Devices

Overall, there is consensus about the negative impact of certain devices on road safety (e.g. mobile phones). In contrast, some nomadic devices may have benefits, or rather an ambivalent safety effect[27]. When used properly, portable navigation devices (PNDs) for instance can have a positive impact, since these devices can ease the task of driving and the routes followed are shorter, so that stress and exposure to "danger" is reduced. However, they can have a negative impact if they are operated by the driver while driving or if the advantage of taking shorter routes is cancelled out if the shorter route follows roads with higher risk by directing traffic through small centers of habitation or along unsuitable roads (e.g. distributor roads)[28]. The main safety benefits of PNDs are:

• Less exposure: The main purpose of navigation systems is to find a suitable route to one's destination. The user can usually choose between the fastest and the shortest route.

22 RoSPA (2009) Driving for Work, Mobile Phones. http://www.rospa.com/roadsafety/info/workmobiles.pdf
23 http://www.bmj.com/content/331/7514/428.abstract
24 Burns, P.C. et al., (2002). How dangerous is driving with a mobile phone? Benchmarking the impairment to alcohol. TRL Report TRL547. Crowthorne, UK. TRL Ltd.
25 http://www.psych.utah.edu/lab/appliedcognition/publications/supertaskers.pdf
26 http://www.dekra.de/de/pressemitteilung?p_p_lifecycle=0&p_p_id=ArticleDisplay_WAR_ArticleDisplay&_ArticleDisplay_WAR_ArticleDisplay_articleID=3607558
27 IGES Institut, ITS Leeds, ETSC (2010) Study on the regulatory situation in the Member States regarding brought-in (i.e. nomadic) devices and their use in vehicles: http://www.etsc.eu/documents/Report_Nomadic_Devices.pdf
28 SWOV (2009): Safety of navigation systems. SWOV Fact sheet January 2009, Leidschendam

- Less getting lost and more attention to traffic: a navigation system ensures that the user does not have to do as much searching for a route or street. As a result, they can devote more attention to the surrounding traffic and, moreover, drive more directly to the destination (less exposure). Both effects are good for road safety. A Dutch survey[29] notes that almost 60% of the respondents use the system because it "reduces the effort of driving".
- Traffic information: navigation system with information on the current traffic situation can give the user early warning of upcoming traffic problems including congestion.
- Another new function allows receiving job instructions via the device. This reduces the need to phone from the vehicle (the jobs and messages on the device can be read aloud) and the administrative burden can also be reduced since mileage and working time may be monitored with a single tab on the screen, reducing the paperwork on the road.

What is most important however is for drivers to be aware that such devices should be used correctly, mainly this means not interfering with the device while driving. In another Dutch survey[30] a majority of users considered it dangerous to adjust the system while driving yet 64% of them said that they did so sometimes or frequently. So despite the safety benefits of PNDs there also is a clear risk to manage. It is therefore not the devices in themselves that are safe or dangerous but it is the way users use them, and this is something that employers should manage. Proper use also includes frequently updating navigation systems, as out-of-date or incorrect information can lead to wrong decisions: undesirable or unsuitable routes (through traffic via streets in residential areas, heavy goods vehicles through town centres) or even incorrect routes (one-way traffic, physical

obstructions, roadworks, roads with height limitations, viaducts and bridges unable to bear the vehicle's weight). Nearly half of the respondents in the DVS study[31] mentioned above knew how long ago their own map had been updated, however about 60% had not refreshed the map details in the past two years. Important reasons for not doing so were cost (36%) and that it was too much trouble (19%). Important reasons for doing so were notification of an available update (over 15%) and 'it's time to do so' (over 25%). Incidents of taking the wrong route or receiving wrong advice were barely cited as reasons for updating. Another recent study by the BAST[32] looked at the effects of new information technologies on driver behavior and ran a trial of an "information" manager which divided information into categories such as "driver-initiated or vehicle-initiated" or "safety relevant". The large scale field test concluded that such an information manager can lead to a more "relaxed driving style" and higher levels of road safety. Finally, research shows that visual information will distract the driver's attention from the driving task more than the audio information[33]. This is also something that should be told to drivers when managing the use of navigation systems.

ITS Services on PNDs for Professional Drivers

Under the ITS Directive the year 2013 will see the adoption of specifications for real-time traffic information systems and for systems to reserve available parking lots. ETSC recognises the potential benefits that this could have especially for HGV drivers who would be able to plan their routes and find a rest area without jeopardising their maximum driving time. Research shows that driver fatigue is a significant factor in approximately 20% of commercial road transport crashes[34]. Better availability of parking and information as well as data exchange on this subject will help drivers plan and take their breaks more efficiently.

29   DVS (2008). Analyse nadelige effecten navigatiesystemen op routekeuze. Gebruik en misbruik van egen; deel 2. Rijkswaterstaat, Dienst Verkeer en Scheepvaart, Delft.
30   Oei, H.L. (2002). Mogelijke veiligheidseffecten van navigatiesystemen; Een literatuurstudie, enkele eenvoudige effectberekeningen en resultaten van een enquête. R-2002-30. SWOV, Leidschendam.
31   DVS (2008). Analyse nadelige effecten navigatiesystemen op routekeuze. Gebruik en misbruik van egen; deel 2. Rijkswaterstaat, Dienst Verkeer en Scheepvaart, Delft
32   BAST (2003) Auswirkungen neuer Informations-technologies auf das Fahrerverhalten http://www.bast.de/nn_42640/DE/Publikationen/Berichte/unterreihe-m/Functions/Berichte-M,param=3.html
33   Verwey, W.B. & Janssen, W.H. (1988). Route following and driving performance with in-car route guidance systems. Report IZF 1988 C-14. TNO Institute for Perception IZF, Soesterberg
34   http://www.etsc.eu/documents/drivfatigue.pdf

Safety preferences	10:25am
Show only essential menu options while driving	✓
Suggest driving breaks	
Show safety reminders	
Warn when near places of worship or schools	
Warn when driving faster than allowed	
Warn when driving faster than a set speed	
Warn me not to leave the device in the car	
	Done
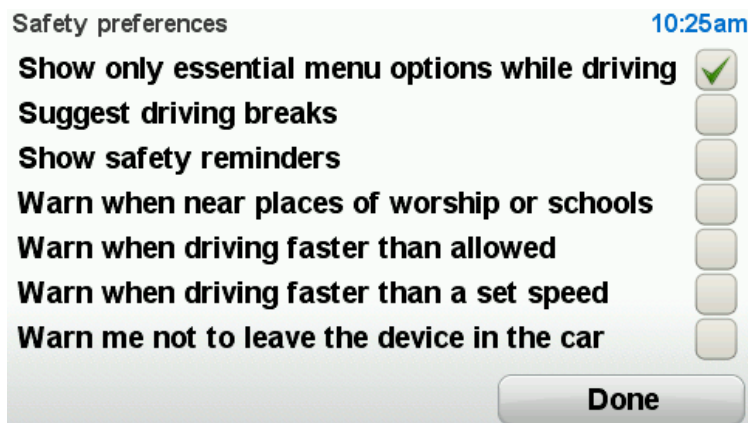
Example of a screen shot of a PND including possible safety features linked to fatigue, managing driving time and speed.

Another EC funded project has tackled this topic, the project Heavyroute[35] focussed on applying and combining existing and newly developed systems, technologies, databases and models to develop an advanced HGV management and route guidance system. It noted that the use of mapping systems based in satellite guidance has increased dramatically and is providing major benefits to professional drivers. However drivers may find themselves on inappropriate routes for their vehicle. Working with all the major stakeholders, the Heavyroute project worked to provide the tools, the systems and the data collection and interpretation processes that will effectively link Europe's road infrastructure via electronic mapping systems to the truck operators and drivers. The project was completed in 2009.

Mobile phones

There are good health and safety reasons for lone workers and staff who travel in areas where summoning help may be difficult[36] to have a mobile phone at hand. The most obvious positive safety/security effect of mobile phones regards the post crash phase. Clearly a road user is able to call emergency services more quickly if they have a mobile phone, especially if the crash occurs in an isolated environment. Over the long-term when vehicles gradually become equipped with systems such as eCall that automatically call emergency services in the event of a serious crash, this benefit of having a mobile phone might become less important.

2.3 Current situation: users' behaviour

As mentioned above, users are probably not aware of the risks associated with distracted driving as much as they are aware of other risks such as drink driving. A recent European 'Eurobarometer'[37] opinion poll survey demonstrates that while 94% of people considered "driving under the influence of alcohol" a major road safety problem, this number was 76% for talking on a mobile phones without hands-free, and as little as 26% for talking on a mobile phone with hands-free (see below).

Perceptions about the seriousness of road safety problems
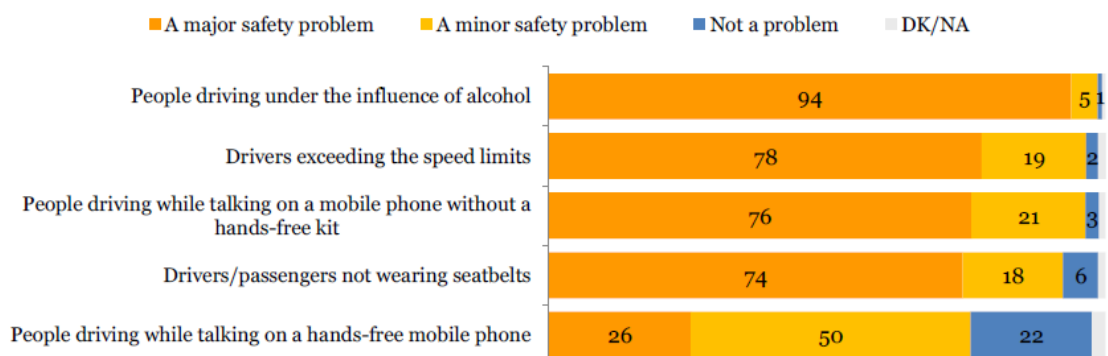
- ■ A major safety problem
- ■ A minor safety problem
- ■ Not a problem
- ▢ DK/NA

	Major	Minor	Not	
People driving under the influence of alcohol	94	5	1	
Drivers exceeding the speed limits	78	19	2	
People driving while talking on a mobile phone without a hands-free kit	76	21	3	
Drivers/passengers not wearing seatbelts	74	18	6	
People driving while talking on a hands-free mobile phone	26	50	22	

Q2. In terms of road safety, do you feel the following constitutes a major safety problem, a minor safety problem, or is not a problem [IN OUR COUNTRY]?
Base: all respondents, % EU27

European Commission Road Safety Eurobarometer 2010

35 http://heavyroute.fehrl.org/?m=1
36 RoSPA (2009) Driving for Work, Mobile Phones. http://www.rospa.com/roadsafety/info/workmobiles.pdf
37 http://ec.europa.eu/public_opinion/flash/fl_301_en.pdf

High mileage and company car drivers are also more likely than most to use a mobile phone while driving[38]. Very often it is the employers who provide mobile phones or reimburse the cost of work-related calls made on private ones[39], this might reinforce employees' misconception that they are expected to be reachable at anytime.

Recently a survey by ING Car Lease[40] in the UK also concluded that the recession is encouraging more company car drivers to take calls when behind the wheel. The survey found that while 61% of company car drivers questioned felt under greater pressure to take or make calls while driving, 39% of respondents admitted to having previously texted or emailed while behind the wheel. Further, 16% did not know whether the company had a mobile phone policy. If the figure in the survey is an accurate representation of all company car drivers in the UK, then as many as 1,755,000 drivers could be texting or emailing behind the wheel, calculates ING[41].

According to a recent survey[42] by the Austrian Road Safety Board (KfV) almost every third driver reads text messages whilst driving. A total of 14% of the 1,000 respondents, admitted to writing SMS behind the wheel. When writing a short message it takes the driver five seconds to react to a hazard. The same study found 7 % of respondents said they occasionally make phone calls whilst driving. The understanding of the risks amongst motorists is low: 15% of respondents believe the ability to drive would be little or not at all affected if using the mobile phone whilst driving.

3 How to manage the risks without losing the benefits?

Distracted driving, including the use of electronic devices while driving, should be a particular source of concern for employers and is a risk that should be managed properly within driving for work policies.

3.1 Adopting a Policy for managing distracted driving

Business Case

Duty of care and health and safety compliance are legal necessities in most EU Member States, and an essential consideration for employers. Employers should also make sure that their employees are able to comply with the law for example on using work equipment in a safe manner. But equally important, it makes sound business sense to draw up and implement a safe driving for work policy. This should include measures to manage distracted driving. If 'driving for work', being 100% focused on the driving task should be an expected part of employee behaviour. The business case for adopting a policy for managing distracted driving should cover the following benefits:

- Fewer working days lost due to death and injury.
- Reduced risk of work-related ill health.
- Reduced stress and improved morale / job satisfaction.
- Less need for investigation and paperwork.
- Less lost time due to work rescheduling.
- Reduced insurance costs.
- Reduced vehicle downtime.
- Reduced vehicle repair costs.
- Improved residual value of vehicles.
- Image of company shown to care for employees.
- Fewer missed orders and business opportunities.
- Reduced damage to company brand and risk of losing the goodwill of customers.
- Focus on driving tasks leading to more efficiency.
- Less chance of key employees being banned from driving.

The risk associated with distracted driving and the use of mobile phones and electronic devices should clearly be reflected in driving for work policies. Employers should also ensure that the policy is clearly articulated and broadly communicated so that employees are aware of the existence of the policies (for example by reading the policy out loud with the employee or getting the employee to sign a declaration or a 'pledge', rather than simply handing out a few pages for the employee to read). If a company is providing mobile phones, at the very least employees should be required to sign and acknowledge that they have received, understood and will comply with the company policy[43]. Good practice is to ask employees to undertake comprehension checks – this forces them to read the material at least once, and increases the chance that they will follow the advice given – it also provides a very robust audit trail for the

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38   RoSPA (2009) Driving for Work, Mobile Phones. http://www.rospa.com/roadsafety/info/workmobiles.pdf
39   ibid
40   http://www.roadsafe.com/news/article.aspx?article=1023
41   ibid
42   http://www.kfv.at/kuratorium-fuer-verkehrssicherheit/publikationen/studien/verkehr-mobilitaet/
43   Noble, J. & Riswadkar, A.V. (2009), Cell Phone Liability for Employers. The John Liner Review, quarterly review of advanced risk management strategies 23 (1). PP 73-79.

employer as not only can the prove that they have given these documents to the employee, but that they have also read and understood them. Policies should also be uniformly enforced (see section 3.2).

A number of samples of distracted driving / mobile phone/ electronic device policies and guidelines are available on-line for employers to draw from[44]. Employers can either adopt or adapt such policies to suit their needs. One important consideration is to what extent the driving for work policy will cover employees driving employer owned vehicles or their own vehicles whilst on business (grey fleet). Employee responsibility for privately owned vehicles, phones and electronic devices needs to be clearly outlined in the policy. Employers can have a huge influence in fostering improved road safety compliance for employees using their own vehicles and equipment for work purposes. Large employers can also influence policies in Small and Medium Enterprises [SME's] when they subcontract out work further along the supply chain by insisting that subcontractors adopt the same conditions and standards in relation to driving for work. A policy for mobile phones or electronic devices should typically include the following (adapted from RoSPA, 2009; TAC, 2008):

- Employees must not make or receive calls whilst driving for work.
- The golden rule "Engine on, phone off": if it is necessary to make a call, stop in a safe place that does not pose a hazard for other road users.
- Allow calls to go on "voicemail" with a message such as: "You have reached Mr Smith. I'm sorry I can't take your call because I'm driving my car or am otherwise engaged. It is my company's policy not to use mobile phones while driving for work. I will call you back as soon as I am free and it is safe to do so. If your call requires an immediate response, please call... (customer service number or an alternative designated number)."
- Plan journeys ahead to include stops that also provide opportunities to check messages and return calls.

Other members of staff must also know about the

policy and not call a colleague when they know that they are likely to be driving. The caller should check if the person is driving and if they are, hang up.

Swisscom Schweiz AG

Swisscom, a large telecommunications company in Switzerland, launched a fatigue and distraction campaign in 2010 targeting all employees including the fleet drivers (4,000 fleet cars). This supports the company's Vision Zero for serious and fatal collisions. The goals are to improve road safety of employees; prevent damage to their image, prevent operational disturbance and reduce vehicle damage. The measures adopted included disseminating information to all employees, sending a newsletter to fleet car drivers, education and instruction of multipliers. This includes branch managers, safety agents and superiors. The campaign was evaluated using different criteria such as numbers of clicks on the staff intranet pages, newsletters sent, participants in training sessions. Direct text messages to mobile phones were also sent; this was also seen as an important method as these are opened and read by almost everyone as the message was short and to the point. The results were positive with, for example, almost one in four drivers reading the newsletter.

Chemical Company, UK[45]

A chemical company based in the UK, with a small pan-European car fleet for the sales force, decided in the mid 1990's to implement a ban on using hand-held and hands-free telephones whilst driving. The Sales Director was concerned that this would lead to a loss of business, so measures were put in place to ensure that this did not happen. The back office team was strengthened and customers were told about the new policy and advised to call the office with any queries. In parallel, the employees were shown how their own driving deteriorated, in an off-highway setting, to foster buy-in from them.

When the organisation's customers were asked what they thought of the service they were getting, they actually reported that it had improved following the ban on the sales team using their telephones whilst driving. This was

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44   Examples include: http://www.rospa.com/roadsafety/info/workmobiles.pdf   http://www.tacsafety.com.au/upload/Safe_Driving_Policy.pdf
Shell E&P Ireland Ltd (SEPIL)"The use of mobile phones - even with hand-free kits - is prohibited http://www.erscharter.eu/signatories/profile/17600
45   Example given by Andrew Price, now at Zurich Financial Services

because the most usual enquiry was concerning their orders which the back office team were able to answer more quickly, eliminating the need for any intermediate calls to the sales person. The sales team also reported that their driving was less stressful, and that they were able to respond to calls more professionally when parked-up as this gave them time to think exclusively about the issue without the distraction of driving. As an added benefit, the monthly mobile telephone bills were reduced by approximately 20%.

Communications and Time Management

Senior managers should be expected to lead by example, they must never make or receive a call on a mobile phone while driving for work or expect their colleagues to do so. It is the role of the top management to make sure that systems of work do not pressurise staff to use a mobile phone while driving for work. This includes looking at employee to employee communication systems. These may have to be dramatically changed, for example back office staff will no longer automatically put clients through to employees who may be engaged in the driving for work task. Following an analysis of the way the working day is structured this may also be changed to enable those who are driving for work to integrate time for catching up with phone calls and emails. This can also link with an organisations fatigue management policy-good practice is to take a 15-20 minute break from driving every 2h, or sooner if you feel tired. Whilst the driver should get out of their vehicle and stretch their legs, this is also an excellent opportunity to catch up on messages and make calls. Structuring the day also includes for example, not scheduling phone conferences during commuting (driving) time. Managers should also be held accountable for policy enforcement.

Recommendations to employers

- Senior managers to take the lead by respecting the distracted driving policy.
- Adopt a clear policy against distracted driving / use of mobile phones and other electronic devices while driving for work, including as a minimum: "engine on, phone off" and asking staff to put their phone on voicemail with an appropriate message.

- Undertake a review of communication strategies and tools in place.
- Communicate to staff the reasons why policies are in place: hands-free can be as dangerous as hands-held, and having a mobile phone conversation while driving is as bad or even worse than drink driving in terms of risk.
- Ensure there is a mechanism in place to verify such as a training session to ensure that employees, including management level are aware and understand existing driving for work policies.
- Create a safety culture: management should ensure that work practices do not pressurise staff to use a mobile phone or another electronic device while driving.
- Lead by example: top executives should lead by example and never make calls / text/ check emails devices while driving for work.
- If mobile phones are given to staff or calls reimbursed, staff should be clear that this is subject to employees respecting company policies.
- Regarding Navigation Devices: ensure that HGVs are equipped with adequate tailor-made navigation systems; ensure navigation systems are updated regularly to minimise the risk of wrong information; Purchase Head-up display for speed and navigation information; consider buying and installing navigation devices where manual interaction is not possible when the vehicle is moving.
- Otherwise prohibit interaction with the devices while driving for work; advise drivers to rely more on audio rather than visual information, inform employees on the correct location for mounting PND devices.

3.2 Employer led Approaches through Technology and Telematics

Legislation against distracted driving and the use of nomadic electronic devices is hard to enforce by traditional means (traffic police)(more on this in section 4). Unless the enforcement is strong enough, laws are not likely to discourage drivers from using a mobile phone while driving, for example[46]. Further, the primary goal of company policies should be to prevent an undesired outcome for the organisation, but having a policy in place does not necessarily guarantee a successful defence in every case[47]. So reducing the risk does not only mean developing a policy, but also managing the

46 Noble, J. & Riswadkar, A.V. (2009), Cell Phone Liability for Employers. The John Liner Review, quarterly review of advanced risk management strategies 23 (1). PP 73-79.
47 ibid

risk proactively and uniformly through collective and individual measures across the company by setting up a monitoring process as part of the company safety management system, for example through technology or using telematics. Promotion of safety policy can range from very simple measures, for example some companies have chosen to place a warning sticker on company-provided phones reminding individual employees about the dangers of distracted driving[48], to much more advanced solutions. Suckling Transport for example, a company specialised in the transport of fuel by road, introduced an interlock between a fixed mobile telephone in the cab of the vehicle to the handbrake, to ensure the telephone can only be used when a vehicle is stationary[49].

Telematics providers can also offer their customers the possibility to enforce their policies by using mobile phone records in conjunction with telematics reports to identify occasions when drivers are using their telephones whilst the vehicle is in use. With driver safety forming a larger and more comprehensive part of any fleet management solution, there has been an increase in companies looking for in-vehicle telematics to support behaviour-based reporting. With lone worker legislation on the rise and the onus put squarely on the employer to protect both his mobile employee and those he/she may come into contact with, it is imperative to be able to identify any potential risk. One provider, Trimble[50] has recently launched a Driver Safety solution that can measure and benchmark the driving of an individual to allow organisations to understand the risk associated with their drivers' style, thus allowing them to mitigate poor behaviours using methods such as training and incentives.

Offering GPS location information as well as behaviour data such as harsh braking, acceleration, speeding and cornering, can provide high level and detailed reporting of those drivers displaying dangerous driving behaviour and therefore most likely to be in an collision. With mobile phones proven to be a hazardous distraction while in the vehicle, this telematics driver-style information can now be matched to loaded mobile phone usage records to determine where a driver was when they used their phone, if they were in motion and

then if this usage was associated with poor driving style or inappropriate behaviour. The reports can be sent to a number of different stakeholders from Fleet Managers to HR who can then determine the action to be taken. To gain maximum benefits from this tool, experience shows that it should be used as part of an integrated driving for work distraction policy always in conjunction with employers and employees.

4 National level

Much can be done to tackle distracted driving at a national government level both in terms of targeting the general population and those drivers driving for work.

4.1 Awareness

Traffic law enforcement is not only about identifying and apprehending offenders. What guides people's behaviour is not only the fear of being caught but also their understanding of the road safety rules themselves and of the risk related to breaking these rules. The majority of road users want to comply with these rules not to avoid fines but simply to abide by the law[51]. Awareness about the existing legislation and the risks associated with mobile phone and PND use seems to vary. Firstly, governments should clearly communicate the legal requirements covering both mobile phone and PND use. According to a recent questionnaire of citizens in 5 EU MSs (Spain, UK, Italy, Sweden and Poland)[52] (conducted by IGES Institut, ITS Leeds, ETSC 2010) citizens show a lack of awareness about legislation. The area they were most informed about was mobile phone legislation. Ownership of a nomadic device did not affect knowledge about the legal requirements of their use. Secondly, as part of this information campaign, government should also explain the risks of driver distraction. To maximise the impact of such awareness raising campaigns these should be carried out in parallel with traffic law enforcement[53]. Researchers also underline this and stress that enforcement must be highly visible and publicised and indicate that it is the drivers' subjective risk of being caught that must be increased if enforcement is to be successful[54]. Communication campaigns linked to police enforcement are very important in doing this.

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48   ibid
49   http://www.etsc.eu/documents/PRAISE%20Fact%20Sheet%202.pdf
50   www.trimble.com/ukmrm
51   Goldenbeld, C. et al., (2000): Legal and administrative measures to support police enforcement. Deliverable 5 of the ESCAPE (Enhanced Safety Coming from Appropriate Police Enforcement) project. Available at http://virtual.vtt.fi/virtual/proj6/escape/deliver.htm
52   IGES Institut, ITS Leeds, ETSC (2010): Study on the regulatory situation in the Member States regarding brought-in (i.e. nomadic) devices and their use in vehicles. Study tendered by the European Commission, Berlin 2010. http://www.esafetysupport.org/download/documents/nd_study_on_the_regulatory_situation.pdf
53   In line with the EC Recommendation of 2004 on enforcement of traffic law
54   ESCAPE http://virtual.vtt.fi/virtual/proj6/escape/deliver.htm

National Level Examples of Campaigns

UK "Kill the Conversation"

In May 2009, THINK! launched a multimedia campaign to show the dangers of using mobile phones while driving[55]. The campaign was aimed at all drivers with a particular emphasis on young/new drivers. It was also aimed at callers and people who text while driving. This was a high-profile multimedia campaign using TV, online, radio and press. The television commercial 'Split Screen' was originally run in March 2007 and shows a wife calling her husband on his mobile phone and the repercussions of her actions. The aim was to broaden the responsibility to the caller and promote the message to 'Kill the conversation'. On-line the 'driving challenge' game was launched in June 2008 and demonstrated how using a mobile phone at the wheel causes unintentional blindness. The game promoted the message to 'Switch off before you drive off'. A radio campaign was also launched warning young drivers of the dangers of texting while driving. The radio campaign promotes the message 'Don't use your mobile when you're driving'. The campaign also advised those who needed their phones for work to switch their phones to voicemail and pick up messages when safely parked.

Belgium "No Phone at the wheel"

During the summer of 2010 the Belgian Road Safety Institute (IBSR/BIVV) ran a campaign to highlight the risks associated with mobile phone use while driving[56]. The poster illustrated a cell phone destroyed on the screen, a picture of a child and the slogan "Dad, it was cut ..." The goal was to educate drivers on the consequences of a death while playing on the emotional aspect. The simple slogan "no mobile phone whilst driving" made clear that drivers should avoid such a situation. A second version of this poster was particularly aimed at young male drivers. It consists of a photo of a young woman and the text "Loulou, why did you hang up?". In this case also, the context was clear. The poster campaign was run along the main roads and posters in smaller format were displayed in public services, youth centers, cultural centers, and businesses. Besides the poster, the campaign message was also broadcast via variable message signs (VMS) in tunnels in Brussels and on highways in Wallonia.

Germany "Who is driving?"[57]

The German Road Safety Council organise every year, in cooperation with the Berufsgenossenschaften (Statutory Accident Insurance) from different industrial sectors, a quiz focusing on one specific topic. As employers are members of these statutory accident insurance organisations they receive a package of materials (posters, leaflets) to disseminate them in their companies. Employees are invited to take part in a quiz. In 2002, the topic was distraction and a billboard was designed and put also along the German Autobahns to support company-related actions.

Italy communication campaign on driver distraction

In 2010, ANIA Foundation for Road Safety chose distraction as its annual social campaign topic. The idea came from the result of a survey carried out in Italy by Ipsos (a worldwide organisation specialised in making survey-based research) on the behaviour of Italian drivers in their cars. The results of the survey showed that 51% of Italians admitted they've been involved in a vehicle collision due to distraction. Amongst the most dangerous activities mentioned that they engage in: using laptops (90%), eating or drinking (82%), smoking (60%), using mobile phones (50%), texting (76%), or dialling a phone number (45%). On the 6th of July 2010, the ANIA Foundation launched its communication campaign called 'Mind on driving' ('Pensa a guidare'), the message was spread with the publication of leaflets, posters, and broadcasting of a number of radio and TV spots. The involvement of famous football players within the ANIA campaign helped raise awareness amongst the national audience. Two spots were shot with two famous Italian goalkeepers to

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55   http://www.dft.gov.uk/think/focusareas/invehiclesafety/mobilephones?page=Campaign&whoareyou_id=
56   http://www.ibsr.be/main/OnzeCampagnes/Archief/DetailCampaign.shtml?detail=900203656&language=fr
57   http://www.dvr.de/

promote the "Mind on driving" campaign and are available on the ANIA Foundation website[58].
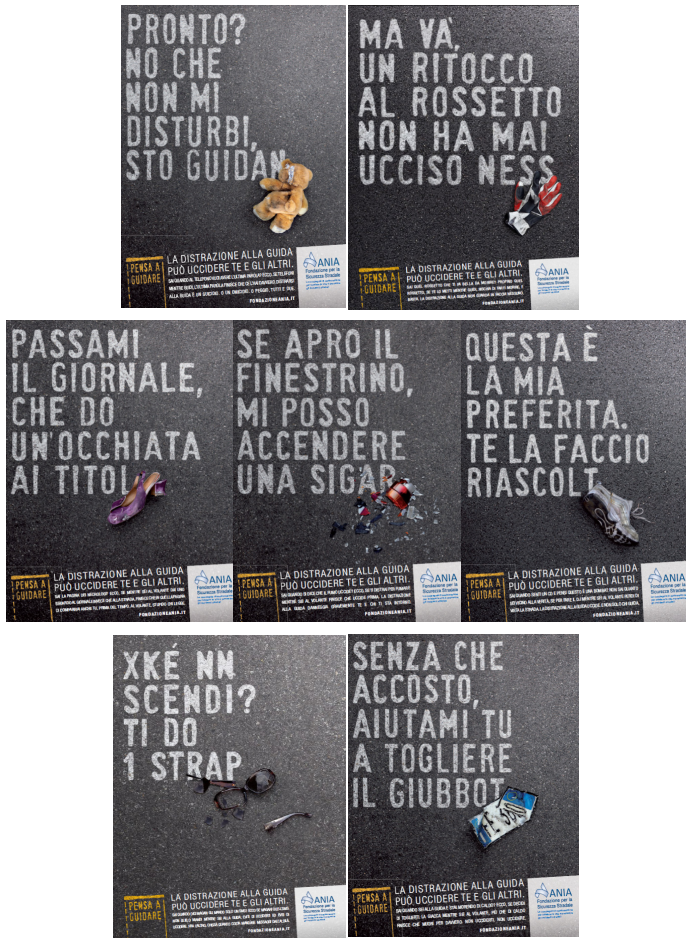
4.2 Legislation

Legislation on mobile phone and nomadic devices differs in the EU.

Mobile Phone Use

All EU Member States, apart from Sweden[59], have specific legislation on mobile phone use[60]. They also stipulate the use of hands-free equipment. With regard to hands-free, most commonly a headset or wireless equipment (e.g. Bluetooth) is considered sufficient, as long as the driver doesn't hold the phone in their hands while driving. However, some countries additionally require that the phone must be fixed in a mounting. Furthermore, some countries (e.g. Luxembourg, Slovenia, and Greece) have even more specific regulation in place that restricts using mobile phones or mounting mobile phone cradles in several ways. In these countries, for instance, the use of additional phone functions (e.g. texting) is prohibited. In some countries, (e.g. Germany) hands-free devices must be used for any function of a mobile phone (e.g. GPS). In only ten countries is it explicitly forbidden to use the texting function.

Table 1: Legislation on mobile phone use[61]

Country	Legislation requires		Hand-held phone is prohibited if		Requirement to use		Hands-free required when using		Forbidden to use			Requirements concerning	
	complete ban	use of hands-free equipment	engine is running	vehicle is moving	headset/Bluetooth	additionally fixed phone	phone function	other function	texting function	all functions that involve continous handling	headphones	location of mounting	way of fixing
AT		X		X	X		X						
BE		X	X		X		X	X					
BG		X		X	X		X	X					
CY		X		X	X		X		X				
CZ		X		X	X		X	X					
DE		X	X		X		X	X	X				
DK		X	X		X		X	X					
EE		X		X	X		X						
EL		X		X		X	X	X	X				X
ES		X	X				X				X		
FI		X		X	X		X	X		X			
FR		X		X	X		X	X	X				

58   http://www.fondazioneania.it/Fondazione_Ania/PENSA_A_GUIDARE.html
59   In Sweden, legal requirements on the use of mobile phones while driving are derived from a general caution "to avoid accidents, road users shall observe care and attention that the circumstances demand".
60   IGES Institut, ITS Leeds, ETSC (2010): Study on the regulatory situation in the Member States regarding brought-in (i.e. nomadic) devices and their use in vehicles. Study tendered by the European Commission, Berlin 2010 http://www.esafetysupport.org/download/documents/nd_study_on_the_regulatory_situation.pdf
61   ibid

Country	Legislation requires		Hand-held phone is prohibited if		Requirement to use		Hands-free required when using		Forbidden to use			Requirements concerning	
	complete ban	use of hands-free equipment	engine is running	vehicle is moving	headset/Bluetooth	additionally fixed phone	phone function	other function	texting function	all functions that involve continous handling	headphones	location of mounting	way of fixing
HU		X	X		X		X						
IE		X	X		X		X						
IT		X		X		X	X	X	X				
LT		X	X		X		X	X		X			
LU		X		X		X	X		X	X			X
LV		X		X	X		X		X				
MT		X		X		X	X						
NL		X		X	X		X	X					
PL		X		X	X		X	X					
PT		X		X	X		X	X	X	X			
RO		X		X	X		X						
SE													
SI		X		X		X	X	X	X	X			
SK		X		X	X		X	X					
UK		X	X		X		X	X					
CH		X		X	X		X	X	X				
IS		X	X		X		X						

PND use and Mounting Legislation

This area is less regulated than mobile phone use[62]. Only 12 EU countries have general legislation in place that applies to some extent to mounting and using PNDs. Where there is legislation these countries indicate that manual interaction with the device is prohibited when the vehicle is moving. This restriction can either be derived from general articles on driver behaviour (e.g. driving without due care and attention) or general articles on vehicle condition (e.g. vehicle's front window/windscreen must allow a clear view). For some countries it is not fully clear to what extent these general articles apply to the use of PNDs. For instance in Sweden, the relevant general articles on driver behaviour do not stipulate a concrete prohibition on the driver to manually interact with a PND when driving, as long as no other road user or traffic is endangered or the driver doesn't behave recklessly. Other countries (e.g. France, Italy, Slovenia) have ruled from these general articles on driver behaviour that manual interaction with a PND is not allowed.

Table 2: Legislation on PND use (IGES Institut, ITS Leeds, ETSC 2010)

Country	Legislation requires		Manual interaction prohibited if		Prohibited to use		Requirements concerning	
	complete ban	use restriction	engine is running	vehicle is moving	media player function	other functions	location of mounting	way of fixing
AT								
BE								
BG								
CY		X					X	
CZ		X					X	
DE		X				X	X	X
DK		X					X	
EE								

62   ibid

Country	Legislation requires		Manual interaction prohibited if		Prohibited to use		Requirements concerning	
	complete ban	use restriction	engine is running	vehicle is moving	media player function	other functions	location of mounting	way of fixing
EL		X		X		X		X
ES		X		X		X	X	
FI		X		X			X	X
FR		X		X	X		X	
HU								
IE								
IT		X		X	X		X	
LT								
LU		X					X	X
LV								
MT		X					X	
NL		X					X	
PL								
PT		X		X				
RO								
SE								
SI		X		X				
SK		X		X			X	
UK		X			X			
CH		X		X			X	
IS								

highlighted: specific regulations

Many countries have general articles in place stipulating that the vehicle windows/windscreen must allow a clear and undistorted view[63]. In some countries legal requirements have derived from these rather universal articles. Countries with rather specific legislation on PNDs include Spain and Luxembourg. In Luxembourg, legislation states that mounting any accessory devices such as PNDs is only allowed on the lower left side of the windscreen. In Spain, the Road Safety Law (Ley de Seguridad Vial) introduced in 2009 contains a specific article 65.4.g on the use of PNDs. It is prohibited to operate the device when the vehicle is moving and the device must be mounted where it can be easily seen by the driver without obstructing the field of view.

Consumer Information

National level governments could legislate for producers of mobile phones and PNDs to inform consumers about the risks of using them whilst driving. Moreover they could legislate that manufacturers of devices publish safety information for their customers on using PNDs especially adapted to their use whilst driving for work. Member States should also insist that producers provide information on proper mounting for PND and include this information in the manual supplied with the PND. Some manufacturers are already doing this, however this should be the norm.

4.3 Enforcement

Enforcement is a means to prevent collisions from happening by way of persuading drivers to comply with the safety rules. It is based on giving drivers the feeling that they run too high a risk of being caught when breaking the rules. Sustained intensive enforcement that is well explained and publicised also has a long-lasting effect on driver behaviour. The enforcement of nomadic device related legislation can be technically more difficult compared to other offences such as speeding for example. Visual or sound distraction is practically impossible to assess from outside the vehicle, while the miniaturisation of devices makes it difficult to visually detect if the device was used inside the moving car. The use of nomadic devices

63   ibid

behind the wheel is nowadays exclusively subject to non-automated enforcement by police officers in vehicles, on motorbikes, or on the roadside. A driver can be stopped after committing an offence, where the offender receives immediate feedback and the police officer has the opportunity to explain why they are enforcing relevant legislation[64].

According to a recent study[65], legislation on the use of nomadic devices is enforced by national police forces in Member States with different intensity. In about half of countries, targeted checks are applied, meaning that the Police dedicate the full attention to the improper use of nomadic devices, typically of the mobile phone. This could take a form of a Mobile Phone Day of Action as run in the UK, or specialised motorbike Police enforcement units operating in Austria. The broadest scope of checks in respect to the use of nomadic devices causing distraction is currently Spain. This is thanks to its most comprehensive legislation covering several different devices. In some countries such as Poland, or Portugal, Police report to perform both targeted and general

checks of driving population. However, in about one third of countries, no specific targeted checks are performed (e.g. EL, IE, IT)[66].

Sanctions

Research has also found that long-term behavioural effects from enforcement are only achieved if the detection of a violation is followed by immediate feedback or sanction[67]. It is however important that the level of sanctions accords with the risk related to non-compliance. This is also important to motivate police officers in their work, although research has found that higher sanctions have less of an impact on safety than the level of enforcement[68]. Monetary sanctions for using a mobile phone differ in the EU. The fine level varies from 11 EUR in Lithuania to 200 EUR in Spain. This graph shows these values that can be interpreted as monetary fines with standardised capacity to pay. It also shows that the adjusted fine levels in some Central and Eastern European countries are actually higher than the absolute fines.

Figure: Income-adjusted monetary fine levels for a mobile phone offence in Europe[69] (in EUR)
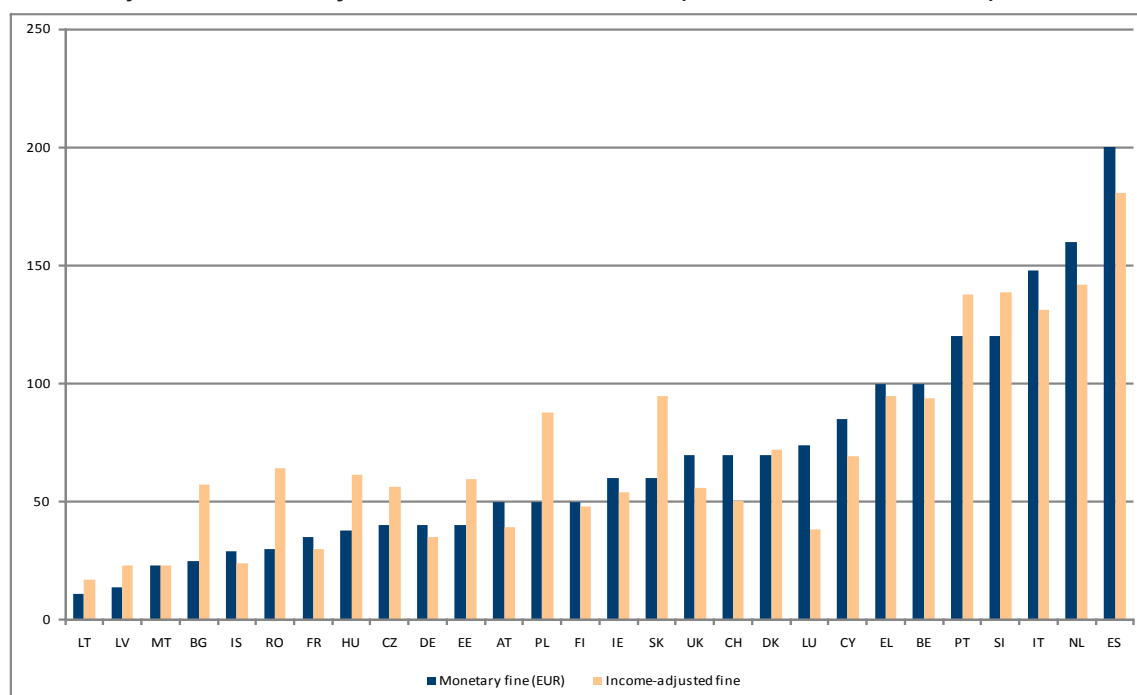
Although having general penalty point systems in place, several countries don't sanction mobile phone offences with penalty points. Where countries do have a penalty point system introduced that covers also mobile phone offences, the relative points for

a mobile phone offence (i.e. percentage of points until licence withdrawal) vary between 6 per cent in Germany and 25 per cent in the Czech Republic, Italy and the UK[70].

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64   ibid
65   ibid
66   ibid
67   ESCAPE http://virtual.vtt.fi/virtual/proj6/escape/deliver.htm
68   SUNflower (2002): A comparative study of the development of road safety in Sweden, the United Kingdom and the Netherlands. Final report. Leidschendam. http://ec.europa.eu/transport/roadsafety_library/publications/sunflower_report.pdf
69   http://www.etsc.eu/documents/Report_Nomadic_Devices.pdf
70   ibid

Rehabilitation Courses

In some cases it has been found to be more effective to impose a remedial measure in combination with a sanction. So far most rehabilitation courses have either been general or specifically targeting drink drive or speeding offenders.

In the UK three regions, namely Hampshire, Thames Valley and Suffolk have begun offering driver rehabilitation courses for driver distraction and/or using a mobile phone while driving. The Call Divert Scheme in Thames Valley and Suffolk provides drivers with the opportunity to take part in an educational course instead of receiving a fixed penalty fine and points on their driving licence. "Call Divert" run by AA DriveTech typically targets drivers who were driving a motor vehicle, or supervising a provisional licence holder, while using a hand-held mobile phone or other interactive communication device. The Scheme aims to raise the awareness of the potential consequences of using a mobile phone while driving or supervising a provisional licence holder. The Course provides a framework for discussion and debate and explains, with examples, the UK law regarding using a hand-held mobile phone while driving or supervising a provisional licence holder. It shows how using a hands-free or hand-held phone while driving affects driving decisions and discusses the tragic consequences if it all goes wrong. Since the Call Divert Courses started in 1997, over 15,000 drivers have successfully completed the programme across the UK. Key to the success of the Course is an acceptance that the mobile phone is an integral part of life in general and work in particular but it is a major distraction while driving. Therefore, drivers need to be offered realistic, pragmatic and truly practical 'coping strategies' that empower them not to make or receive any calls while driving.

In Germany, novice drivers who have been detected using a mobile phone while driving have to attend a rehabilitation course, as well as paying a fine, and their probationary period is extended for six additional months.

4.4 Road traffic death investigation establishing distraction

The use of nomadic devices, or distracted driving, are reported in police road traffic death investigation forms in a majority of Member States, but the level of detail and presumed underreporting make the data unreliable and incomparable between countries[71]. The elementary problem is the impossibility to verify whether the driver was using (improperly) a nomadic device at the crash event. An increasing practice is accessing mobile phone records and linking this with the time of the collision to establish if the driver was distracted prior or during the collision. The UK's ACPO "Road Death Investigation Manual"[72] includes mobile phone use as one of the possible sources for distraction causing dangerous driving. It is included as one of the contributing or precipitating factors in the template used for road traffic death investigation.

4.5 Driver Training

Driving schools could play a primary role in providing necessary information on the risk of distracted driving. Beyond the initial driver training, governments could also insist that driver education programmes include distracted driving in driver training (including for professional drivers) such as the new Directive 3003/59 (see PRAISE Report on Driver Risk Assessment and Training)[73]. Special programmes and initiatives run by employers and insurance companies should also cover distracted driving risks. In some EU Member States such as Germany and Italy drivers who have lost their driving licences due to a driving ban must complete a general rehabilitation training programme including different topics on road safety; this should also include the risks of distracted driving and tools to manage communication.

4.6 Public Procurement

Governments can bring about change by setting an example. They can influence demand through their own public procurement policies. All non-private customers, such as governmental bodies, local authorities and companies can play an important role by including specific requirements on minimum safety levels in their in-vehicle technology procurement policies. In this case they should only purchase PNDs which have high safety standards and features. Also when they area subcontracting out their services they could only do so to transport providers who also have a mobile phone and PND policy restricting or banning use for safety reasons.

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71 ibid
72 http://www.npia.police.uk/en/11963.htm http://www.acpo.police.uk/
73 http://www.etsc.eu/PRAISE-publications.php

US Government Bans Texting by Employees

In October 2009, the US Federal Government demonstrated leadership in reducing the dangers of text messaging while driving for its near 3 million civilian employees when President Barack Obama issued an Executive Order using his presidential prerogative to prohibit the use of text messaging while driving on official business or while using Government-supplied equipment[74]. Every day, Federal employees drive on official Government business, and some Federal employees use Government-supplied electronic devices to text or e-mail while driving. Extending this policy to cover Federal contractors is designed to promote economy and efficiency in Federal procurement. Federal employees, Government Contractors, Subcontractors, Recipients and Sub-recipients shall not engage in text messaging (a) when driving government or privately owned vehicles while on official Government business, or (b) when using electronic equipment supplied by the Government while driving. All government agencies were asked to take appropriate action within the scope of their existing programmes. This included, considering new rules and programmes, and re-evaluating existing programs to prohibit text messaging while driving, and conducting education, awareness, and other outreach for Federal employees about the safety risks associated with texting while driving. These initiatives should encourage voluntary compliance with the agency's text messaging policy while off duty.

4.7 Recommendations to EU Member States

- Run regular targeted information campaigns for those driving for work linked to enforcement on the risks of using a mobile phone or PNDs whilst driving.
- Adopt clear and strict legislation banning the use of mobile phones, including hands free, whilst driving.
- Adopt legislation restricting the use of PND whilst the vehicle is moving.
- Inform employers of the legal situation in different EU MSs.
- Promote the business case to employers and link financial and non-financial sanctions to risk associated with offence.
- Communicate the legal restrictions for using a

mobile phone and PNDs to citizens and target employers as a specific group.
- Include distraction by use of mobile phone or other PND device in road traffic death investigation by statutory bodies and communicate this to the public guidelines.
- Include driver distraction policy requirements in public procurement.
- Integrate distracted driving into driver training (citizen and professional) and education including driver rehabilitation courses.
- Integrate distracted driving into training and education for transport managers.
- Mandate safety information (including mounting PND information) to consumers by manufacturers of PNDs and mobile phones.

5 European level: what can the EU do?

5.1 Information, Training and Enforcement

Following on from the overview of what is being undertaken at a national level the EU can fulfill a number of different roles. One is that of information provision. It could communicate to employers and citizens the different legal requirements on mobile phone use and the use of PNDs. There is also a need for more information on their use and the impact on road safety so the EU could also invest in research and surveying this use and associated risks. According to the IGES[75] Report, better data is needed to more accurately characterise and quantify the problem. The report showed that several EU countries do not carry out regular programmes to monitor the prevalence of mobile phone or other nomadic device use whilst driving. In many EU countries, there is currently a lack of data on the extent to which driver distraction, due to the use of nomadic devices, is a contributory factor in road traffic deaths. Even if data are recorded, differences in road traffic death reporting and data collection make it difficult to compare data between EU countries.

Enforcement

Within the EU's new "Road Safety Policy Orientations" under Objective 2 on enforcement, the European Commission stressed the need to increase coordination and sharing of best practice to help make enforcement and controls more

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74   http://www.whitehouse.gov/the_press_office/Executive-Order-Federal-Leadership-on-Reducing-Text-Messaging-while-Driving/
75   http://www.etsc.eu/documents/Report_Nomadic_Devices.pdf

efficient. They also stressed the importance of linking enforcement to user information and supporting information actions and awareness-raising. The Commission will also prepare a common road safety enforcement strategy. They could also integrate the need to enforce sources of distractions including mobile phone and PND use in this strategy and include it as a point for Police forces in the different Member States to exchange best practice on. Moreover with the Directive on Cross Border Enforcement of road safety related traffic offences use of mobile phones should also be included in the priority list of sanctions.

Occupational Safety enforcement bodies also have a role to play in enforcing statutory provisions with employers. Work related road safety risks need to be prioritised by EU and information provided to empower employers to act more responsibly and exercise their duty of care to those employees who drive for work, including managing in vehicle distraction risks.

Driver training

As mentioned above the risks of distraction from mobile phones and PNDs should be integrated into citizen and professional driver training. As the European Commission is due to review both the Driving Licence Directive (2006/126) and the Directive on Initial Qualification and Periodic Driver Training of drivers of certain vehicles (2003/59) in the near future they could also look to see how this could be included in the curricula.

5.2 EU Driving for Work Road Safety Policy

The EU is in the process of developing its driving for work road safety policy. Although work-related road safety was not included in the EU's "Road Safety Policy Orientations" as such, the European Commission does include integrating road safety into other policies including employment. The EU's Transport Ministers also identified, at the Transport Council in December 2010, that employers should be encouraged to adopt road safety action plans[76]. Moreover, within the field of employment policy the EU also adopted "Improving Quality and Productivity at work: Community Strategy 2007-2012 on Health and Safety at work". Although driving for work is not included there is the possibility that specific measures focusing on reducing death and injury whilst driving for work could be included in the next Community Health and Safety at Work Strategy. The need to address the risks of distracted driving should also be

included in the development of the EU's driving for work road safety policy.

5.3 Consumer Policy

Within the context of the EU's consumer policy there is also a Directive 97/55 EC on misleading advertising. The EU should encourage Member States when implementing this Directive to make sure that there is no misleading information as regards the safe use of mobile phones and accompanying equipment for hands free and PNDs.

5.4 EU ITS Action Plan and Directive

The EU ITS Action Plan and Directive lay down the framework for the implementation of ITS stressing that they can contribute to making transport safer, more efficient and competitive, more sustainable and more secure. Actions for relevance here include technologies such as driver assistance and calculation of itineraries. The development of PNDs attached services and their placement in vehicles will be influenced by these new actions. The ITS Directive states that specifications and standards for an optimal use of road, traffic and travel data should include multimodal and real-time traffic information. Both are important for the development of PNDs. Specifications will also be developed for the collection of this data by relevant public authorities and/or private sector. Specifications are foreseen for the definition of the necessary requirements to make road, traffic and transport services data used for digital maps accurate and available to digital map producers and service providers. Especially of relevance is that the definition of minimum requirements for road safety related 'universal traffic information' are provided, where possible, free of charge to all users. The year 2013 will see the adoption of specifications for real-time traffic information systems and for systems to reserve available parking lots.

In the ITS Action Plan the definition of the on-board Human-Machine-Interface and the use of nomadic devices to support the driving or transport operation as well as the security of the in-vehicle communications will also be covered (priority area III). This will be built upon on the European Statement of Principle on safe and efficient in-vehicle information and communication systems. The development of consumer information on nomadic devices could also be considered. In particular setting up a scoring system based on

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76 http://ec.europa.eu/danmark/documents/alle_emner/transport/101202_raadet_en.pdf

safety performance such as EuroNCAP. The HASTE project was close to developing such a scoring system[77].

5.5 Support for Research and Development of Nomadic Devices

The European Commission is supporting the research and development of nomadic devices including the safety aspects. There are currently a number of projects underway whose research outcomes will be important in informing next steps.

Project Interaction

'Interaction' focuses on understanding driver interactions with In-Vehicle Technologies[78]. The project aims to collate knowledge that will enable the definition of actions to strengthen drivers' awareness on the use of these technologies and for the consequences that such use has or may have. The project will also come up with recommendations for the design of future systems and of appropriate instructions for drivers that will use them to favour a safe use of In-Vehicle Technologies.

Support of Field Operational Trials of ICT

The European Commission is also supporting FOT-NET[79]: Networking for Field Operational Trials. This is a large scale test programme aimed at providing a comprehensive assessment of the efficiency, quality, robustness and acceptance of ICT solutions for transport. The FOTs try to understand important questions such as: how the driver uses the system, what are the short and long term effects and how can the systems' performance be improved. A common European FOT methodology has been developed and the GESTA project, also funded by the European Commission, has developed a handbook on FOT methodology.

5.6 Recommendations to the EU

- Support awareness information campaigns on the risks of distracted driving.
- Ensure broad information to EU employers and citizens about the legal position surrounding the use of mobile phones and PNDs in the different EU Member States for example by publishing this information on their website.
- Consider the possibility of developing guidelines on how the usage of mobile phones in road traffic should be assessed. The methodology developed in the area of seat belt use within the 6th FP project SafetyNet could serve as a template for this.
- With regards to road traffic death investigation, develop methods to enable better assessment of the role of distraction in road traffic deaths, including a review of existing reporting systems. Road traffic death data systems on nomadic device use should be improved, including type of device and the context in which it was being used when the crash occurred.
- Undertake a survey of the use of PNDs in the "driving for work" context.
- Include mobile phone and PNDs in the upcoming road safety enforcement strategy, Cross Border Enforcement Directive and facilitate exchange of good practice on enforcement between the different police forces.
- Include managing risks associated with mobile phone use and other PNDs in driver training.
- Include the risks of mobile phone and PND use in the EU's driving for work road safety strategy.
- Ensure that the Directive on misleading advertising is respected as regards mobile phones and PNDs.
- Continue to support the field operational trials of mobile phone and PND technology and apply lessons learnt to address risks and benefit from safety services.
- Support the research and development of PNDs and their services to include safety applications as a matter of priority.
- Develop consumer information on nomadic devices including setting up a scoring system based on safety performance such as EuroNCAP.

77   HASTE Project Deliverables http://www.its.leeds.ac.uk/projects/haste/deliverable.htm
78   http://interaction-fp7.eu/
79   http://www.fot-net.eu/en/about_fot-net/about_fot_net.htm

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Preventing Road Accidents and Injuries for the Safety of Employees

Road Safety at Work Zones

ETSC

European Transport Safety Council

PRAISE

Work-Related Road Safety

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PRAISE
Work-Related Road Safety

PRAISE is a project co-funded by the European Commission and implemented by ETSC on Preventing Road Accidents and Injuries for the Safety of Employees (PRAISE). The project aims to advance work-related Road Safety Management and provide the know-how to employers who have to take on that challenge. It also aims to present the work-related road safety standards of EU Member States and carry out advocacy work at the EU level: work-related road safety is an area of road safety policy that clearly needs renewed political commitment.

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Part 1 State of Play

1.1 Introduction

The focus of this thematic report is improving safety for both employees and road users in relation to work zone areas on and adjacent to roads. The road work zone (RWZ) is defined as the part of a road facility influenced by works occurring on or near it. The report sets the context by outlining the nature and scope of the problem of road safety at road related work zones including identification of the most significant risk factors and causes of collisions and incidents. The Report then takes a specific look at the various stages involved in working on or near roads namely planning, operation, installation and removal of the works. At each stage key issues in terms of safety are identified and discussed. Subsequently good practice solutions or approaches in terms of RWZ safety have been identified and recommendations for the EU, National governments and Employers in terms of contributing to improved worker safety are suggested. This topic is pertinent across all Member States where increasing road traffic puts added pressure on road infrastructure potentially increasing the incidence of maintenance works required and, specifically for new Member States, where new and replacement roads are being planned.

There are a range of employees whose place of work is the road way or road side and who are exposed to significant risk as a direct result of this. This group includes not only those engaged in road construction and/or renewal but also those working in road maintenance, utilities management (electricity, communications, water, and gas), service maintenance (drains, tree and verge cutting) and traffic management. In the broader context the report offers principles that should apply to all people working on or near the road and also needs to consider third parties, not only those in their vehicles (cars, trucks, buses and motorcycles) but also cyclists and pedestrians, as the most vulnerable road users, and persons living in the surroundings of the road.

This report focuses on the specific risks at RWZs that are the result of the competition between workers and normal road users for the limited space available. However, the issue of safety is interrelated with broader health impacts and risks. The nature of the majority of road related works activities and the characteristics of their location pose increased risks to workers for example in terms of the negative impact of prolonged exposure to weather (e.g. sun or cold exposure), traffic noise and fumes or the physical strain of repeatedly operating machinery or dealing with heavy loads. Road workers can also be exposed to increased stress as a result of negative reactions from other road users. Such exposure can impact on the level of safety afforded to road workers at any given time and approaches to ensuring the health and safety of road workers should be considered in an integrated manner.

There is debate and uncertainty surrounding the scale of the problem which is difficult to gauge due to lack of specific data collection in relation to RWZ related collisions. However there is a general consensus and recognition of the higher risk exposure associated with road side working as opposed to other occupations. In this context there is also acceptance of the fact that deaths and serious injury at or adjacent to RWZs are a major social issue and efforts are needed to reduce them as much as possible.

The level of risk will depend on the type of works to be carried out, the duration and the location – classification of the road and volumes of traffic. It is important to recognise that there are crucial differences between road types (rural, urban and motorway) that require varying approaches in terms of safety provision. Similarly, the type of road work will influence the safety measures and approach that best fits i.e. whether the works are mobile, short, medium or long term.

The type of the work zone in terms of function, area and duration can vary greatly as can the type of work being progressed and the environment in which the work zone is located. In turn, these variations impact on the type and nature of risk present and on the steps that can be taken to minimise this risk. Different work zone types also present different driving conditions to other road users which have implications for safety and are a critical consideration when planning and operating the work zone.

1.2 Defining the Environment: Types of Work Zone, Types of Roads

The ARROWS[1] and PREVENT[2] Handbooks defined three categories of work zone types (based on duration of works) as common in most countries namely Long-term, Short-term stationary and Mobile. Long-term refers to works staying in place at least overnight, short-term to works staying in place for at least half a day but no more than one day and mobile refers to works that travel. Since publication of these reports a more common four category definition of work zone types has become generally accepted in the industry as follows:

- **Long-term stationary work** is defined as construction or maintenance work that occurs in a single location with duration of more than three days.
- **Intermediate-term stationary work** occurs in a single location for more than one daylight period (up to three days) or night-time work lasting more than one hour.
- **Short-term stationary work** is construction or maintenance work that lasts for more than one hour, but is completed within a single daylight period.
- **Mobile work** is construction or maintenance work that moves intermittently or continuously.

These Handbooks also underlined that, while there are variations in the duration of road works, there are also variations in the types of roads on which they take place and the interactions between these two variables set the context for the design of the road work, the impact on other road users and the risk to safety. The ARROWS project defined five categories of road type as follows:

- Motorway and dual carriageway.
- Rural primary.
- Rural secondary.
- Urban main.
- Urban local[3].

In general, varying national definitions of road classes can be adequately accommodated under this broad classification of road types[4].

The various road types and work zone types interact to produce dynamic environments which are made increasingly complex with the introduction of workers, road users and changing weather and local environment. This serves to highlight the fact that in many ways each road work scenario is unique – it will have unique characteristics working together with the potential to create risk and means that a 'one size fits all' approach to providing for safety is not appropriate. The dynamic nature of works in or adjacent to roads needs to be remembered by all those involved in their design, management and use.

In the context of the above it is clear that issues relating to safety will also vary from work zone to work zone and that individual risk assessments, which allow for the identification of location specific risks will be required in order to develop a comprehensive approach to providing effective safety measures. However, the difficulties in dealing with ever unique situations can be lessened with the identification of high-level safety principles, aimed at improving safety, to be applied at all stages of road works from planning through to removal. Such principles will ensure that achieving a high level of safety is then inherent in all decisions taken in terms of safety measures, work zone design and operation.

1.3 Scope

A significant amount of research has been carried out in Europe and further afield which highlights the fact that work on or near roads results in increased risk for both workers and road users. However, the majority of this research has been piecemeal focusing on single countries or specific types of roads and concentrating on single issues such as road worker deaths or occupational health. As such, it is difficult to gain a holistic view of the true scale of road work related incidents. Despite this, the existing research serves to underline that there are significant safety issues surrounding road works which have the potential to result in negative human, economic and social consequences. Moreover, the European

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1 http://www.ntua.gr/arrows/finalhb6a2.pdf ARROWS was a European Commission funded research project aimed at improving the safety of road users and workers at RWZs. Its main output was a Handbook intended for highway authorities, designers, contractors and other individuals and organisations responsible for traffic safety at roadworks.

2 http://www.hit.certh.gr/prevent/media/Deliverables/Handbook.pdf Building on the findings of ARROWS the PREVENT project (also funded by the EC) developed an educational programme aimed at improving traffic behaviour at road works and training schemes for highway repair and maintenance worker personnel, and driving instructors.

3 http://www.ntua.gr/arrows/finalhb6a2.pdf

4 Ibid

Commission adopted a new target to reduce road traffic deaths by 50% by 2020 in its new "Road Safety Policy Orientations 2011-2020"[5].

Risk to road workers

In terms of risk faced by road workers a recent study in the Netherlands (2006–2007) estimated from data on fatal crashes that the risk facing road workers is significantly higher than that faced by general construction workers[6]. Similarly in the UK it is noted that the average death rate for road workers continues to be one of the highest for employment sectors reported by the Health and Safety Executive[7].

A survey released by the UK Highways Agency in 2006 suggested that 'up to 20% of road workers had suffered some injury caused by passing vehicles in the course of their careers and 54% had experienced a near miss with a vehicle'[8].

Risk to road users

An international review on collision studies carried out as part of the European project ARROWS 'revealed that work zone areas have, typically, higher (road traffic) collision rates in comparison with equivalent non-works sections'[9]. In Austria, yearly about 120 collisions and 4 deaths occur at roadwork zones on national roads. Currently the proportion of road construction related collisions compared to all road collisions is approximately 4%[10]. Studies in Finland and Slovenia showed that 'motorists are up to five times as likely to get hurt when travelling through a work zone'[11] while in Germany research has shown that approximately one quarter of collisions happening on national routes occur at work zones. One exception is a study carried out on behalf of the UK Highways Agency that reviewed the safety performance of traffic management at major road works–the fourth such study over the period from 1992[12]. The study showed 'no significant difference in the rate of Personal Injury Accidents (PIA) when road works were present on the motorway.' When compared with the 1992 results the 'with' works accident rate had reduced from 0.174 to 0.101, the same as the national average PIA. 'The conclusion of this study is that due to the increased number of safety measures and practices over the past decade, the risk (in terms of Personal Injury Accidents) when road works are present is similar to the risk when no road works are present.'[13]

One of the limitations currently encountered while assessing safety in RWZs is that little detailed information exists about the change in collision risk and costs associated with works activities. Whilst many countries routinely collect information on the number of collisions at works these do not in general allow an estimation of the increased risk. Research to-date is limited but demonstrates firstly that the presence of work zones increases risk on the roads, secondly, that working on the roads is one of the most dangerous occupations and thirdly, that improved safety practices can reverse these scenarios.

1.4 Nature of the problem

From a road safety viewpoint the risks involved with RWZs can include risk of collisions between general road users (vehicles, cyclists, pedestrians) and barriers, equipment, vehicles or personnel associated with the RWZ as well as collisions involving only road users due to the disturb induced by the RWZ to the normal traffic flow (e.g. side sweep crashes due to sudden lane changes, rear-end crashes due to sudden breaking). Identification of the exact causes of collisions is often difficult to ascertain as a combination of factors may interact to culminate in a collision. As such it is difficult to identify when the presence of a work zone on or near a road, or its characteristics, has directly resulted in road traffic collisions. From the worker safety viewpoint the risks involved with RWZs can include risk of collisions in or outside the work zone, or when the worker enters or leaves the work zone. The collisions can happen with passing vehicles or work vehicles. The worker can be a pedestrian or driving a vehicle.

The dynamic and fluid nature of road related work zones has the potential to result in a deterioration of safety and an increase in risk factors. RWZs represent unexpected and uncharacteristic

5   http://ec.europa.eu/transport/road_safety/pdf/com_20072010_en.pdf
6   http://www.virtualriskmanager.net/main/aboutus/niosh/poster_venema-anita_1.pdf
7   http://www.highways.gov.uk/knowledge/documents/Road_worker_Safety_Strategy.pdf
8   http://www.highways.gov.uk/knowledge/documents/Roadworkers_Safety_Report_Phase_One_Final.pdf
9   http://www.ntua.gr/arrows/finalhb6a2.pdf
10   http://www.asfinag.at/c/document_library/get_file?uuid=ccd7dbb6-3e9f-4ad0-9f6b-842f3651acfd&groupId=10136
11   European Union Road Federation (2007) Safety on motorway Work zones, Discussion Paper. http://www.erf.be/media/discussion_paper_workzone_safety_final.pdf
12   http://www.thenewspaper.com/rlc/docs/04-trl595.pdf
13   Ibid

changes to the road network and present immediate and unavoidable scenarios for drivers thereby contributing to driver confusion and error. Work zones are a deviation from the normal road scenario in terms of functionality, legibility, speed and space. By their very nature the interaction of 'work tasks' carried out by employees with the general public in the form of road users presents an added risk scenario.

A number of studies have been carried out attempting to provide clarity in this area and to inform the development of safer processes and approaches around work zones through the identification of causes of collisions. Research has shown that roadworks that are carried out over a longer period and that cover a longer work zone seem to have a lower crash rate than short term works and that the actual operational area where physical works are occurring appears to be more risky at the access and egress to the work zone[14]. In rural areas, roadwork's crashes often occur in the vicinity of approach roads and exits and are often rear end collisions where road blocks are present[15]. Intersections where traffic from side road joins a main road with a work zone have been identified as relatively dangerous in urban areas. 'The work zone is sometimes closed off badly, it is not always clear which adjustments in behaviour are required of cyclists, and the sign 'cyclists dismount' is sometimes applied incorrectly '[16].

Driver perceptions and actions are significant contributory factors in collisions at road side work zones. Speed is the number one cause of road traffic deaths[17]. In this regard the PREVENT study stated that 'the most consistent finding is that speeding is common at roadworks…(and)…the majority of drivers drive too fast when approaching roadworks'[18]. A study in France demonstrated that 44% of road users were speeding in the vicinity of road works (excess speed at least 20 km/h) while 20% failed to ensure the provision of safe distances with other vehicles.[19] Road users fail to realise the extent of their vulnerability or to perceive the increased risk presented by the presence of works on or adjacent to roads.

The cause of real concern regarding driver behaviour

at RWZs is the fact that drivers believe that they take sufficient caution. 'Experimental studies have shown that the majority of drivers in fact approach road works zones driving too fast for the circumstances, and usually well above the posted speed limit. Moreover they do not decelerate until just before an abrupt change in the conditions... and then in an extremely abrupt manner'[20]. On the other hand a Dutch study into RWZ safety showed that RWZs are not always guarded appropriately, resulting in confused road users entering the work zone and road workers working at the very edges of and even outside the RWZ[21].

Work on roads complicates the driving task and can lead to driver error or/and violations. Driver behaviour resulting in RWZ collisions includes:

- Excessive speed before or adjacent to the work zone.
- Changing lanes too late.
- Inappropriate following distances.
- Losing control of the vehicle.

In the context of the above it is clear that work zones on and adjacent to roads are an additional threat to road users and workers alike as well as to mobility on European roads. The increased risk at RWZs needs to be recognised by the EU and National governments as well as employers and steps taken to reduce this risk and associated deaths and injuries. Occupational health and safety needs to be integrated into the overall road works planning and execution process.

1.5 Quantification

There is a need for more comprehensive and harmonised data collection in relation to RWZ collisions, their causes and their consequences in order to inform the development of safety enhancing measures. In this regard clear definitions and reporting arrangements need to be established. 'Traffic volumes, speed before the work zone and in the work zone, weather conditions, time and day of accident, lighting and road surface conditions and general road infrastructure (number of lanes before and after work zone, type of road) are the external factors

14   http://www.swov.nl/rapport/Factsheets/UK/FS_Road_works.pdf
15   http://www.ntua.gr/arrows/finalhb6a2.pdf
16   http://www.swov.nl/rapport/Factsheets/UK/FS_Road_works.pdf
17   http://www.etsc.eu/documents/ETSC%20PIN%20Annual%20Report%202009.pdf
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20   http://www.ntua.gr/arrows/finalhb6a2.pdf
21   Venema, A., et al. (2008). Aanrijdgevaar wegwerkers; Eindrapport. Van den Berg Infrastructuren, Zwammerdam. http://www.arbeidshygiene.nl/~uploads/text/file/2008-03-04%20venema%20et%20al%20trf.pdf

that could be included in accident records to give the general idea of the conditions in that an accident has occurred'[22].

The situation is further complicated when third parties are involved as reporting mechanisms do not support identification of third party involvement in incidents relating to RWZs. In the UK employers are required to report any injuries that occur at work; however, incidents which occur on roads are excluded from the workplace reporting requirements. Accidents at road and street works have, historically, been under reported, with a lack of data on works related incidents.

Some good practice approaches for more detailed data collection do exist. In Germany for example, there is official data relating to road works and in-depth collision analyses that can allow for the identification of road works typology and potential collision causation factors. In Ireland police have agreed to collect collision data that facilitates identification of the context of road use of people involved in road collisions. The changes will specifically identify people engaged in driving for work or working on or near the road and non-workers involved in collisions with the latter.

However, in general data collection is piecemeal and lacking in detail with no means of comparing across the European Union.

Recommendations

Employers

- Carry out studies to identify change in collision risk associated with works activities.
- Develop systems to record work zone characteristics and incidence occurrence and share this information.
- Carry out before and after studies to identify change in collision risk associated with works activities.
- Carry out risk assessment before every road work activity.
- Monitor road work collisions, incidents and near misses.

Member States

- Change collision data collection to facilitate the identification of collisions occurring in or near work zones and the primary causal factors, including police reporting procedures.
- Carry out before and after studies to identify change in collision risk associated with works activities.
- Finance further research focusing on the behaviour of workers at work zones.
- Finance further research on various vehicle types, pedestrians and cyclist interaction with work zone areas.

EU

- Support the revision of police reporting procedures at the national level to facilitate the identification of collisions occurring in or near work zones.
- Facilitate changes to collision data collection and identify good practice in this area.
- Support studies to increase the knowledge of the issues at stake, coordinating traffic and occupational health and safety policies.

1.6 Existing Guidance and Regulations

At both European and Member State level a range of legislation and guidance exists that is relevant to the issue of safety in the context of working on or near roads either directly or indirectly. At the European level a number of Directives have been developed that have implications for this area in terms of provisions for standards and procedures.

Directive 92/57/EEC[23] relating to 'Temporary or mobile construction sites' sets out minimum safety and health requirements for temporary or mobile construction sites (i.e. any construction site at which building or civil engineering works are carried out) and intends to prevent risks by establishing a chain of responsibility linking all the parties involved. While Annex I of the Directive does not explicitly state that it applies to road works, several of the mentioned activities are a part of road construction. In Belgium, for example, the Royal Decree transposing this Directive includes temporary road works when more than one contractor is involved (which is almost always

22   http://www.ntua.gr/arrows/finalhb6a2.pdf
23   http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1992L0057:20070627:EN:PDF

the case). In the UK, construction work is defined to include road works.

Safety Framework Directive 89/391/EEC[24] underlines the onus on employers to protect their employees and states that they should evaluate the risks to the health and safety of their workers and take measures necessary for the safety and health protection of workers. This requires a risk assessment based approach to safety management.

The Personal Protective Equipment Directive 1989/686[25] applies to any device or appliance designed to be worn or held by an individual for protection against one or more health and safety hazards (as defined in the Directive).

Directive 2008/96/EC[26] on Road Infrastructure Safety Management introduces a comprehensive system of road infrastructure safety management and is also highly relevant. It addresses projects for the construction of new road infrastructure or substantial modifications to the existing network which affects the traffic flow within the trans-European road network. The Directive also includes the obligation of Member States to adopt guidelines on temporary safety measures applying to roadworks under Article 6. Member States' guidelines will be made available on a public website. Article 6 also states that safety inspections shall comprise of periodic inspections of the road network and surveys on the possible impact of roadworks on the safety of the traffic flow.

The Directive aims to promote the objective that safety must be integrated in all phases of planning, design and operation of road infrastructure. It must be regarded in its own right and separately from economic and environmental analysis. Member States were also encouraged but not mandated to apply the provisions of the Directive to national road transport infrastructure, not included in the trans-European road network. In this regard the European Commission has funded the PILOT4SAFETY project which aims to apply the Directive's approaches related to training and certification of Road Safety Experts for the application of Road Safety Audit and Road Safety Inspection procedures to selected secondary roads, in the EU Regions represented in the project. The idea is to share good practices and define common agreed training curricula and tools for qualification of road safety personnel.[27]

The majority of Member States have also developed legislation and/or guidance relating to road works or at least some aspects of this. In some countries a legislative approach has been taken through which those carrying out certain types of road works are obliged to follow a standard approach in terms of issues such as design, layout, equipment and other relevant issues while in other countries a 'recommended' guidance based approach had been taken which is not mandatory. Many Member States also have more than one type of guidance or set of regulations that applies to standards of work zone management and/or operation depending on the typology or road or road works. It is important for Member States to consider the approach to work in or adjacent to roads in a comprehensive and clear manner and to ensure that, where multiple documents exist, they are harmonised, logical and consistent.

There tends to be a greater focus on long term work zone management as this requires more comprehensive traffic management and forward planning efforts. While guidance in the area of short term and mobile work zones is also available, the approach put forward is largely sign based rather than process based. The reliance on signage alone is unlikely to maximise safety for workers. A priority should be to decide when barriers or another protection tool such as vehicles with barriers should be used to physically protect personnel in the installation and removal stage. It is important, for all types of works to facilitate a process based approach to the carrying out of works in or adjacent to roads that includes risk assessment, mitigation and monitoring.

It is evident that there is still work to be done in ensuring a comprehensive approach to safety provision for road works based occupations. There is a focus on the use of equipment to reduce risk which may not always consider fully the optimal approach in terms of ensuring the health and safety of employees. Mandatory guidance should be provided at the national level that sets out a process based approach to safe working on or near the road, putting people at the centre of procedures.

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24 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31989L0391:EN:HTML
25 http://ec.europa.eu/enterprise/sectors/mechanical/documents/legislation/personal-protective-equipment/
26 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0096:EN:NOT
27 http://pilot4safety.fehrl.org/

1.7 Case Studies

United Kingdom

In the UK the Department of Transport has published the Traffic Signs Manual: Chapter 8: Traffic safety measures and signs for road works and temporary situations.[28] This document provides guidance for those responsible for the design of temporary traffic management arrangements which should be implemented to facilitate maintenance activities or in response to temporary situations. It contains advice relating to traffic safety measures, and the identity and location of the traffic signs needed to guide road users, including pedestrians, safely past obstructions in temporary situations. It is structured to facilitate and reflect the design process for temporary traffic management, from the initial broad brief to details of signing provision. It raises the principal issues that need to be considered in temporary traffic management design and provides advice about their resolution. The document deals with the design of temporary traffic management arrangements on single carriageway roads and dual carriageway roads separately.

The Department for Transport has also published 'Safety at Street Works and Road Works; a Code of Practice' which sets out the principles to be followed when signing, guarding and lighting works on all highways and roads except motorways and dual carriageways with hard shoulders. This is known as the "Red Book" and is fully consistent with Chapter 8. Its purpose is to ensure that road users and operatives at sites remain safe when works are taking place in the highway. It has been written and published in a size suitable for operatives to carry in a van or tool box and so is readily available to consult on site. The Department for Transport has just completed a consultation exercise to review and update this Code of Practice.

Germany

The German Statutory Accident Insurance body (GUVV Unfallkasse) with the professional association for the construction industry (BG Bau) and the German Road Safety Council (DVR) published, in 2008, a booklet on traffic safety at roadworks[29]. The booklet identifies the legal basis for such work, with the particular issues of construction methods and the consequences for the safety of workers in the foreground. Acceptance, inspection and maintenance of the roadwork site are covered looking at, for example, how often the site has to be inspected.

The Netherlands

The Netherlands have guidelines for the uniform preparation of work zones which place an emphasis on being simple and clear and stress that distance and/or division between road workers and traffic/other users is important. The guidelines, however, do not have a basis in law.[30]

Italy

In Italy mandatory legislation has been in existance since 2002 (Decree of the Ministry of Transportation and Infrastructure, 10.07.2002) focused predominantly on signage provision and workers visibility requirements as safety mechanisms. Specific attention is paid in defining the protection of pedestrians in urban work zones. On the other hand, no details on the physical protection of work zones are currently included in the Decree. Since 1996 (National Law 494/96 recently updated with National Law 81/2008) a Coordination Safety Plan, prepared by a qualified work zone safety expert, is required as mandatory for any public work but a specific module on road related work zones is usually not offered in the official training courses.

Ireland

In Ireland, specific legislation and guidance exists including the 'Guidance for the Control and Management of Traffic at Road Works' which provides design guidance for temporary traffic management at road works on single carriage road ways.[31]

Switzerland

In Switzerland there are legal framework directives and a control body called Suva, which is competent for safety at work. Roadwork zones, signage and markings are regulated by the VSS (Swiss Association of Road and Transportation Experts). There is also a "Bulletin for safety of workers during road works".

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28 http://assets.dft.gov.uk/publications/traffic-signs-manual/traffic-signs-manual-chapter-08-part-02.pdf
29 http://www.bgbau-medien.de/bau/baustverk/inhalt.htm
30 http://www.crow.nl/nl/Meta_Navigaton/over/Over_CROW.html
31 http://www.lgmsb.ie/Upload/file/Guidance%20on%20the%20Control%20%20Management%20of%20Traffic%20at%20Roadworks%20Seminar%20Presentations%20Dublin%20%20Limerick.pdf

Recommendations

Employers

- Work proactively with Member States to produce more process focused rather than equipment focused guidance and legislation.
- Utilise guidance as standard practice in carrying out work.

Member States

- Develop legal standards for working on roads.
- Produce guidance that is process based rather than signage based.
- Produce guidance that focuses on the human factor as well as the traffic factor.
- Produce legislation that is clear and enforceable to ensure that it is applied.
- Produce guidance including decision making tools that aid those responsible for planning and managing work zones to achieve integration between the traffic management and safety objectives.
- Apply the principles of the EU Infrastructure Safety Directive (2008/96/EC), not only to the TEN-T network but, to the rest of the road network.

EU

- Work towards harmonisation of standards and guidance nationally and across the EU.
- Collate various approaches and disseminate good practice.
- Support common EU curricula for road safety professionals (auditors/inspectors).

Part 2 Planning

2.1 Minimising Works Strategically

Safety, including the safety of workers, should be a key consideration at all stages in the life-cycle of any road related works project whether it be long, medium, short term or mobile. Project planning, including the tendering process carried out by clients, should incorporate work zone safety risk assessment, impacts and mitigation measures as a matter of course. Consideration of the safety of those working in the work zone solely by the contractor or direct employer is an approach that does not

facilitate adequate consideration of safety issues. Clients, including Highways Agencies and/or local authorities, should be proactive and visible in attempting to improve the safety of those working in and around roads as well as that of road users.

The issue of maintenance should be considered from the outset of the design stage in terms of new roads or proposed amendment/renewal of existing roads. In this regard designers should investigate means of engineering out the need for maintenance and engineering in measures that support safe maintenance from the outset.

Design of roads to facilitate safe operation and maintenance of the road long before any works are required needs to be ensured. The design of roads should be based on the principle of minimal intervention which tries to ensure that minimal changes to the original road structure will be required. Design that contributes to legibility and reduces the need for roads users to modify their behaviour should be a primary aim.

The risk posed by road works could be minimised by aiming to develop 'zero maintenance' roads. While this would not impact on all types of work occurring on or adjacent to roads it offers the potential to almost completely negate the need for traditional road works thereby achieving huge risk reduction to both workers and general road users.

'It is...a reasonable objective for road transport safety to reduce downtime due to construction and increase the level of service. Research includes concepts to increase durability and reduce maintenance interventions and costs by advanced asset management approaches. The challenge is to unify expectations and lifecycle cost reduction by at the same time increasing availability, quality and reliability of the road infrastructure network. This and traffic safety concepts especially in road construction areas will aid in reducing collision risk. Safety of road workers and concepts to reduce the risk of collisions involving road workers is of specific interest'[32].

While zero maintenance roads may not be achievable in the short term and maintenance is envisaged, designers should consider this need at the design stage. Agencies should realise the

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32   ERTRAC (2010) Proposed Roadmap on Safer Road Transport, Working Group – Road Transport Safety and Security, Draft Paper

importance of life cycle costing rather than initial costing in determining design and building of projects as this has the potential to reduce the duration and frequency of work zones.

Roads Authorities should adopt a life-cycle approach to planning and operating roads infrastructure using 'asset management' as a tool to maintain existing infrastructure in an efficient way, ensuring that it meets safety standards and optimising its use. Such an approach can facilitate reduced maintenance needs by allowing a more targeted approach. 'Good asset management tools must be developed to support decision making by road authorities with respect to maintenance strategies and reserving funds for conservation of the road networks. Monitoring systems to quickly establish the condition of the infrastructure, performance models for structures, materials and maintenance techniques to forecast'[33] should be developed and utilised. The ability to reduce maintenance needs will reduce overall risk on the roads to both workers and other road users.

'Smart maintenance techniques are developed to reduce 'downtime' of the road, for example surface treatment sprays to revitalise surface properties and prefab surface layers (pavement on a roll) allowing partially and rapid replacement and upgrading of pavements. New prefab methods of road construction are used to build new roads or upgrade existing ones. Prefab constructions provide high quality because of the high level of production conditions and the introduction of new techniques and materials. Other smart solutions like temporary 'bridges' are used to roof over maintenance work, thus relieving congestion, reducing the need for diversions and creating safe conditions for the workers'[34].

Opportunities also exist to reduce the risk posed by road works by designing in safety measures such as lay-bys, pull-of maintenance areas and ensuring minimum widths of verges or medians that will provide a safer working environment. Planning should consider the broader business case of including social benefits and the value of workers as assets as well as the long-term savings to be made through initial higher spends on methods of engineering out maintenance requirements rather than the narrow approach focused on upfront cost and traffic management impacts.

Recommendations

Employers and Member States

- Design out the need for maintenance - work towards 'zero maintenance' roads (research and innovation in advancing materials, constructions techniques, etc).
- Design in mechanisms to support safety maintenance when required.
- Utilise asset management and life cycle approaches to target, coordinate and minimise the number of maintenance interventions required.

EU

- Support the development of maintenance free roads.
- Support a life cycle approach to infrastructure construction and maintenance.

2.2 Procurement

'European contracting rules and tender procedures tend to give the contract to the construction company who does the work at the lowest costs. Occupational health and safety is generally not an important issue in these procedures'[35]. Risks increase due to limited road spaces that are appointed to the road workers as well as limited time slots that are available (road works on major roads are preferably carried out during the night). Tenders for road construction projects are generally won by those companies that can work without hindering traffic mobility[36].This is an area that should be addressed in order to provide

33   FEHRL New Road Construction Concepts; Vision 2040 nr2c.fehrl.org/?m=23&mode=download&id_file=1070
34   Ibid p 17
35   SAFEROWOZO. Safe Road Work zones. Project proposal. Venema, A & Van der Vorm, J. TNO, Hoofddorp, 2009
36   Venema, A., et al. (2008). Aanrijdgevaar wegwerkers; Eindrapport. Van den Berg Infrastructuren, Zwammerdam.   http://www.arbeidshygiene.nl/~uploads/text/file/2008-03-04%20venema%20et%20al%20trf.pdf

safer working environments and reduce the risk associated with RWZs.

At the European level Directive 2004/18/EC[37], on coordination of procedures for the award of public works contracts, public supply contracts and public service contracts applies to the construction of roads and installation of signage. The inclusion of the need to take account of safety aspects into this Directive should be considered within the ongoing revision.

Governments can bring about change by setting an example. They can influence demand through their own public procurement policies. There is in fact great potential to do this. All non-private customers, such as governmental bodies, local authorities and companies can play an important role by including specific requirements to achieve high levels of safety at roadworks in their tendering processes. In doing so, they can improve the balance between safety and efficiency at road works and work towards the inclusion of comprehensive safety measures as standard practice.

Organisations and companies both on the client and contractor side should consider the use of safety related performance goals as a mechanism to facilitate improvement. Such goals could focus not only on reducing work zone related collisions but also more specifically on reducing worker injury rates. Clients should also utilise the contracting procedure by specifying safety improvements in relation to required procedures or equipment use. Such an approach has the potential to raise the importance of safety considerations in RWZ planning and shift the focus from congestion and cost based approaches.

The focus on bids which appear to be most economically advantageous and those which offer least impact on traffic flows or disruption is often at the cost of any robust risk assessment and provision of adequate safety measures relating to work zones. As such work zone stakeholders may have a negative incentive to disregard or neglect safety issues. This problem is exemplified as subcontracting occurs with pressure on employers and employees alike to meet restrictive time and budget deadlines. 'A perverse incentive is frequently created to disregard safety rules in favour of engineering considerations or to avoid late finish penalties'[38].

Time allocations reserved to do road works are generally too short and the offer to contractors of possible bonuses to finish within schedule is an additional risk. This approach is not recommended from a safety point of view. A more progressive safety conscious approach that is being utilised in some public-private partnership arrangements is to link safety criteria to payment so that a percentage of money that is going to be paid depends on the safety results (lack of incidents) of the project. Such an approach is particularly relevant to government authorities. Contractor performance should also be judged in terms of safety, not just time and cost.

The number of stakeholders potentially involved in a RWZ, their objectives and defined responsibilities can cause further problems to the detriment of safety. In many cases road work related companies are contracted by government/roads authorities or sub contracted by large companies. A number of 'contractors' often work together at a single work zone. Cross organisational cooperation is therefore required in terms of specifying safety procedures and setting high safety standards. Cooperation should also from the basis for a risk assessment where companies or contractors are operating in a single work zone or within the vicinity of each other. This is necessary to ensure that there is a coherent and effective approach to reducing risk and ensuring safety. There is a need for sharing of information between highways agencies and utilities providers in relation to the forward planning of projects and maintenance requirements.

Tendering processes should stipulate that cooperation occurs in terms of risk assessment and safety planning. Other prerequisites could also be set down during the tendering process and tied in through contracting arrangements such as specification of the need for worker/live traffic separation devices.

Training should also be one of the points to be checked during the procurement process. The transport contractor should include training and qualification requirements of the employees chosen to undertake the work. Here governments too can do more in term of instructing and educating their own employees.

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37 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:134:0114:0240:EN:PDF
38 ERF (2007) Safety on motorway Work zones, Discussion Paper.

Recommendations

Employers

- Engage in a competition to meet high standards of safety during the procurement process.
- Regardless of their size, develop a policy with supporting procedures aimed at preventing collisions at work zones and ensuring worker health and safety.

Member States

- Develop further guidance on setting safety related performance goals and ensuring safety measures through contractual obligations and budget.
- Ensure all tenders include criteria relating to provision for safety and safety standards specifically for workers as well as other road users.
- Investigate the possibility of setting up formal agreements for coordination between contractors.
- Include risk assessment of employees and subsequent training and qualification checks during the procurement process.

EU

- Revise the EU Directive on Public Procurement to addresses safety aspects.

2.3 Planning the Work zone

During the work planning phase, fundamental decisions about the RWZ are made which dictate levels of safety either directly or indirectly. 'When determining the timing, form and type of road works, a balance should be achieved between the following:

- Safety of road users and workers.
- Traffic flow and road user inconvenience.
- Efficient work zone scheduling and economical traffic operation.
- Environmental impact and other quality requirements.

The impact of the roadworks as regards space, time and cost should be minimised as far as possible; at the same time, safety, environmental and other quality standards must be met'[39].

More work needs to be done in achieving this balance with traditional approaches focusing largely on ensuring the efficient flow of traffic failing to adequately balance this with safety of workers. To-date integration between existing frameworks for workers and frameworks for road users isn't achieved. Strategic level initiatives that have the potential to help redress this balance have been outlined in the Section above including zero maintenance roads, lifecycle management, procurement procedural changes and integration of occupation health and safety consideration into planning. At the lower level other initiatives can also be applied to reduce maintenance requirements and to reduce risk.

Steps should be taken to reduce the number of road works required through forward planning and cooperation between relevant organisations (highways agencies, local authorities, utility operators). Cooperation should ensure that, where safe and practical, works required in an area can be combined and carried out at the same time rather than separately. This has the potential to avoid the use of numerous short work zones and thereby reduce the safety risk.

"Road works and other works that can affect the availability of the road should be coordinated. Different works on the same site should as much as possible be combined to limit the period of reduced availability of the road...This would limit interference between works and traffic and increase the security of workers. Additionally, it should be avoided that traffic trying to avoid road works on one site, ends up in another work zone"[40].

To reduce the risk exposure of both road workers and road users the use of strategies including road closure or night time working may be considered which can limit the actual time required to carry out work and the interaction between a live work zone and the general public. Further research is required in order to identify the costs and benefits of such approaches not only in terms of money and time but also in terms of the safety of the workers and the safety of other road users. Such

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39   http://www.ntua.gr/arrows/finalhb6a2.pdf

40   NAVB-CNAC Witboek wegenwerken-Livre blanc Travaux de voirie http://navb.constructiv.be/nl/Welzijnsinfo/Publicaties.aspx?Page=46   Short summary in English provided by Kris Redant

research including collecting and analysing data would be useful in order to aid decision making at the planning stage as to when such strategies should be adopted. In this regard there is a need for a more formal approach or set of guidelines on when to use such strategies which fully incorporate worker safety in the decision making process.

Recommendations

Employers and Member States

- Develop processes to ensure coordination and combining of works.
- Stimulate research to provide a greater understanding of the balance between traffic impact and safety of strategies such as road closures, lane closures, night-time working.
- Develop a more formal, evidence based guidance on deciding when to adopt the above strategies.

2.4 Safety Appraisal, Risk Assessments and Safety Plans

A safety appraisal is a systematic and critical examination of the workplace for the purpose of identifying hazards, assessing the risk and recommending controls to reduce the risk, where appropriate. Risk is a measure of the likelihood of an incident occurring coupled with the potential severity of the injury or loss. When the safety appraisal identifies a hazard, it is necessary to assess the risk in order to determine what control measures should be introduced. The risk assessment assesses both the probability of an incident occurring and the consequences of the incident.

Safety appraisals and risk assessment should be carried out prior to all proposed works in or adjacent to roads. The level of detail involved should reflect the complexity of the work proposed and the local environment and should cover both issues relating specifically to employees as well as all other road users: pedestrians, cyclists, public transport, HGV's and cars as different hazards risks and subsequently mitigation measures may emerge.

Measures to remove or minimise risk should be developed and integrated with the transport management plan to ensure safety is paramount at all times. This will require an iterative process in order to reach a balance between safety provision and transport efficiency (See Section 2.10 below). To ensure that this takes place it is important to designate a person responsible for safety in relation to each work zone and to put in place systems of checks or reporting mechanisms to be used at the operational, installation and removal stages. In Belgium the appointment of a safety coordinator is mandatory; however, this is not always applied by contractors. As such enforcement of inspections needs to be addressed[41]. In Italy a qualified expert responsible for the work zone safety has to be appointed by the contractors in every public work according to the National Law 81/2008 (former 494/1996).

Risk Assessment should be carried out by all those involved in working on or near roads regardless of the size of the company or works to be progressed. In this regard the risk assessment procedures can be targeted and tailored to match the complexity of the situation. Overall, it is important for organisations considering employee training to have an effective risk assessment-led process under the Framework Directive 89/391/EEC[42]. Under Article 6, within the context of their responsibilities, the employer shall take necessary measures for the safety and health protection of workers, including prevention of occupational risks and provision of information and training, as well as provision of the necessary organisation and means. Article 12 on the training of workers states that, the employer shall ensure that each worker receives adequate safety and health training. Also training should take place in the event of the introduction of new work equipment or a change in equipment, or in the event of the introduction of any new technology.

Risk assessment should also cover whether or not personnel are capable of understanding and acting upon instructions, have good hearing and eyesight. They should also assess that safety is not compromised by them suffering from specific conditions or illnesses[43]. PREVENT WP3 developed tools for the training for workers, supervisors and inspectors[44].

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41   NAVB-CNAC Witboek wegenwerken-Livre blanc Travaux de voirie http://navb.constructiv.be/nl/Welzijnsinfo/Publicaties.aspx?Page=46 Short summary in English provided by Kris Redant
42   http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31989L0391:EN:HTML
43   http://www.dft.gov.uk/ha/standards/ians/pdfs/ian115.pdf
44   http://www.hit.certh.gr/prevent/media/Deliverables/D2.pdf

Case Studies

Ireland

In Ireland the Health and Safety Authority has developed a Code of Practice aimed at Contractors involved in Roadwork and Road Maintenance[45] activities where three or less persons are employed as part of its broader Safe Systems of Work procedures[46]. The aim of this Code of Practice is to improve the level of safety and health among small-scale employers and contractors (employing up to three employees) engaging in road works and to assist them in putting a Safety Statement in place. The Code provides guidance to employers on how to plan and work safely on site. In implementing the Code employers can use a 'Safe Systems of Work Plan' (SSWP) provided by the HSA which is a simple tool to aid risk assessment and safety planning.

Part 1 provides for recording descriptions of the workplace, the work activities and the skills and resources needed to carry out the work. Details must also be provided of who is in charge of the works and emergency contact details. Part 2 provides for the identification of hazards and control measures to deal with these and a check mechanism to ensure that measures are put in place before work commences. Part 3 allows those who are going to work on the activity to sign off on the SSWP and should be completed by the person who prepared the SSWP and the workers to confirm that the SSWP has been brought to their attention.

Austria

ASFINAG plans, finances, maintains and tolls the entire Austrian motorway and expressway network covering 2,175 kilometers and has recently published a Road Safety Programme to 2020[47] which includes comprehensive collision prevention measures aimed at making Austrian roads safer. Part of the plan specifically targets practices surrounding road works zones putting in place new procedures to improve efficiency, reduce cost and improve safety. The procedures include the development of a handbook to set standard practice and the use of checks and inspections to ensure that safety planning is implemented and maintained. In relation to risk assessment, safety planning and monitoring, the Road Safety Programme provides for the following in relation to RWZs:

- New roadwork zones will be inspected together with the police and undergo intense observation in the first days after traffic approval.
- During the entire duration daily road safety checks will be performed and fines given out to construction companies if defects are caused by them.
- Observations about defects from ASFINAG Pilot and via the ASFINAG Service Centre are handled with the highest priority.
- The Road safety checks of roadwork zones are performed in accordance with the European Infrastructure Directive.
- New Roadwork Zone Handbook is prepared (in accordance with the RVS 05.05.42).
- At roadwork zones that have a significant influence on the traffic flow Road Safety Audits (RSA) are performed in advance.
- In terms of work safety the project manager will write a protocol of all work collisions and their consequences, from start to approval of the roadwork zone.

Recommendations

Employers

- Understand that safety measures are necessary for every type of RWZ. Even when the work zone has a very short duration, occupies a very short length, or is located on the hard shoulder or the roadside, the potential implications for safety should be always considered[48].
- Develop safe systems of work procedures.

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45   http://www.dft.gov.uk/ha/standards/ians/pdfs/ian115.pdf
46   http://www.hsa.ie/eng/Publications_and_Forms/Publications
47   http://www.asfinag.at/c/document_library/get_file?uuid=ccd7dbb6-3e9f-4ad0-9f6b-842f3651acfd&groupId=10136
48   http://www.ntua.gr/arrows/finalhb6a2.pdf

- Carry out a safety appraisal and risk assessment for all proposed works.
- Provide a safety statement or plan for each work zone.
- Designate a competent person with specific responsibility for safety for each works project.
- Monitor the implementation of the Safety statement / plan throughout the work duration.

Member States

- Assist in the development of standard practice safe systems of work procedures.
- Consider the need for an authority/3rd party/ regulator to audit/check the planning for works in terms of meeting safety criteria prior to the commencement of works.

EU

- Support the inclusion of "work zone safety management" in a common EU curriculum for road safety auditors/inspectors.
- Disseminate good practice on Road Safety Audits and Risk Assessment on work zones.

2.5 Personnel

Inherent in the planning procedure relating to road works is the need to redress the balance between traffic management and employee safety. The risks for workers are not always recognised. Occupational health and safety must be integrated into the overall road works planning and execution process. Changes to the procurement process, as suggested above, can work towards achieving this however more can also be done by employers in terms of internal arrangements.

A change in focus is required away from the impact on journey times and the traffic network towards the value of employees and the moral and legal obligation to work towards a vision of zero risk for those working on the roads. Companies and authorities with employees that carry out work on or adjacent to roads should develop specific policies and procedures to ensure the upmost safety in this area.

Organizations should aim to adopt a 'vision zero' for RWZ related collisions. The absence of a true safety culture amongst road authorities and private contractors with specific targets elevates

risk associated with road works zones even before the complexities of interactions with the general public and operation of the zone are considered.

Case Study

United Kingdom

The UK Highways Agency are progressive in their commitment to improving the safety of their road worker employees, having adopted an 'Aiming for Zero' approach to health and safety including eliminating all deaths and serious injuries to road workers maintaining the road network. Central to the approach is a goal of 'Exposure Zero' 'to eliminate the need for road workers involved in routine maintenance of (the) road network to be on foot on the live carriageway' as this is when they are most at risk. In attempting to deliver the goal they have carried out a review of operations that require road workers to be exposed to live traffic, with a view to reducing risks, and a revision of maintenance priorities to reduce the number of visits and ad-hoc repairs and maintenance to cut the need for road workers to be on the network[49].

One of the most likely ways of achieving Zero Exposure is through the development and use of new technologies which mechanise some of the high risk tasks involved in road maintenance. The Agency has also been trialing new technology and ways of working which aim to remove the road worker from the roadway as much as possible.

2.6 Training

There is a requirement for compulsory training on safety and health issues (Article 12 of Framework Directive 89/391/EEC). Training should be risk assessment led or based on a needs analysis. People planning and managing work zones need to be qualified and as such standard practice training programmes should be developed specifically focusing on working on or adjacent to roads in order to embed safety into work processes. Training must focus on work methods (deciding what safety measures to implement, how and when) as well as equipment usage, covering signage, barriers, clothing, safety inspection procedures and planning for what happens in case of an incident. Workers also need to be specifically trained in the operation of traffic control devices. At the international level there

49   http://www.highways.gov.uk/knowledge/documents/Road_worker_Safety_Strategy_Action_Plan_2009-11.pdf   and   http://www.highways.gov.uk/knowledge/documents/Road_worker_Safety_Strategy.pdf

also exists an OHSAS 18000 (occupational health and safety management) document through which companies can receive certification in this area. OHSAS 18000 is management system specification. National governments should take a leading role in setting standards for training in this field and ensuring uptake. In Belgium a system of training and certification has been developed[50] while in Germany the DVR organises seminars for workers and safety officers of companies on how to deal with work zones. In UK, Sector Schemes are used to agree training levels required by work type, together with the relevant industry representatives.

Case Studies

Ireland

Ireland has recognised that, in order to stay safe in construction, everybody working in the sector must have specific training. A system of mandatory training and registration requirements for workers under safety and health legislation has been developed and also applies to those working in road maintenance in order to ensure that competent people are carrying out the works.

Workers must hold a valid Safe Pass qualification[51] and must renew this every four years. The training modules cover safety culture, duties and responsibilities at work, collision reporting and prevention, and special working situations such as working at height and excavations. Safe Pass also covers personal protective equipment (PPE), use of hand-held equipment, tools and machinery, safe use of vehicles, noise and vibration, manual handling, and health and hygiene.

A more specific Construction Skills Certification Scheme (CSCS)[52] provides for the training, assessment, certification and registration of construction workers undertaking certain tasks. The CSCS aims to raise standards of safety and health awareness, and so reduce risks and collisions throughout the industry. In relation to working on or adjacent to roads CSCS registration is specifically required for:

• Signing, lighting and guarding on roads.
• Locating underground services.
• Assisting in the implementation of health and safety at roadworks.

Operators who successfully complete an approved CSCS training and assessment programme are awarded certification from a national organisation and are added to a register. Under national Regulations, project supervisors must ensure that persons are in possession of the relevant CSCS card and safety awareness card before undertaking work in connection with roadworks.

Germany

The German construction industry (BG Bau) and the German Road Safety Council (DVR) have developed a seminar covering training[53]. The seminar is aimed at all those responsible for site safety- from planning approval through to implementation. The current laws and the requirements of the 1995 revised "Guidelines for the safeguarding of jobs on roads" (RSA) are covered and the course is designed with different building blocks and can be used flexibly. The seminar can be conducted as a one or two-day course. A brochure "Road Safety at Worksites" was also published in 2006 to accompany the course.

Italy

In Italy a training course is mandatory to become a qualified expert in RWZ safety according to the National Law 81/2008 (former 494/1996) but specific modules on RWZs are usually not included with the limited exception of courses organised specifically for road authorities (as the ANAS training course which includes such specific module).

Recommendations

Employers

• Ensure integration of occupational safety issues into the overall road works planning and operation process through the development of company policies and procedures.
• Develop a goal driven approach focused on health and safety issues.
• Develop standard practice for carrying out risk assessment, including occupational risk assessment in relation to all works projects.
• Develop standard practice safety planning for all works projects.

50   http://www.besacc-vca.be/fr
51   http://www.fas.ie/en/Training/Employee+Training/Safe+Pass/
52   http://www.fas.ie/en/Training/Employee+Training/Construction+Skills+Certification+Scheme/
53   http://www.dvr.de/site.aspx?url=html/betriebe_bg/seminare/baustellen.htm

- Ensure implementation of a good safety plan with the employment of well-trained personnel on all levels. (Skills Certification Scheme)
- Ensure that there is a clear line of responsibility and that staff are competent and trained.
- Ensure that workers behaviour is part of the process to gain acceptance of the need for safety mechanisms.

Member States

- Support the development of training including qualification of trainers and topics covered in the training.
- Help authorities/contractors to develop specific procedures for carrying out risk assessment for work zones.
- Include specific modules on RWZs in national training programmes for RWZ safety experts.

EU

- Act as a catalyst for the development of EU wide training standards.

2.7 Infrastructure: Transport Management Planning

Traffic Management is central to the planning phase and plays a vital role in providing continuity of safe and efficient road user flow and worker safety when a work zone occurs. The safest work area is one which is completely closed to traffic, however this is not possible without major impact on the road network in terms of traffic management requirements. A balance needs to be struck between consideration of the health and safety of workers and the efficiency of the network/safety of other road users. To date this balance has not been achieved to the detriment of those who work in and around roads. Planners and engineers need to take a more active role in relation to maintenance in order to reduce the impacts of work zones and improve their safety for all.

The traffic management plan should be location specific and will require the collection of information and data relating to the project (type of works to be carried out, phasing approaches/plans, number of actors involved) as well as characteristics of the transport network including the road alignment; vehicular volumes, patterns and composition; presence of pedestrians, cyclists and vulnerable users, collision data; existence of permanent traffic control devices and other equipment; and alternative transport routes. Information on any other projects within the vicinity should also be compiled to assess the combined/cumulative impact of works.

Potential impact of planned works on the wider transport network for all modes should be assessed and, where possible, transport models should be used to provide an analytic assessment. The assessment should be evaluated not only in terms congestion and journey time impacts but also in terms of overall safety on the network should proposed maintenance works be carried out. The risk exposure in surrounding areas may be changed as a direct result of migration of road users from around a work zone area. A multidisciplinary approach is required for input into the traffic management plan which should include personnel trained in the areas of road and occupational safety.

The traffic management plan and the design of the work zone should be of the same high standard as for permanent roads and should incorporate the Principles of Sustainable Safety[54]. These were developed originally in 1992 in the Netherlands, and have become part of European road design and safety since then. These principles include:

- **Functionality** (the road / street / work zone should be designed to fit its purpose, e.g. cycling)
- **Legibility** (the road, junctions and conflicts should be obvious to all road users, and the resolution of conflict should be mutually understood by all road users and workers)
- **Forgiving Environment** (if a collision should occur, the outcome is as benign as possible for both workers and road users)
- **Homogeneity** (it is safer to mix traffic of similar mass, speed and direction thereby limiting exposure of workers to live traffic)
- **Self Awareness** (road users and workers should be aware of their competence)

Traffic management planning should also include a strategy for communications with the public that informs affected road users, the

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54 http://www.swov.nl/rapport/Factsheets/UK/FS_Sustainable_Safety_principles.pdf and http://www.crow.nl/nl/Publicaties/publicatiedetail?code=REC26

general public, residences and businesses in the area, and appropriate public bodies about the project, the expected work zone impacts, and any foreseen changing conditions. For larger road maintenance and construction projects interaction should commence at the planning stage with consultation and may include the following measures:

- Use of websites to allow the general public to access information on work zone activity and possible impacts to their travel routes which should be updated on a regular basis if not providing real-time information;
- Encouraging people to move to other modes of travel such as bus and train where possible to minimise their interaction with RWZ;
- Other media attention such as announcement on local radio, newspaper adverts;
- Consultation at the design stage for larger projects with the general public;
- Work zone awareness campaigns;
- Material to educate the public on safety issues relating to working on or near roads.

For smaller road works warning in advance of installation of road works may be sufficient and more appropriate than consultation.

A number of Member States have already taken steps to ensure that communication is a central part of planning for road works. In Germany consultation with the public is a requirement and in the Netherlands, for major road works, companies must have a website setting out details about the works. In some countries roads authorities are also taking the initiative and have developed real-time websites to provide the public with information about road works, associated traffic conditions and possible diversions or alternative routes (UK Traffic England[55] and Highways Agency[56]).

At the planning stage the traffic management plan should also detail what measures will be taken to convey on site information about the road works during the installation, operation and removal periods and what measures will be used to make it clear to other road users what is expected of them in terms of behaviour. 'The plan should show the type and location of signs, closures, vehicles and other devices at each work site, and be done according to the regulations in force. Part of the plan is also a script for the setting up, the maintaining and the dismantling of the work zone. The plan establishes the responsibilities of road workers, road directors and safety inspectors. A trained official must approve the plan and should monitor the implementation of the plan.'[57] It is critical that the traffic management plan is clear and unambiguous both from the point of view of road users and road workers.

Handling speed and speed reductions should be central in the development of the traffic management plan. As previously noted, speed has been identified as the main cause of collisions at works zones.

During the planning process particular attention should be paid to agreeing speed limits. These should be set based on the need to protect workers rather than to solely keep traffic flowing. A recommended technique is to use stepped speed limits, in properly spaced steps of no more than 20 km/h. Speed limit changes should be implemented before traffic is detoured, through the work zone, or adjacent to unprotected construction workers[58].

Technology is important in both informing road users about required changes to their behaviour and in enforcement (See Section 4.7).

Recommendations

Employers

- Ensure that, at the planning level, suggestions about road safety are discussed with colleagues and other involved persons. A multidisciplinary approach is required.
- Ensure that designers visualise safety measures from the eyes of the road users, especially older drivers and other vulnerable users. Messages should be adequate and easily comprehensible.
- Ensure that signing and layout of road works are flexible, following changes and different phases of the work'[59].
- Assess the potential impact of planned works on the wider transport network for all modes,

55 http://www.trafficengland.com/disruptions.aspx?ct=true#ds
56 http://www.highways.gov.uk/traffic/traffic.aspx
57 http://www.ntua.gr/arrows/finalhb6a2.pdf
58 http://www.ntua.gr/arrows/finalhb6a2.pdf
59 Ibid

not only in terms of traffic impact but on impact on safety.

- Ensure that the traffic management plan and the design of the work zone should be of the same high standard as for permanent roads and should incorporate the Principles of Sustainable Safety.
- Communicate with others. 'The existence of a work zone should be announced to parties directly or indirectly affected or concerned, such as the police, emergency services (e.g. first aid or fire brigade), traffic information centres and authorities responsible for the management of adjacent roads'[60].

Part 3 Installation and Removal of Work Zones

The second stage of a work zone is that of preparing the area for work. This involves identifying the personnel needed for the work, the area for work and the equipment necessary for this part of the process. Different procedures have to be taken into account for urban, rural or highway road works. The installation of a work zone can be seen as a small short term work zone before the main works begins. The last part of a work zone is the removal part which should be seen as the reverse of the installation and covers carefully taking away the extra signage and barriers before leaving the carriageway over to live traffic.

3.1 Personnel

Training for personnel must include the installation of a work zone. Workers need to be informed about the organisation and operation of the site, including all safety aspects, as well as about the emergency plan[61].

One of the key issues in installing the work zone is the importance of co-ordinating between different people involved in the work as usually different contractors are involved. In some Member States (Germany, Ireland, UK) such co-ordination between the different contractors is mandatory. During the installation stage client leadership is very important in ensuring that there is the correct balance of risk between road workers and users.

A priority should be to decide when barriers or another protection tool such as vehicles with crash cushions should be used to protect personnel in the installation and removal stage. A decision tool should be used as to help inform the work zone managers on this.

3.2 Infrastructure

'The installation of road works must be signposted in accordance with general principles governing proper signposting, i.e. they must give road users gradual, consistent and comprehensible warning of the type of obstructions and guide them on how to proceed in a safe manner'[62]. 'Installation of the work zone should take place at a time which is characterised by a lower traffic flow. The introduction of the new temporary work zone road markings should be well timed. When road works are carried out, the existing permanent markings should be covered to avoid confusion. Once the work is finished temporary markings should be removed without leaving any trace'[63]. 'Buffer zones and physical protection of workers are needed even during the preparatory phase. Traffic cones and other guidance and delineation equipment are no substitute for continuous physical protection measures'[64].

The physical design of RWZs aims at the provision of smooth transitions between the normal roadway and the work area, as well as the provision of adequate space (buffer area) for separating the live road from the road works. This is also an important element to take care of when installing and removing the work zone. 'Before opening the work zone it is preferable to conduct both an internal and external check'[65].

Elements of physical design include[66]:

- Lead-in taper and exit taper, providing a smooth change in lane width.
- Longitudinal and lateral buffer width.

Speed restrictions should be introduced as soon as the installation phase of the work zone goes ahead. Especially but not only during the installation and removal phase ITS can introduce information to drivers on more differentiated speed limits and these can be enforced accordingly.

60   Ibid
61   Ibid
62   EUROPEAN UNION ROAD FEDERATION (2007) Safety on motorway Work zones, Discussion Paper http://www.irfnet.eu/media/discussion_paper_workzone_safety_final.pdf
63   http://www.etsc.eu/documents/FINAL_Fact_Sheet_Conspicuity.pdf
64   ibid
65   http://www.ntua.gr/arrows/finalhb6a2.pdf
66   Ibid

3.3 Vehicles and Equipment

Truck mounted attenuators (TMAs) at the back of work trucks offer an extremely convincing means of protection from errant vehicles and construction workers, particularly during short duration works and when carrying out mobile lane closures-they are now mandatory in several EU MSs.

(Truck Mounted Attenuator) TMA

3.4 Informing the Road Users

Advance warning of upcoming road works including the preparatory phase can also help drivers avoid the area. Special care should be taken when the lanes for the start of the work are opened and closed. Overhead gantries can't be used on their own for the purpose of informing the road user on the approach to road works, signs must be used to support the messages as well. The provision of information about prospective road works can also be combined with travel management information encouraging the use of alternative routes and the use of other modes of travel such as public transport to reduce the volumes of vehicles passing through the work zone. Risk can be avoided through timely information to other road users.

Case Study

Ireland

In Ireland, the site is prepared in such a way that signs, lights and guarding are put in place in parallel. Irish authorities also communicate to the public that works will be starting in a number of weeks in order to influence road user route choice and travel planning. Regulations were amended in 2008, to also cover the specific need for training in deciding what signs and barriers are required. One decision maker is nominated on each site in terms of setting and moving signs. Ireland also has a construction skills certification card including specific training for road works and more detailed supervisory level training available.

Recommendations

Employers

- Ensure for co-ordination between the different contractors to take safety into account during the installation and removal phases.
- Ensure that there is a person responsible for safety on each site.
- The signs, markings and other safety measures used should point out clearly the travel paths to be followed by drivers. Existing signs, markings and safety devices should be replaced, covered or altered if they are inconsistent with those paths.
- Place RWZ signs at the normal signing *height*.
- Provide sufficient height to give appropriate visibility to oncoming drivers and, in urban areas, for passing pedestrians.
- Avoid the use of flashing lights in the RWZ in order to maintain their attention-raising effect.
- Ensure that safety barriers are visible, especially during the night-time and in bad weather. It is preferable to use barriers with visual (retro reflective) leading elements.
- Apply traffic markings using yellow retro reflective paint or tapes. The use of thermoplastics or cold plastic is not advisable because of the short time scale of the works.
- Use only well-maintained material at work zones. It should be ensured that signs and beacons cannot fall over, slip away or be blown away by the wind.
- Place signs and other traffic control devices moving in the direction of traffic flow (downstream)[67].
- Use safety devices (such as barriers, TMA's) as described in the instructions accompanying these devices.

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67   Arrows (1998) http://www.ntua.gr/arrows/finalhb6a2.pdf

Member States

- Ensure that legislation on work zone management includes co-ordination between the different contractors to take safety into account.
- Ensure that contractors also start to communicate with road users about upcoming roadworks during the preparatory stage.

Part 4 Management of the Work Zone

The aim of managing a work zone should be adopting measures that will achieve as close to vision zero for deaths and serious injuries as possible. Timing for works is crucial, delays reserved to do works are too short in general and the offer to contractors of a possible bonus to finish within schedule can lead to an additional risk. The next section covers safety of personnel, vehicles and equipment and the work zone infrastructure management. It also includes a section on communicating with the public and managing speed at work zones.

4.1 Safety of Work Zone Personnel

There are five key principles that should be respected to protect road workers cited by ARROWS 1998[68]:

1. Avoid exposure of workers to traffic.

2. Make workers visible to road users, both by ensuring adequate visibility for drivers and by providing suitable clothing for road workers.

3. Provide physical protection of workers from traffic. Even in short-term RWZs, buffer zones should be foreseen as a minimum.

4. Protect workers from collisions involving works vehicles. The movements of works vehicles should be adequately perceived by workers.

5. Avoid excessive work hours. European and national legal requirements regarding work hours must be observed. Fatigue can contribute to increased risk for road workers.

One of the goals of safer work zone management should be to remove personnel from live traffic.

The ideal situation is to work towards using machines using overhead gantries or vehicles without people in them. If workers are on the road then measures must be taken to protect them from moving traffic. This includes installing physical barriers and ensuring proper visibility and appropriate training. Personnel should work facing oncoming traffic, wherever practicable. The loading and unloading of tools and equipment should not be undertaken from the live traffic side of the vehicle. This also means undertaking rigorous planning. The Framework Directive 89/391/EEC should be the starting point. It states that employers shall, taking into account the nature of the activities of the enterprise, evaluate the risks to the safety and health of workers.

Rear end collisions are one of the main risks. Caution should be taken by drivers when reversing. Guidance recommends that drivers at worksites should find safe alternatives to reversing if at all possible and that they should walk around the vehicle and look for obstacles or hazards before moving. If reversing then, it is important that drivers reverse slowly and avoid reversing over a long distance. If possible, drivers should reverse or 'pull-through' into parking spaces rather than out of them[69]. Works vehicles should also include rear-view cameras or audio warning devices[70].

Pointing out the risks of roadworks should encourage safer behaviour of road workers. Most road workers and other involved staff are not conscious of the high risks while working at a road work zone. This lack of awareness should be overcome by appropriate action at a general and a project-specific level[71]. Subsequent to the risk assessment evaluation the employer must implement the resulting preventive and protection measures, in particular, training needs required to the situation.

Giving clear instruction to personnel is a crucial part of managing personnel in a work zone. It is recommended to instruct all employees at the beginning of each road works project. Such instruction should incorporate adequate information about road works in general, as well as the specific project worked upon. All relevant information related to the operations should be shared between all parties concerned. This includes not only the workers directly involved in the maintenance task, but also those likely to

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68   http://www.ntua.gr/arrows/finalhb6a2.pdf
69   Murray, W. Reducing Risks: improving the reversing safety of commercial vehicles. Public Service Review: Freight, Issue 9, 2005/6, www.publicservice.co.uk.
70   Arrows (1998) http://www.ntua.gr/arrows/finalhb6a2.pdf
71   ibid

be affected by it or who may be working in the vicinity[72].

Preventative measures can be identified and implemented according to the results of the risk assessment. It is important to apply the principle of the prevention hierarchy (elimination-substitution-engineering-administrative controls-use of personal protective equipment) at all times[73]. Employers must ensure that personal protective equipment is supplied and used at work wherever there are risks to health and safety. Equipment should be used to manage a risk that cannot be adequately controlled using other measures such as engineering solutions. This includes using equipment that complies with the Personal Protective Equipment Directive (PPE) 1989/686[74]. Employers must make sure that PPE is properly assessed before use, is maintained and stored properly and that employees are provided with instructions on how to use it safely and that it is used correctly by employees.

In order to prevent a collision involving a road worker maximum effort must be made in ensuring that the worker and the equipment that they use makes them as visible as possible. Workers should wear high visibility clothing that is produced with high quality materials and complies with European standards (EN 4714 standard). One producer of construction equipment, Volvo, took the initiative of promoting the use of reflective vests amongst the operators of their machines by distributing vests to their customers.

4.2 Vehicle and Construction Equipment

Vehicles and construction equipment should also be chosen adhering to safety criteria. The section above details the importance of ensuring that personnel are trained and able to use them. When employers are planning their work zone careful consideration is needed to determine in advance which equipment is needed.

According to ARROWS road equipment can be distinguished into three main sub-categories depending on the function of the measures:

- warning/information;
- closure/guidance;
- protection.

The first two sub-categories are, essentially, a complement to physical design and traffic control[75].

4.3 Barriers and Markings

Generally traffic cones and barriers are used to demarcate the work zone but cannot be used as a barrier to protect workers. Good practice now aims to reduce as much as possible workers activity in work zones. This includes the point when workers are very vulnerable, especially when they are setting out road signs. This should be done by actively exploring alternatives to the placing of advance warning signs, cone tapers and lengths of cones for delineation of road works, by use of fixed and mobile gantry signs, high level nearside signs and use of lane-blocking vehicles.

Research also recognises that: 'traffic cones and other guidance and delineation equipment (such as water-filled "barriers") are no substitute for continuous physical protection measures. At worst, they simply lull drivers and the workforce into a false sense of security. Work should not even begin before all the foreseen safety measures have been installed'[76].

Physical protection devices serve primarily to prevent the entrance of vehicles or pedestrians inside the work area and to reduce the consequences of collisions involving vehicles running off the roadway. 'Those currently in use include temporary barriers, temporary crash cushions and truck-mounted attenuators (TMAs)'[77]. Temporary barriers are generally not fixed to the ground and are tested to the same rigorous EN1317 standards as permanent fixtures (though with specific containment classes). Crash cushions are steel closure devices laid on the road surface at the entrance of the work area. This energy absorbing device offers protection in the case of head on collisions at work zone entrances[78].

Impact attenuators are primarily used to protect road workers (SWOV 2010). Attenuators mounted

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72   http://osha.europa.eu/en/publications/factsheets/90
73   ibid
74   http://ec.europa.eu/enterprise/sectors/mechanical/documents/legislation/personal-protective-equipment/
75   Arrows (1998) http://www.ntua.gr/arrows/finalhb6a2.pdf
76   EUROPEAN UNION ROAD FEDERATION (2007) Safety on motorway Work zones, Discussion Paper http://www.irfnet.eu/media/discussion_paper_workzone_safety_final.pdf
77   EUROPEAN UNION ROAD FEDERATION (2007) Safety on motorway Work zones, Discussion Paper & Arrows (1998) http://www.ntua.gr/arrows/finalhb6a2.pdf
78   EUROPEAN UNION ROAD FEDERATION (2007) Safety on motorway Work zones, Discussion Paper http://www.irfnet.eu/media/discussion_paper_workzone_safety_final.pdf

at the back of work trucks offer an extremely convincing means of protection for errant vehicles and construction workers, particularly during short duration works and when carrying out mobile lane closures. TMAs are now mandatory in several EU Member States (e.g. TD 49/07 specification in the UK[79] and Belgium[80]).

Belgium has prepared specific instructions for signage and usage of TMAs on roads with a speed limit above 90 km/h. It states that no cones will be placed between the protection vehicle and the work zone and that protection vehicles will be used for protection only. For works on non-motorways on a lane with continuous traffic, one protection vehicle (TMA) will be used and provided with proper signing and will be placed at 50 m in front of the work zone. On motorways, two protection vehicles (TMA) will be used (MOV Instructions for use of TMA in MOW AWV 2009).

4.4 High Visibility Vehicles

Vehicles used by workers should also be made visible. Studies have investigated the relationship between vehicle and road worker conspicuity[81] (UK 2011). Visibility can also be achieved at a low cost by taking simple measures such as ensuring that vehicles are kept clean, especially the conspicuity markings and lights. Different studies showed that trucks can be rendered much more conspicuous by marking their sides and rear using retro reflective marking tape. Conspicuity marking tape is a high performance retro reflective tape which reflects most of the light falling onto it back towards the light source. The tape, mounted on the rear and sides of the vehicle, enables the driver to identify the truck as an object on the road as well as its height and length. The truck is therefore made visible to other road users thereby reducing collisions, specifically rear and side impacts into large vehicles. The UNECE Regulation 104 sets out an international specification for retro reflective marking tape. Vehicles fitted with tape to this standard can be sold and circulate freely in UNECE countries. Another UNECE regulation (R48) sets out the requirements for the installation of lighting and light signalling devices on vehicles: this regulation currently allows (but does not mandate) the installation of conspicuity markings.

4.5 Infrastructure Measures during Work Zone Operation

Any change to a configuration of a road poses a risk. Changing the usual habits of drivers is an added risk such as for example narrowing lanes for road works. Thus, one of the main categories of safety measures covers physical design of road works. Taking account of maintenance should also be included as early as the design stage of all new infrastructure per se. Thus, including requirements such as the width of lane, emergency access, and the ability to open the median of the road every few metres should be part of all new infrastructure design.

In general, the basic safety principles governing the design of permanent roads should also govern the design of the RWZ areas. These aim at the provision of smooth transitions between the normal roadway and the work area, as well as at provision of adequate space (buffer area) for separating the route for traffic from the road works. Compliance with National Guidance and the EU Infrastructure Directive is paramount.

Elements of physical design include[82]:

- Lead-in taper and exit taper;
- Longitudinal and lateral buffer width.

4.6 Work Zone Layout

The ARROWS project aimed to produce harmonised proposals for RWZ layouts for possible application across Europe. It found that: 'for long-term work zones there is a higher degree of convergence among European countries' practices; thus it was possible to prepare detailed layouts for each one of the four Areas (I, II, III and IV) defined along the work zone. Area I: advance warning area, Area II: transition area, Area III: activity area and Area IV: termination area. For long-term work zones on motorways (and dual-carriageway expressways), full-scale layouts can be produced by combining four basic elements: Area I, Area II, Area III and Area IV. On the other hand, the diversity of national practices as regards layouts of other types of RWZs (short-term, rural-road and urban-road) did not allow for the same detailed

79   ibid
80   http://navb.constructiv.be/nl/Welzijnsinfo/Publicaties.aspx?Page=
81   Highways Agency, UK, Road Worker Conspicuity Daytime and Night Time http://www.highways.gov.uk/knowledge_compendium/publications/F0751754DB1E406290A7ACB476DE3C0D.aspx
82   Arrows (1998) http://www.ntua.gr/arrows/finalhb6a2.pdf

treatment to be applied to those types'. However, Arrows recommends using the basic principles of long-term work zones using a simpler set of safety measures. For examples of the layouts see the Arrows Handbook Figures 2-41[83].

Arrows further outlines six general prerequisites for effective roadwork measures. They should be:

1. **Accurate**. The presence of workers should be clearly indicated. They should provide all the necessary and critical information in a credible manner.

2. **Properly-spaced and properly-timed**. The sequence of RWZ safety measures should be positioned with enough separation to enable road users to process the messages, decide and react.

3. **Perceptible and "readable"**. The RWZ should be self explanatory; its layout should make it obvious how to interact with workers and other road users.

4. **Comprehensible**. Safety measures should make obvious to the road users how they should act. Nonverbal information messages are preferable to text.

5. **Ensuring alertness**. It is important to design the approach to the work zone so that drivers are notified that they are entering a road section requiring more "active" driving. The actual start and end of the work zone must be identified by appropriate elements (e.g. signs).

6. **Reasonable**. It is essential to prevent divided attention, distraction and mental overload of road users. A fundamental principle is to use "as few signs as possible but as many as necessary".

Physical Design Check[84]:

- The minimum distances between consecutive work zones should be such that the flow of traffic can return to normal between them. The separation should permit fast-moving traffic to overtake slow-moving vehicles so that platoons can be dissipated and traffic normalised.

- The basic safety principles governing the design of permanent roads should also govern the design of the RWZ areas. Geometry and traffic control devices should be comparable to those for non-works situations. Where lane layout is altered it should provide radii that conform to the same criteria used for normal design.

- Frequent and abrupt changes in geometry, such as lane narrowing, dropped lanes or main roadway transitions requiring rapid manoeuvres, should be avoided.

- To minimise the extent of the disruption to traffic, the work zone should be kept as small as possible while providing adequate safety for workers.

- The length of work zones with narrowed lanes, i.e. with limited capacity, should be generally restricted so as to be acceptable by motorists.

- At work zones where congestion is likely, make provision for incident management, including having recovery vehicles permanently on site or available on immediate call-out for dealing with collisions.

- Make provisions for the safe operation of work or incident management vehicles, particularly on high-speed, high-volume roadways.

- Provide a roadside recovery area for emergency situations and disabled vehicles.

- Equipment, works vehicles and work zone material should be resistant to impact as far as practicable.

- Be especially mindful of obstructions on the central reserve - keep them as far away as possible from the edges of carriageways, and minimise interference with sight lines or with the safety fence.

- Establish well-defined buffer zones, free from workers, equipment and materials.

- Attention should be paid not only to the conspicuity and location of the devices but also to their design and material, to reduce the risk of serious damage in a collision. Do not place adverts in the vicinity of the work zone.

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83   ibid
84   ibid

4.7 Information to the Public on Roadworks

Drivers should factor in possible road works when they are planning their journeys and try to avoid them. 'A timely warning about road works enables drivers either to cancel the journey, change the route or prepare themselves for delays'[85]. The media should be engaged in increasing public awareness of planned road works and to enable relevant actions. There is a need to influence rules existing in different countries on how information is given and received by the public ahead and during the operation. Site managers should prepare a communication campaign well in advance of the works.

The implementation in GPS navigators of live information on RWZs and cues offers very important assistance in providing real time and reliable information to the public on the RWZs and their impact on the traffic flow.

Roadwork co-ordinators also need to make sure that they inform local residents, shop keepers and businesses as well as road users of upcoming roadworks. It is important that accessibility is assured as much as possible (pavements, keeping access to private property, accessibility to public transport). Such information about the RWZs helps make the inconvenience they cause more acceptable[86].

'It is important to design the approach to the RWZ so that road users are notified that they are entering a section requiring more "active" driving where utmost care is called for'[87]. Road users often disregard signs and speed limits at road works. The importance of obeying rules in work zones and the possible consequences of not doing so needs to be communicated more.

4.8 Journey Planning and the Wider Road Network

In the UK, the Highways Agency has developed web-based information services for drivers on when and where road works are likely to be (see www.highways.gov.uk), so that they can be planned for and avoided. Alternative routes should be communicated to the public as well. In some countries such as the Netherlands authorities will not allow works on the road unless they are closed completely to traffic. This is a clear way of reducing risk for road workers but comes with the need of managing traffic flows. In case of road closure or delays caused by roadworks with drivers avoiding the routes and taking other routes measures also need to be taken to consider managing the impact of transferred risk onto adjoining roads.

4.9 Including Work Zone Safety in Driver Training and Education

Driving safely through road works should also be included in novice driver training and education. Training should focus on attributes that are most essential to recognise a work zone. The driving curriculum should also cover when to reduce speed, when to change lanes and in which direction. 'Training should also cover the possible negative consequences of speeding and close-following in a RWZ. Drivers should be made aware that the relative perceived benefits of speeding in saving time may be tiny on a certain stretch of road'[88].

Employers must take measures to reduce risk of their drivers driving for work and factor in systems to avoid risks and loss of time through roadworks. This includes checking the route in advance and avoiding planned road works. If the route does go through road works then extra journey time should be taken into account.

Advice to Drivers[89] once in the RWZ:

- Take extra care and keep to the posted speed limit.
- Get into the correct lane in good time – and avoid switching.
- Concentrate on the road ahead – not the road works.
- Be alert for works traffic leaving or entering the road.
- Keep a safe distance – there could be queues in front.
- Observe all signs – they are there to help you.

85 http://www.hit.certh.gr/prevent/media/Deliverables/D2.pdf
86 NAVB-CNAC (????) Witboek wegenwerken-Livre blanc Travaux de voirie
87 EUROPEAN UNION ROAD FEDERATION (2007) Safety on motorway Work zones, Discussion Paper http://www.irfnet.eu/media/discussion_paper_workzone_safety_final.pdf
88 http://www.hit.certh.gr/prevent/media/Deliverables/D4.pdf
89 UK Highways Agency Public Information

4.10 Road User Testing of Roadworks

Through EuroTest/TAP, 18 FIA automobile clubs in 17 countries have been evaluating the quality and safety of mobility in Europe since 2000 including since 2005 tests of roadworks. The most recent roadwork evaluation was undertaken in 2010 with a review of roadworks in urban areas. The methodology was based on criteria in the ARROWS 1998 handbook and considered the most important safety issues along with questions regarding layout and quality of a roadwork site. All in all, around 180 inspection items were evaluated in 15 countries. Mostly the Eurotest evaluated that the result was very positive. Signposting and traffic routing were two areas profiled for improvement. Results can be viewed through a city and country by country breakdown and individual rating with evaluation per work site and some city comparisons were made[90]. Specific recommendations for authorities were extrapolated from the evaluation[91] as well as tips for different types of road users[92].

EuroTest 2010: 57 City Road Works in 12 European Cities

Road Work Zone	Signs/Marking	Traffic guidance	Traffic flow	Information	Overall Rating
Weighting	15%	25%	35%	25%	
(A) Vienna					
Handelskai	+	o	++	++	+
Breitenfurter Straße – 2	o	o	++	+	+
Breitenfurter Straße – 1	++	+	o	++	+
Obere Donaustraße	+	+	o	+	+
Südtiroler Platz	--	+	o	++	o
Friedensbrücke	+	o	-	+	o
(B) Brussels					
Boulevard de la Grande Ceinture	+	++	++	+	++
Boulevard Léopold III	o	+	++	++	+
Boulevard du Souverain – 1	o	o	+	++	+
Chaussée de Gand	--	o	++	+	+
Boulevard Louis Mettewie	-	-	o	+	o
Boulevard du Souverain – 2	-	-	-	+	o
(CH) Zurich					
Birmensdorferstraße	o	+	++	++	+
Hardbrücke	o	+	++	++	+
Seebahnstraße	-	+	o	++	+
Schaffhauserstraße	o	o	-	++	o
Pfingstweidstraße	-	o	-	++	o
(D) Berlin					
Invalidenstraße	o	+	++	++	++
Tauentzienstraße	+	+	++	+	+
Karl-Marx-Allee	o	o	++	+	+
Spandauer Damm	-	-	o	++	o
Wollankstraße	o	o	--	++	o
(D) Munich					
Schleißheimer Straße	+	+	++	+	+
Landsberger Straße	o	+	o	++	+
Luise-Kiesselbach-Platz	+	+	-	++	+
Einsteinstraße	+	+	o	+	+
Georg-Brauchle-Ring	o	+	++	--	o
(E) Barcelona					
Ronda del Guinardó	+	+	++	++	++
Avinguda Meridiana	+	+	++	+	+
Avinguda del Doctor Marañón	o	o	++	+	+
Ronda del General Mitre	+	+	o	+	+
Carrer del Comte d'Urgell	-	o	-	+	o

Road Work Zone	Signs/Marking	Traffic guidance	Traffic flow	Information	Overall Rating
Weighting	15%	25%	35%	25%	
(E) Madrid					
Paseo de la Habana	+	+	++	+	+
Calle de Serrano	--	o	o	+	o
Calle de Mejía Lequerica	-	-	++	--	o
Calle de los Hermanos Bécquer	--	--	--	+	-
Calle de Juan Bravo	--	-	--	+	--
(F) Paris					
Place du Trocadéro et du 11 Novembre	--	+	++	o	+
Place Arnault Tzanck	-	o	+	+	+
Boulevard de Clichy	o	o	-	+	o
(I) Rome					
Via Livorno	o	o	+	o	o
Via Anastasio II	+	o	-	+	o
Corso Trieste	--	-	+	o	o
Via Nazionale	--	+	o	o	o
Viale dei Colli Portuensi	-	o	o	o	-
(L) Luxembourg					
Rue de Beggen	-	-	o	--	-
(NL) Amsterdam					
Gooiseweg	+	+	++	++	+
Kreisverkehr Noordzijde – Oostoever	o	o	++	+	+
Rokin	++	o	+	+	+
Johan Huizingalaan	o	-	++	+	+
Burgemeester de Vlugtlaan	-	o	+	+	o
(SLO) Ljubljana					
Dalmatinova Ulica	+	o	++	+	+
Železna Cesta	o	o	++	o	+
Poljanski Nasip	o	-	+	+	o
Slovenska Cesta	-	+	+	o	o
Vojkova Cesta	-	o	+	o	o
Trubarjeva Cesta	++	+	--	o	-

++ very good   + good   o acceptable   - poor   -- very poor

4.11 Signage

One of the ways of communicating with the public is signage. Work zone co-ordinators also have a legal duty to comply with Directive 92/58/EEC on safety and/or health signs ensuring that signs are in place where hazards cannot be avoided or reduced.' The legibility of signs should be increased using pictograms and messages presented on conspicuous signs. The sequence of RWZs information devices should be positioned with enough separation to enable road users to process the messages, decide and react. Also particular care should be taken to address the risk of reduced work zone visibility at night, for instance through systematic street lighting. Signing should follow the evolution of time and space and be removed when and where they are no longer needed'[93]. Overlapping with existing or conflicting signs must also be avoided.

90   http://eurotestmobility/com/eurotest.php?itemno=381&lang=EN
91   http://eurotestmobility.com/eurotest.php?itemno=377&lang=EN
92   http://eurotestmobility.com/eurotest.php?itemno=383&lang=EN
93   EUROPEAN UNION ROAD FEDERATION (2007) Safety on motorway Work zones, Discussion Paper http://www.irfnet.eu/media/discussion_paper_workzone_safety_final.pdf

There are various forms of guidance or legal requirements at a national level that set out how road work signage should be undertaken. One reoccurring question is the extent to which road work managers are using signs. In the planning and installation phase they should make sure that the level of signage gives the driver the information they need to know what they are being asked to do but without overwhelming them. Research shows that 'a large number of signs and devices at RWZs does not necessarily lead to better road user behaviour'. A reasonable hypothesis may be that the more devices, the greater risk that there will be devices missing, misplaced, out of order, misunderstood or no detected[94]. However drivers will decide whether or not to comply with a warning, or generally to show safety behaviour- if the perceived benefits of compliance outweigh the costs[95].

4.12 Using ITS in informing drivers

'Infrastructure to Vehicle' ITS can help to inform drivers about upcoming RWZs and speed limits. Variable message signs (CMS/DMS/VMS) are message boards placed along roadways that notify travellers of incidents, travel time information, construction/road closures, and other potential hazards in or around the work zone.

The use of variable message signs is now in place. For example, if traffic is extremely slow in the work zone, a variable message sign upstream of the work zone might warn of a 10-minute delay ahead; a second sign might then warn drivers to slow to 55 km/h. If traffic speeds decrease further, indicating worsening congestion, the system would automatically change the signs to indicate an even longer delay and advise of slower speeds ahead. The signs can also be used to suggest alternate routes or tell drivers to tune into a radio station which broadcasts further advice. To emphasise the timeliness of the messages, each sign can also

display the time the message was posted. Drivers armed with information on traffic ahead are better prepared for changing traffic conditions and thus more likely to have a safe trip. The economic benefits of reducing delays and improving safety at work zones can outweigh the costs of the system by a factor of six or more[96]. Extending this to informing the driver via their in-vehicle ITS systems such as for example navigation devices can also be a way of directing the information. In a further stage vehicle to vehicle ITS can also be used to inform drivers of road works up ahead.

4.13 Speed Management

Managing speed should be the number-one concern at road works. Surveys show that a vehicle's speed in the activity area (where work is going on) seems to be related to its initial speed when entering the RWZ[97].

Speed limits should be credible. If road users pass through a work zone and do not see activity over several days they can be tempted to neglect the imposed speed limits (NAVB-CNAC Belgian White Book). In the Netherlands there is good experience with signing to inform users why a road is closed without visible activity. Such signing apparently increases the acceptability of speed limitations. 'Also there the Dutch Ministry of Transport has introduced new, more credible speed limits for roadworks on the motorways. The speed limit can be differentiated across lanes and for time of day'[98].

Speed limits in work zones must be set for protection of the workers and also of the drivers passing through them along with the requirement of managing traffic flows. A balance should be achieved.
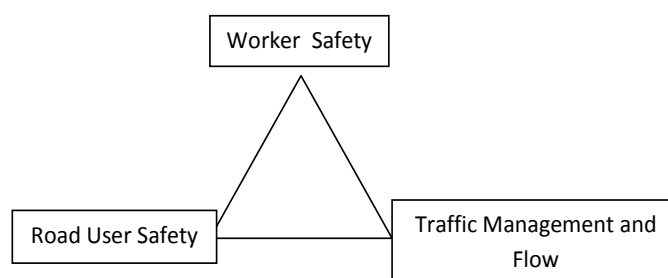
At present there is an ongoing challenge in reaching the correct balance between considering road worker safety and managing traffic.

94   http://www.hit.certh.gr/prevent/
95   ibid
96   ibid
97   http://www.hit.certh.gr/prevent/media/Deliverables/D2.pdf
98   http://www.swov.nl/rapport/Factsheets/UK/FS_Road_works.pdf

There are several reasons why speed limits at work zones should be lower than at non-work sections. Important factors in determining appropriate speed limits are:

- **Adjustment to reduced roadway standards**: Narrowed lanes, deviations (e.g. to/from the contra flow) or reduced shoulders are common changes in highway geometry at RWZs, necessitating lower speeds.
- **Protection of road workers**: Even if there is no effect on the geometric standards of the roadway, the presence of workers calls for a reduction in traffic speeds.
- **Queuing**: On motorways and other higher-volume roads, lane closures may result in queuing, which could increase the probability of rear-end crashes.
- **Commonly, nation specific maximum speed limits for work zones are defined**. These can be adjusted downwards if necessary for safety reasons[99].

Informing the Public of Speed Limits

According to studies carried out on drivers, 'speed behaviour at work sites is largely dependent on the road signs and variable message signs (VMS) they are confronted with'. Also that, 'the likelihood that drivers will slow down when they recognise a sign increases when the signs become more specific'[100]. There is a need for better means of reinforcing the lower speed limit message other than with just static signs. Measures can include providing information to the driver via other media such as the radio and reduced limits set by law. The way the road lay out is designed and set can also reduce the speed. The government in Germany launched, in 2010, a new way of informing road users via CB radios which broadcasts: "warning dangerous road section"[101]. The system is mainly targeting HGV drivers and is broadcast in seven languages. CB radio is still commonly used amongst HGV drivers.

Speed Enforcement at Work zones

Another measure which ideally should go hand in hand with public information to the driver to reduce the speed is the support of a physical Police presence undertaking speed enforcement checks. Due to the special nature of the work zone (e.g. limited space, difficult or even impossible to access) Police officers should be educated and trained on how and when to take measures with regard to violation of traffic rules within the work zone[102]. In Italy "Autostrade per l'Italia S.p.A." has been working to reduce roadworks related collisions by means of different measures including the use of mobile laser control (autovelox) for speed control in co-operation with the motorway Police.

Speed enforcement can also be managed with fixed automated safety cameras including section control which is a method of speed enforcement involving a series of cameras installed over a stretch of road. An image and data are recorded for each vehicle as they enter and leave two points in the system (a section of road). 'Section Control is an efficient speed enforcement method, leading to reductions in speeds across entire sections of roads and reductions in the number of collisions and casualties'[103]. Enforcement of speed limits via average speed cameras is one of the most effective ways of reducing vehicle speeds and achieving speed limit compliance in the UK. Average speed cameras have so far been used effectively for major (long term) road works. Research into the use of average speed cameras in short term (overnight) works carried out on behalf of the Highways Agency showed that their use is practicable and the cameras do achieve a statistically significant reduction in traffic speed.

Another tool to be considered is that of applying stricter penalties in case of a speeding offence committed in a work zone. This is currently the case in the Netherlands and the USA and has been debated in the UK.

Immediate feedback is another way of informing drivers of the speed they are travelling at. Radar speed monitoring/display units can also be used. This is a portable system that can be mounted on a sign or located on a portable trailer that uses radar to measure vehicle speed and that informs motorists of their speed. In 2006, the Dutch Ministry of Transport started a new trial to reduce the speed at road works. Road users were given immediate feedback on their speed, while their vehicle registration number was shown. This direct feedback appeared to result in speed reduction[104]. Unreasonably low speed limits should always be avoided.

99   Arrows (1998) http://www.ntua.gr/arrows/finalhb6a2.pdf
100 EUROPEAN UNION ROAD FEDERATION (2007) Safety on motorway Work zones, Discussion Paper
101 http://www.bmvbs.de/SharedDocs/DE/Pressemitteilungen/2010/mehr-verkehrssicherheit-auf-autobahnen-als-erstes-bundesland-warnt-nordrhein-westfalen-flaechend.html?linkToOverview=DE%2FPresse%2FPressemitteilungen%2Fpressemitteilungen_node.html%3Fgtp%3D36166_list%25253D16%23id24122
102 http://www.hit.certh.gr/site/indexen.php
103 http://www.etsc.eu/documents/copy_of_copy_of_Speed%20Fact%20Sheet%205.pdf
104 http://cardweb.swov.nl/swov/website_uk_detail.html?Zoek=Zoek&display=1&pg=q&q=20070567&start=0

Traffic and Speed Management key issues are[105]:

- Try to maintain the number of lanes, using altered layout, narrow lanes, contra-flow or added lanes. If lanes have to be closed, do this as little as possible, leaving at least one lane in each direction, and using narrow lanes or altered layout as far as possible to avoid flow restrictions and diversions. If you have to close a lane on motorway or dual-carriageway road, it is preferable to close the fast lane(s) first and conduct traffic through the slow lane(s).
- If the work zone is short-term and the traffic volumes are low, alternate one-way operation may be used, with either fixed priority or traffic lights (but not with flagging).
- If some limited extra-capacity is needed, diversions to alternative routes may be used, provided that these routes can accommodate the new traffic and are carefully controlled.
- Design the traffic control plan in such a way as to help drivers to make proper choices rapidly, reinforce critical information without being excessive, appear credible, and avoid conflicting information. Traffic management systems should follow the evolution of the works in time and in space, and be removed as soon as they become unnecessary.
- Separate decision points for the driver.
- Minimise any unavoidable reduction of forward visibility, and provide proper warning. Use signing, markings and safety devices that are consistent with intended travel paths. In long-term work zones, replace, cover or alter existing signs, markings and safety devices that are inconsistent with those paths. In short-term work zones, use mainly devices that emphasize the appropriate path. Make realistic estimates of the approach speeds, and choose realistic and justifiable speed limits, to be supported by accompanying measures (reduced width, police presence).
- Do not prolong low speed limits through long stretches.
- Do not position speed limits signs too far in advance - drivers may consider them premature and ignore them when reaching the critical point.
- An emergency plan should be part of the design. It should describe the procedures in case of collisions and define the required actions to be taken (e.g. emergency vehicles and shelter possibilities).

4.14 Case Studies

Belgium White Book

In Belgium the National Committee for Safety and Hygiene in Construction NAVB/CNAC is an organisation that promotes safety and security in the construction sector. They have also developed measures targeting the specific subsector of road works. They have developed a simple White Book on Road Works addressing the ten main safety problems and solutions. These include: co-ordination, timing, signalling, wider safety zones, regulation compliance, limited experience of the safety co-ordinator, speed limitations, public private partnerships, social effects and vandalism. The first point they stress is co-ordination between road works and that, if different works can be combined during a limited period of time, it will probably be more accepted for road users if a section is completely unavailable during this period. They raise the need to ensure that traffic trying to avoid road works on one site may end up in another road work site. The White Book also stresses the legal obligation in Belgium for the appointment of a safety coordinator as in most road works the contractor is working with subcontractors and the appointment of a safety coordinator is mandatory. Safety should also be included in the training and existing certification scheme for safety co-ordinators.

Portugal: Worker Safety Management System for New Road Construction Projects

The Portuguese Road Institute has developed and implemented a worker safety management system for new road construction projects reviewed by the EU OSHA[106]. This has led to a documented collision reduction rate of between 30 and 40%; moreover the seriousness of collisions and the number of days of absence were reduced. The aim of the system was to provide a common safety framework for all parties involved in a road construction project. The approach is to systematically establish the health and safety obligations and responsibilities of each party. Contractors also have to have health and safety systems in place that comply with the IEP's own management system. An effective monitoring system was set up. A safety

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105   Arrows (1998) http://www.ntua.gr/arrows/finalhb6a2.pdf
106   http://osha.europa.eu/fop/netherlands/en/goodpractice/PDF%20map/bouw2_8.pdf

culture was promoted within the organisation with contractors. The system was also integrated with other management activities such as quality assurance and cost-effectiveness. Part of the implementation and promotion of the new system was training of all of IEP's own employees and different participants in the construction process. To support the introduction of the management system a comprehensive manual was introduced.

Increasing Road Worker Safety in the Netherlands

In The Netherlands, there are non-legally binding guidelines for uniform preparation, indication and signalling of roadworks[107]. According to these guidelines, the indications of the work zone and the guidance of traffic must be simple and clear, thus both ensuring that the road users are aware of the roadworks ahead in time and that they know what is expected of them. Furthermore, sufficient distance or a barrier between road workers and traffic is required. The Netherlands also has legally binding requirements for sign and layout of work zones on national roads[108]. However, an evaluation of 50 roadworks locations[109] shows that only few locations follow the guidelines completely. A 2009 Labour Inspectorate evaluation showed that the road worker was in danger of being crashed into by a vehicle at almost 30% of the 223 inspected locations[110]. Furthermore, in 21 situations, risks were so high that the work had to be stopped.

During 2006 and 2007 a study was undertaken in the Netherlands in order to better understand the crash risk for road construction workers during road works. Based on the outcomes of the study a collision model was developed for investigating collisions and safety promotion materials were constructed for road workers. A video was prepared to make workers and managers aware of their own behaviour. The video uses actors, but the situations were based on actual observations. Also, stickers were prepared for the types of behaviour that can prevent collisions. [111]

Evaluation of the E411 and E25 Roadworks Belgium 2004-2006

A Case Study on the E411 and E25 Roadworks prepared by the Belgian Road Research Centre raises some important findings on improving road safety at road works[112]. The road works were being undertaken over a three year period and involved long-term operations on significant sections of two key routes. The report provides an abundance of data pertaining to traffic and speed, both before and during the works. The roadworks were ambitious, aiming to repair 127.5 km in the province of Luxembourg (south-east of Belgium), between March 2004 and October 2006. Rehabilitation was considered essential in view of the worrying state of the road surface, severely affected by the "punch-out" phenomenon. The thorough report concluded with several key findings that can provide some useful lessons for others on how to conduct road works safely. Firstly, that it is essential that sufficient care is taken to ensure that lanes are clearly and unambiguously defined, particularly when using narrow lanes. Secondly, that running with a single lane in each direction can be a good option from a safety perspective provided sufficient capacity is maintained. Thirdly, that it is vital to monitor collisions at the commencement of the works, so that any problems can be identified and rectified quickly and finally, that the use of very long stretches of works can exacerbate delay problems due to collisions and incidents.

UK Campaign on Speeding: Difference when travelling at 50 to 70 mph at Roadworks

The Highways Agency, supported by DfT's Think! Road Safety campaign, developed two DVDs (with supporting materials) highlighting the need to slow down and respect speed limits at road works. The first, entitled "Respect", compares the responsibility of the road worker with that of other professionals such as teachers and doctors whose roles are also to make our lives more informed, reliable and safe[113]. The consequences of not respecting road workers (by not respecting speed) are made clear and this is

107   CROW (2005). *Werk in Uitvoering; Diverse richtlijnen.* Publicatiereeksen 96a en 96b. CROW kenniscentrum voor verkeer, vervoer en infrastructuur, Ede. In SWOV 2010

108   AVV (2005). *RWS-richtlijn voor verkeersmaatregelen bij wegwerkzaamheden op rijkswegen.* Directoraat-Generaal Rijkswaterstaat, Adviesdienst Verkeer en Vervoer, Rotterdam. In SWOV 2010

109   Weijermars, W.A.M. (2009). *Verkeersonveiligheid bij werk in uitvoering, deel III en eindrapportage.* R-2009-4. Stichting Wetenschappelijk Onderzoek Verkeersveiligheid SWOV, Leidschendam. SWOV 2010 http://www.swov.nl/rapport/R-2008-14.pdf

110   Dutch Labour Inspectorate (2010). *Risico's bij werken aan de weg. Inspectierapport 2010.* Arbeidsinspectie, Utrecht. In SWOV 2010

111   Venema and Brinkhuis (2008) TNO Quality of Life, Increasing Road Worker Safety in the Netherlands http://www.virtualriskmanager.net/main/aboutus/niosh/poster_venema-anita_1.pdf

112   http://www.brrc.be/pdf/publications/e41_05.pdf

113   http://www.highways.gov.uk/knowledge/20639.aspx

then translated to other professions with shocking outcomes. The second, "5 Seconds", covers the direct impact of speed and the different consequences of travelling at 70mph and at 50mph[114]. A speed restriction of 50mph at road works will mean that travelling a quarter of a mile to pass the road works will take 18 seconds. Travelling at the maximum speed of 70mph, to travel the same distance it will take 13 seconds - the difference being only 5 seconds. The DVD features two business colleagues who are on their way to an important presentation but are already running late. We see how a decision made to save just 5 seconds by speeding, can change lives when an incident occurs.

UK Highways Agency Health and Safety Toolkit

The Highways Agency has also developed a Health and Safety Toolkit as a means of identifying the many good practices, innovations and ideas which can contribute positively to workforce health and safety that are currently being used on the network. The toolkit aims to act as a vehicle to communicate and share good practice with interested stakeholders to further drive improvements across the industry. The scope of the toolkit covers the four key project stages: design, maintenance, construction and demolition. Examples so far include the 'Quick moveable barrier' which provides safety to site staff working within temporary lane closures, as opposed to working on live road areas with conventional cones. Other examples include 'Warning Devices for Overhead Structures', 'Mechanical Gully Cover Lifter' and 'Mechanical Kerb Lifter'.

UK Road Workers' Safety Forum

The Highways Agency also plays an active role in the "Road Workers' Safety Forum" (RoWSaF). The Forum has the sole aim of improving safety of road workers and road users while travelling through road works. RoWSaF has supported the development of a range of information DVDs, media resources and printed materials for use by companies and agencies. RoWSaF also has a Trials Team which undertakes trials and evaluation of innovative techniques and equipments aimed at improving the safety and welfare of operatives working on the Highways Agency's road network. Trials investigations have included "sequentially flashing road danger laps", "remotely controlled signs", and "vehicle mounted VMSs for incident management".

Recommendations

Employers

- Make sure that PPE is properly assessed before use, is maintained and stored properly and that employees are provided with instructions on how to use it safety.
- Inform the public of road works via media and websites: including alternative route information.
- Ensure high visibility of workers 24 hours a day even in adverse weather conditions.
- Enforcement is considered essential; it should be ensured that the assistance of the police can be provided as necessary[115].
- Park maintenance vehicles safely; work zone delineators should be used around the vehicle.
- Cover RWZ speed restrictions that do not apply outside working hours (for example, in cases where a work zone does not influence traffic flow when not in operation).
- Keep the RWZ clean during the work.
- Replace traffic signs, beacons etc. (that are moved for the purposes of work) to their original position afterwards.
- Remove safety measures when works are complete; abandoned RWZs should be avoided as far as possible.
- Remove signs and other traffic control devices moving against the direction of traffic flow (upstream).
- Recognise that at a general level, appropriate education and training of site personnel at all levels on RWZ safety issues can contribute to the understanding of safety aspects as an object of responsibility, as well as to ensuring the competency of the involved personnel in undertaking their responsibilities on the site. Education and training should not be given "once and then never again"; it has to be repeated and updated. It could be incorporated into certification programmes at a national level.
- At a project-specific level, make the instruction of site personnel an important component of the RWZ implementation process.

114 http://www.highways.gov.uk/knowledge/20639.aspx
115 Arrows (1998) http://www.ntua.gr/arrows/finalhb6a2.pdf

Recommendations to Member States

- Comply with requirements set out in the Infrastructure Safety Directive especially adopted guidelines on temporary safety measures applying to roadworks[116].
- Recognise that the decrease of traffic congestion from RWZs will have a positive impact on safety, save costs and reduce CO_2 emissions.
- Prioritise Labour Inspectorate to enforce legislation protecting safety of road workers' publicise results and give feedback on preventative measures for managing risk to employer carrying out roadworks.
- Increase enforcement of specific laws and set appropriate penalties at RWZs.

Recommendations to the EU

- Review progress made by Member States in implementing the Infrastructure Safety Directive's guidelines on temporary safety measures, as applied to roadworks, and support the exchange of best practice.
- Consider the opportunities to work towards further harmonisation in terms of standards on design of road works (design, signing and protection)[117].

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116 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:319:0059:0067:EN:PDF
117 PREVENT 2003

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Preventing Road Accidents and Injuries for the Safety of Employees

**Tackling Fatigue:
EU Social Rules and
Heavy Goods Vehicle Drivers**

ETSC
European Transport Safety Council

PRAISE
Work-Related Road Safety

PRAISE Thematic Reports

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PRAISE
Work-Related Road Safety

PRAISE is a project co-funded by the European Commission and implemented by ETSC on Preventing Road Accidents and Injuries for the Safety of Employees (PRAISE). The project aims to advance work-related Road Safety Management and provide the know-how to employers who have to take on that challenge. It also aims to present the work-related road safety standards of EU Member States and carry out advocacy work at the EU level: work-related road safety is an area of road safety policy that clearly needs renewed political commitment.

Tackling Fatigue; EU Social Rules and Heavy Goods Vehicle Drivers
Contents

ETSC
European Transport Safety Council

Introduction

This report aims to offer employers insight into tackling fatigue amongst HGV drivers. Fatigue is one of main risks for this group of professional drivers. Part one looks at the involvement of HGVs in collisions and collision causation factors including fatigue[1]. The second part of the Thematic Report gives an overview of EU legislation on driving and resting times. Although this legislation aims at improving the working conditions of drivers and ensuring fair competition in the EU, this report will focus in on its road safety aim primarily that of addressing fatigue. The third part focuses on issues related to implementing the legislation at national level and offers recommendations to Member States, the EU and employers. The final part looks specifically at what employers can do to tackle fatigue. An employer's 'safety culture' which integrates fatigue policy across its supply chain can support compliance with existing EU legislation.

## Part 1 State of Play

1.1 Recent Trends in Truck Collisions

Over the last decade the number of commercial vehicles travelling on European roads has substantially increased. A safe road transport system must work to avoid collisions of vehicles, especially those with large differences in mass[2] and reduce the main risk factors, including fatigue. Road traffic collisions involving Heavy Goods Vehicles (HGVs) tend to be more severe than other collisions because of the vehicles' size and mass[3]. According to the European Road Safety

Observatory over 4,800 people were killed in collisions involving HGVs in the EU 23 in 2008 (last available data in November 2010[4]). This compares with the overall figure from ERSO of 38,935 road deaths for the year 2008 in the EU 27. The average HGV deaths per million population is 10.9 in the EU 23 and ranges from 3.5 in Slovenia to 36.3 in Slovakia. Averaged over the EU 23 countries 14.2% of deaths occurring in 2008 were in collisions involving HGVs. The total number killed in collisions in the EU 19,[5] where data is available, fell from 7,559 in 1999 to 4,832 in 2008, a reduction of 36.1%[6]. This is in line with the general reduction trend in the total number of deaths over this period. The CARE data also show that 26% of collisions involving HGVs occurred on motorways, 56% on rural roads and only 13% on urban roads.[7]

The rate of death of HGV drivers in road crashes is lower than for other groups of road users, but they impose substantial risks on them[8]. The number of injured people in collisions involving HGVs is about half the number of deaths, reflecting their relatively high fatality rate[9]. Of the deaths in collisions involving HGVs for the EU 23 in 2008, 49% were car occupants, 13% HGV occupants themselves, 16% pedestrians, 6% cyclists and 6% PTW riders[10].

1.2 Time of Day

ERSO[11] presents the distribution of fatalities in accidents involving HGV's by time of day. This shows that hourly rates are relatively high between 08:00 and 18:00 in all countries, which can be mainly attributed to a higher volume of HGVs. The Figure below illustrates this data for the EU 22.
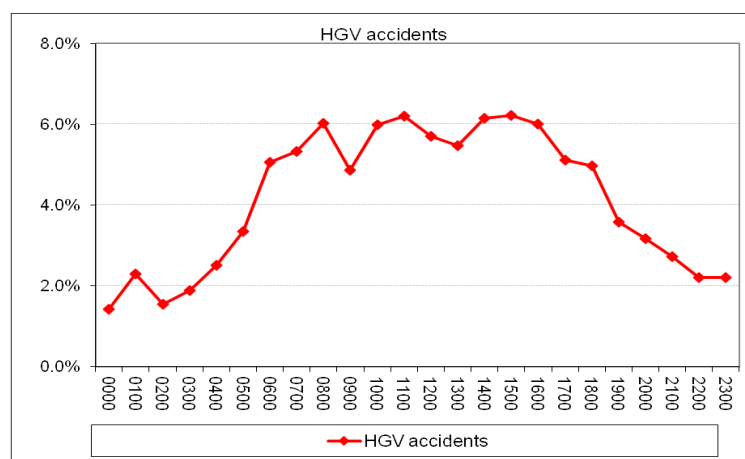
1   Literature on this topic uses many definitions for fatigue. The concepts of 'fatigue', 'sleepiness', 'tiredness'and 'drowsiness' are often used interchangeably but have different meanings. The terms 'fatigue' is most commonly used in road safety policy while academics often favour the term 'sleepiness'. Although the causes of fatigue and sleepiness may be different, the affects are very much the same, namely a decrease in mental and physical capacity detrimental to the driving task performance. For ease, this Report will refer to 'fatigue'.
2   SWOV (2005). Sustainable safety, Fact Sheet, SWOV, Leidschendam.
http://www.swov.nl/uk/research/kennisbank/inhoud/05_duurzaam/the_five_sustainable_safety_principles.htm
3   ERSO Fact Sheet 2010.
4   Ibid EU23 countries are the EU Member States with the exceptions of Bulgaria, Cyprus, Lithuania and Malta.
5   EU 19 include the aforementioned EU 23 without: Estonia, Latvia, Hungary and Slovakia
6   Ibid
7   ibid
8   Elvik , R. (2007) Occupational risk in road transport in Norway, Working paper of January 30, 2007, Institute of Transport Economics.
9   http://www.cedelft.eu/publicatie/are_trucks_taking_their_toll/874?PHPSESSID=5883134d975671ec8e15017dd4c5d91a
10   ibid
11   ERSO (2012). Fact Sheet.

1.3 Collision Causation Factors

There is little data available in terms of collision causation in commercial transport. During the EC SafetyNet project, in-depth data were collected using a common methodology for samples of collisions that occurred in Germany, Italy, The Netherlands, Finland, Sweden and the UK. This SafetyNet Collision Causation Database was formed between 2005 and 2008 and contains details of 1,006 collisions covering all injury severities. A detailed process for recording causation (SafetyNet Collision Causation System – SNACS) attributes one specific critical event to each driver, rider or pedestrian. Links then form chains between the critical event and the causes that led to it. For example, the critical event of late action could be linked to the cause 'observation missed', which was a consequence of fatigue, itself a consequence of an extensive driving spell. In the database, 16% (158) of the collisions involve HGV or bus drivers. HGV drivers account for 79% of this group. The figure below compares the distributions of specific critical events for HGV or bus drivers and other drivers or riders in HGV/bus collisions[12].
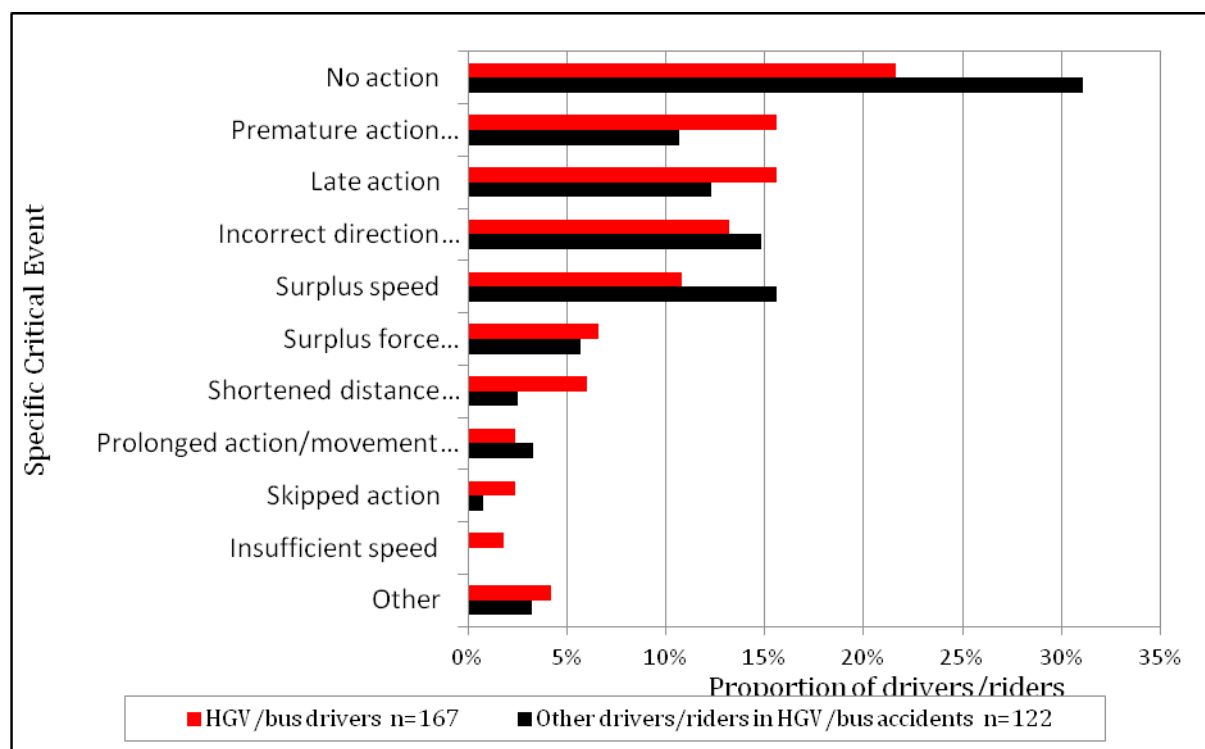
Further analysis by SafetyNet gives the most frequent links between causes for HGV or bus drivers/riders. Faulty diagnosis and missed observation are the two dominant causes[13].

Another study, the "ETAC" European Truck Collision Causation Study, was conducted by the International Road Transport Union (IRU) and the European Commission in 2007[14]. The collision expert teams investigated 624 collisions altogether. The main results of the study showed that 85.2% of the collisions were linked to human error on the part of one of the road participants (truck driver, car driver, pedestrians) as opposed to technical or infrastructure related problems. However, the study found that out of the collisions linked to human error, only 25% were caused by the truck driver. The main causes of collisions between a truck and other road user were: non-adapted speed, failure to observe intersection rules and improper manoeuvre when changing lanes. Fatigue/falling asleep is also a causation factor in wrong manoeuvres involving overtaking and changing lanes. These three main causes only show a tendency and the main cause of a collision varies according to the collision configuration. The report goes on to give an overview of the main causes of collisions according to different configurations.

Empirical studies about behaviour related collision causes involving HGVs were run in Germany, Finland and Great Britain[15]. The main aspects which were analysed were "fatigue", "falling asleep"

12   http://ec.europa.eu/transport/road_safety/pdf/statistics/dacota/bfs2010_dacota_intras_hgvs.pdf
13   SafetyNet Accident Causation Database 2005 to 2008 / EC Date of Query 2010.
14   http://ec.europa.eu/transport/roadsafety_library/publications/etac_exec_summary.pdf
15   Evers, C. (2009) Auswirkungen von Belastungen und Stress auf das Verkehrsverhalten von LKW-Fahrern. Berichte der BAST, Heft M 204, page 48-49.

and "distraction", where the alertness is impaired. All of the studies showed that the proportion of the collisions caused by "fatigue" was higher in these specific studies than those registered in the official statistics.

1.4 Fatigue

The human body's natural sleep wake cycle means that most people feel sleepy twice a day (at night and in the afternoon), drivers are therefore more likely to fall asleep when operating vehicles at that time[16]. Crashes caused by tired drivers are most likely to occur on long journeys on monotonous roads, between 2am and 6am, between 2pm and 4pm. ETSC reports[17] that peak collision levels at night are often 10 or even more times higher than daytime levels. Changing the timing of activities to the night hours means being subject to the reduced functional capability due to a lowered metabolic rate, and, during the subsequent (daytime) sleep, being exposed to the high metabolic rates that disturb sleep. Furthermore, how long a person is awake is equally important: late at night and early in the morning will be a double burden on people who drive at night[18]. In academic literature, fatigue and sleepiness are separate concepts. Grandjean (1979) defines fatigue as a gradual and cumulative process associated with a 'loss of efficiency, and a disinclination for any kind of effort'[19] whereas "sleepiness" signals the likelihood of falling asleep, can be defined as a difficulty in remaining awake and depends on how much sleep a person has had and how long they have been awake[20]. ETSC's Thematic Report on Fitness to Drive[21] includes a section on fatigue which is reproduced here with additional information relating to professional HGV drivers.

A small part of the general population (3-5%) also has to cope with obstructive sleep apnoea, a sleeping disorder which contributes to above average day-to-day fatigue[22]. Organisations such as the Irish Sleep Society provide useful information to help with identifying and dealing with sleep related problems.[23] Results from a Finnish survey involving 1,097 heavy vehicle drivers indicated that one fifth suffered from sleep apnoea[24]. Fatigue manifests itself in slower reaction times, diminished steering performance, reduced ability to keep distance to the car in front, and increased tendency to mentally withdraw from the driving task. The withdrawal of attention and cognitive processing capacity from the driving task is not a conscious, well-planned decision, but a semi-autonomic mental process of which drivers may be only dimly aware. The causes of fatigue are sleep loss, time awake, circadian phase and time on task. Fatigue is associated with increased risk. A person who drives after being awake for 17 hours has a risk of crashing equivalent to being at the 0.5 g/l blood alcohol level (i.e. twice the normal risk)[25]. The increased risk often results from a combination of biological, lifestyle, and work-related factors. In Great Britain research shows that up to 20% of collisions on monotonous roads, such as motorways, are fatigue related[26]. In Germany, an investigation of all fatal collisions that took place on Bavarian motorways in 1991 shows that around 24% of collisions are caused by falling asleep at the wheel[27].

The following table[28] shows different sources of fatigue, impacts on driving and links to possible countermeasures.

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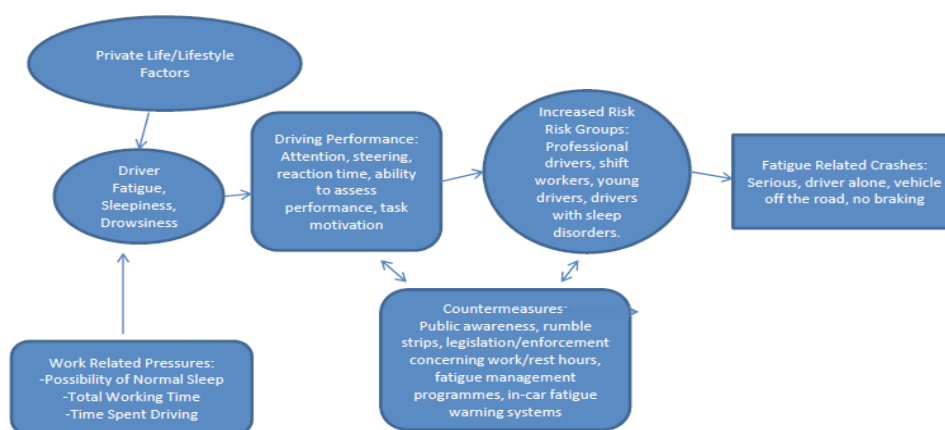
16   TIRF Traffic Injury Research Foundation, (2009), The Facts About Fatigued Driving in Ontario A Guidebook for Police. http://www.tirf.ca/publications/PDF_publications/2009_Facts_Fatigue_Driving_Ontario_Police_Guidebook.pdf
17   ETSC(2001)The Role of Driver Fatigue in Commercial Road Transport Crashes
18   ibid
19   Grandjean (1979) in Fourie C. et al (2011) Fatigue Risk Management Systems DfT.
20   Dement and Carskadon, 1982, Akerstadt and Folkard, 1995; Dijk and Czeisler, 1994 in Fourie C. et al (2011) Fatigue Risk Management Systems Department for Transport (DfT), UK.
21   ETSC, (2010). PRAISE Thematic Report 4, Fitness to Drive http://www.etsc.eu/PRAISE-publications.php
22   http://ec.europa.eu/transport/road_safety/specialist/knowledge/fatique/index.htm
23   http://www.irishsleepsociety.org/downloads/adobe_pdf_files/guidelines/ISS_Apnoea_Guidelines_Web2.pdf
24   Partinen, M., Hirvonen, K., Unikuorma, (2005), Final report from the Finnish Work Environment Fund (100344), 24.3.2005.
25   http://ec.europa.eu/transport/road_safety/specialist/knowledge/fatique/index.htm
26   ROSPA Royal Society for the Prevention of Accidents, Fatigue Facts http://www.rospa.com/roadsafety/advice/driving/fatigue_facts.htm
27   Langwieder, K., Sporner, A. & Hell, W. (1994). Struktur der Unfälle mit Getöteten auf Autobahnen im Freistaat Bayern im Jahr 1991. HUK-Verband, Büro für Kfz-Technik, München.
28   Reproduced from SafetyNet, (2009) Fatigue.

1.5 Fatigue in the professional transport sector

A major risk factor affecting HGV drivers is fatigue. Often, working in this sector is not characterised by the typical "9 to 5" working hours. Research shows that driver fatigue is a significant factor in approximately 20% of commercial road transport crashes[29]. The ETAC Study, based on the 624 collisions in the database, showed that while fatigue was the main cause in only 6% of the collisions, 37% of these were fatal. When fatigue played a role in the collision, 68% involved a truck and another vehicle and in 29% of the cases the collision was a single truck collision. These figures do attest to the seriousness of fatigue induced collisions, but they do not detract from the relatively small proportion of collisions (6%) that are caused by fatigue according to the study. Figures from the UK show that commercial vehicles constitute less than 2% of the national vehicle fleet and travel only 6% of the distance travelled by all vehicles, but are over-represented in collision statistics. In addition, in the UK, the percentage of fatigue-related goods vehicle fatal crashes is over twice that for cars (8% versus 3%)[30].

In a recent study undertaken by SWOV, a group of mainly international truck drivers said they were tired behind the wheel and reported falling asleep while driving more frequently than car drivers (23% to 10%). They also said that in the past year they had continued or started to drive although they felt they were too tired to do so (37% HGV drivers vs. 20% of car drivers)[31]. Increased crash risk occurs at night particularly in the case of longer working days and of irregular hours. Those fatigue factors that have been shown to influence road safety need to be better controlled through regulation enforcement and risk management. In general, professional drivers undertake more long journeys, drive more often under time pressure and are more likely to carry out distracting tasks while driving, such as making phone calls, eating and drinking[32]. The sedentary lifestyle and poor eating habits contribute to more than 40% of professional drivers being categorised as obese or having a significantly elevated body mass index[33].

Obese individuals are more frequently falling asleep whilst driving[34]. Fatigue also affects local/short haul drivers. Hanowski et al monitored 42 local/short haul drivers for approximately two weeks each with video cameras and sensors, finding evidence of driver fatigue such as driving for periods with eyes 80%-100% closed[35].

1.5.1 Night and Shift Work

There are several scientific studies reporting the negative health effects of non-standard working hours and possible psychosocial problems, both short-term effects and long-term associated health effects. Night work also has an impact on traffic collisions: if a collision occurs at night, the risk for a serious collision is much higher. According to the European Survey on Working Conditions (Eurofound, 2005), workers in the transport sector seem to work shifts more than the average European worker (about 26.8% of the transport workers reported they work shifts against 16.1% of the average working population).

1.5.2 Just-In-Time Management

Workloads are increasing and drivers face escalating pressures, for example pressures from clients to deliver faster and more cheaply, with issues such as 'just-in-time management', increased traffic, remote monitoring and working irregular and long hours.[36] Drivers can be over-stressed by the demands placed on them to deliver goods to meet the schedules of modern transport systems and the impact of elaborate subcontracting chains. If they fail to meet such schedules the transport operator may have to compensate the client for delays incurred. This situation encourages drivers to flout the rules in relation to rest times so that they can deliver on time and remain competitive.

1.5.3 Quality of Sleep

Another issue in tackling fatigue is the quality of sleep. The ETSC Review cites that the duration and quality of sleep have a direct effect on the level of alertness and the ability to drive a vehicle safely[37]. Evidence suggests that following severe

29 ETSC (2001) The Role of Driver Fatigue in Commercial Road Transport Crashes.
30 DfT Stats 2009 in Jackson, P. et al (2011) Fatigue and Road Safety: A Critical Analysis of recent Evidence, DfT
31 Goldenbled, C. Et al (2011) Driver Fatigue: prevalence and state awareness of drivers of passenger cars and trucks: A questionnaire study among driving licence holders in the Netherlands, SWOV.
32 Broughton et al., (2003) in EU OSHA, (2010). 'A review of collisions and injuries to road transport drivers.'
33 Jackson, P. et al (2011) Fatigue and Road Safety: A Critical Analysis of recent Evidence, DfT.
34 Goldenbled, C. Et al (2011) Driver Fatigue: prevalence and state awareness of drivers of passenger cars and trucks: A questionnaire study among driving licence holders in the Netherlands, SWOV.
35 http://scholar.lib.vt.edu/theses/available/etd-07272000-08470013/unrestricted/Hanowski_ETD.pdf
36 EU OSHA Website link available: http://osha.europa.eu/en/front-page/view
37 ETSC (2001) The Role of Driver Fatigue in Commercial Road Transport Crashes.

sleep restriction, recovery of performance may not be complete even after three nights of recovery sleep[38]. Furthermore, sleep starts to be negatively affected if this daily rest falls below 12 to 14 hours.

1.5.4 Working Time, Driving Time and Rest Time

Drivers have to fulfill many different functions beyond driving, which can already account for 9-10 hours per day. This can contribute to increased stress and fatigue. For professional drivers, long working hours often go together with early waking and reduced sleep. Short trips can also end up in fatigue-related crashes because time of day and long and irregular working hours are stronger predictors of fatigue than time spent driving[39]. Hamelin found that after 11 hours of work the risk of being involved in a collision doubles. His data also shows that risk levels vary with three key factors. There is an increased risk of impaired function and drowsiness at night, an increased risk due to the greater length of the working day, and irregular working hours also seem to lead to sleep/alertness problems[40].

1.5.5 "Hours of Work" vs. Fatigue Risk Management

EU legislation governing hours of work will be presented in the next section. One important question is whether or not hours of work legislation can manage fatigue effectively. A recent review[41] cites that this "one size fits all" approach cannot possibly manage the complex influencing factors and consequences of fatigue. Researchers argue that Hours of Work (HoW) are simplistic and do not give due consideration to the range of factors relating to work hours such as different operations, working conditions and risk exposure[42]. Moreover, the rules have not changed since 1969 while the context in which they operate has changed dramatically (i.e vehicles, technology, market demands). Other more singular efforts have been made such as launching awareness campaigns at a national level, training and educating employees and the use of in-vehicle technologies that detect tiredness. However, research[43] points to the need for a more systematic approach that 'improves HoW limitations and isolated measures for

managing fatigue'. Yet, hours of work should remain as the regulatory starting point. Part 4 of this report looks at what fatigue risk management could offer employers and employees. These management systems would go above and beyond the current legislative requirements on Hours of Work and employers taking this systematic approach would be better placed to prevent fatigue.

Recommendations to the EU and the EU Member States

- Improve data collection and harmonisation on the involvement of HGVs in collisions. What is monitored is more likely to be improved.
- Increase investigation of collision causation involving HGVs to better understand collision causes and adopt preventative measures.
- Work with Police to develop a course on identifying and investigating fatigue collisions.
- Undertake a large scale EU driver fatigue survey to gauge current prevalence rates for driving while fatigued, the use of effective counter-measures and differences between commercial and non-commercial drivers.
- Strengthen the enforcement of the liability clause (Article 10) of EC 561/2006 in order to prevent the pressures of just-in-time management contributing to fatigue and stress.

1.6 Business Case and Liability of Employers

Employers have clear requirements as regards to setting out driving time for their employees and complying with the EU legislation under Regulation (EC) 561/2006 covering Driving and Rest Times. Article 10 clearly sets out employers' obligations relating to road safety: 'A transport undertaking shall not give drivers it employs or who are put at its disposal any payment, even in the form of a bonus or wage supplement, related to distances travelled and/or the amount of goods carried if that payment is of such a kind as to endanger road safety and/or encourages infringement of this Regulation.' Article 10.4 covers other parts of the supply chain including contractors and sub-contractors. This chain of responsibility should raise safety levels through extending the scope of

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38   ibid
39   SafetyNet (2009) Fatigue
40   ibid
41   Fourie C. et al (2011) Fatigue Risk Management Systems DfT
42   Dawson and McCulloch (2005) in Fourie C. et al (2011) Fatigue Risk Management Systems DfT
43   Fourie C. et al (2011) Fatigue Risk Management Systems DfT

liability to those parties who, through action or inaction, contributed to a breach and therefore bear a level of responsibility for it[44]. This is looked at in more detail in Part 3.

Beyond duty of care and the aforementioned legal obligations, a successful organisation will benefit in a number of ways from managing fatigue within their fleet of drivers, and it therefore makes sound business sense to ensure that employees are fit to drive.

This can be illustrated by:

- reduced absenteeism;
- fewer collisions resulting in material damage or even casualties;
- enhanced motivation;
- improved productivity;
- easier recruitment;
- increased turnover;
- a positive and caring image.

The European Commission has calculated that non compliance with obligations for minimum rest periods can result in driver fatigue and is estimated to produce an increase in the societal cost of collisions of 2.8 Billion Euro a year[45].

Part 2 European Legislation

At European level a framework of social rules for goods and passenger road transport operators has been established over the years, in order to ensure the adequate social protection of road transport workers and improve road safety by preventing fatigue. At international level, drivers' activities are regulated by the European Agreement concerning the work of Crews of Vehicles engaged in International Road Transport (AETR), of 1st July 1970.[46] This section presents a brief overview of EU legislation, Part 3 will look at its implementation and will seek improvements which would result in better fatigue management and road safety.

2.1 Driving Hours Rules

Rules on driving hours and rest periods as defined by Council Regulation (EEC) No 3820/85[47] of 20 December 1985 have been replaced by Regulation 561/2006/EC[48] of 15 March 2006. This set of common rules aims to avoid distortion of competition, improve road safety and ensure drivers' good working conditions within the EU. In particular, according to this regulation, daily driving must not exceed 9 hours (with an additional hour allowed twice a week) while a break totalling 45 minutes (separable into 15 minutes followed by 30 minutes) must be taken after 4 1/2 hours' driving at the latest. The daily rest period ought to be at least 11 hours, with an exception of going down to 9 hours three times a week. In a week, it is allowed to drive for six days (while respecting the daily driving time) and the total weekly driving time must be limited to a maximum of 56 hours. The weekly rest is 45 continuous hours, which can be reduced to 24 hours. Compensation arrangements apply for reduced weekly rest periods.

The Commission Implementing Decision C (2011) 3759, adopted in accordance with Article 25(2) of the Regulation (EC) 561/2006, provides for a uniform model of calculating driving period starting from the moment an infringement on the daily rest requirement occurs (when the driver has not taken rest periods in their entirety as requested by Regulation (EC) 561/2006). The purpose of establishing this common calculation method was to enable enforcement authorities to make uniform decisions on the number and gravity of infringements committed by drivers who failed to comply with their rest period obligation. This method does, however, not provide for any tolerance as to non-compliance with rest periods requirements, which will always be regarded as an infringement and sanctioned accordingly. This common approach is meant to avoid situations where drivers are penalised differently and disproportionately for the same records in different Member States[49].

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44   Quinlan, M. (2008) Remuneration and Safety in the Australian Heavy Vehicle Industry. http://eprints.mdx.ac.uk/7206/1/RemunSafetyAustHVIndustryNov08.pdf

45   http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0451:FIN:EN:PDF
Cited in the CE Delft, Handbook on estimation of external costs in the transport sector, 2008. On the basis of these estimations the EC conservatively estimated the cost of fatigue of professional drivers in terms of accidents to 2.2 billion euro. Furthermore, it is estimated (CARE Database) that fatalities involving buses represent 28% of those involving Heavy Duty Vehicles (HDV). Under the simplifying assumption that other costs of accidents (injuries, damage to the infrastructure, congestion, etc…) involving buses are following the same relation to the same costs generated by HDV, the total cost of accidents for all commercial vehicles above 3.5 t would amount to 2.8 billion euro.

46   A consolidated and updated text of the AETR was produced by CORTE (entered into force on 20 September 2010).

47   Regulation (EEC) n°3820/85 of 20 December 1985 on the harmonisation of certain social legislation relating to road transport.

48   Regulation (EC) n° 561/2006 of 15 March 2006 on the harmonisation of certain social legislation relating to road transport and amending Council Regulations (EEC) n°3821/85 and (EC) n°2135/98 and repealing Council Regulation (EEC) n°3820/85.

49   http://ec.europa.eu/transport/road/social_provisions/enforcement_en.htm

2.2 Working Time

Whilst the EU drivers' hours rules place limits on driving times and rest periods, they do not place any specific limits on overall working time. The provisions of Regulation (EC) n° 561/2006 are, therefore, supplemented by the EU Parliament and Council Directive 2002/15/EC[50] of 11 March 2002 laying down minimum requirements with regard to the organisation of working time for all persons performing mobile road transport activities, including self-employed drivers. The Directive regulates on a longer perspective the daily, weekly, monthly working time. Its main objective is to ensure that professional drivers are not being overloaded with work and to create comparable competition between the Member States. Compared to the driving and resting time regulations, it has only an indirect influence on road safety[51]. Under this Directive 'working time' for mobile workers must not exceed an average 48 hour week (normally calculated over a 4 month reference period), 60 hours in any single week and 10 hours in any 24 hour period, if working at night. Working time includes activities such as: driving; loading and unloading; cleaning and technical maintenance; assisting passengers boarding; disembarking the vehicle. It excludes: mandatory breaks and rest periods; and periods of availability. The Directive also entails break requirements (maximum 6 consecutive working hours without breaks) and extends the rest time provisions of the EU drivers' hours rules to crew members when operating on in-scope vehicles.

2.3 Tachograph Legislation

A tachograph is recording equipment, fitted to commercial vehicles, which stores details of the movement of vehicles and of certain work periods of their drivers. The recording of the driver's individual duty periods is mandatory in commercial vehicles in European countries for enforcement of driving-time regulations.

The digital tachograph records drivers' activities, speed, distances, identification data of the vehicle, of the tachograph fitted, calibration data as well as faults and attempts to manipulate the system and when data has been accessed (for example by the enforcement authority). It stores digital data of the driver activities and vehicle activities on its internal memory and separately on a driver's smart card. A truck operator must periodically download this data from the digital tachograph and the driver cards. They also need to analyse the data, to ensure that the rules have been complied with. The system of the digital tachograph is controlled by four different Smart Cards: Driver, Company (operators), Workshop (Tachograph manufacturers, Vehicle manufacturers or Tachograph Calibration Centres) and Control Card for enforcement authorities. Each Smart Card is issued according to the specific needs. All Member States have to ensure the availability and provide all necessary infrastructure and equipment for application, personalisation and issuing of digital tachograph Smart Cards.

Under Regulation (EC) n° 561/2006, the driving and rest time periods must be recorded and compliance with these rules must be regularly monitored. Digital tachographs are required by law. Regulation (EEC) n° 3821/85[52] of 20 December 1985 provided the legal basis for the installation of recording equipment (analogue tachographs) in road transport. The tachograph has been mandatory since 29 September 1986, and digital tachographs were introduced with Regulation 2135/98/EC[53]. This Regulation amended Regulation (EEC) n° 3821/85 so that today Regulation (EEC) n° 3821/85 covers both analogue and digital tachographs. The digital tachographs must be fitted into goods vehicles that come into scope of the Drivers' Hours rules and which were brought into service after 1st May 2006.

The European Commission[54] has recently proposed to further revise the tachograph legal framework. The legislative proposal looks at using the satellite

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50   Directive 2002/15/EC of the European Parliament and of the Council of 11 March 2002 on the organisation of the working time of persons performing mobile road transport activities.
http://eurlex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32002L0015&model=guichett
51   Kühner, R.: Straßengüterverkehr in Deutschland- rechtlicher Rahmen, Strukturen und Sozialvorschriften, speech at the VGT 2011.
52   Regulation (EEC) n°3821/85 of 20th December 1985 on recording equipment in road transport.
 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1985R3821:20090724:EN:PDF
53   Regulation (EC) n°2135/98 of 24th September 1998 amending Regulation (EEC) n°3821/85 on recording equipment in road transport. http://eurlex.europa.eu/Result.do?T1=V2&T2=1998&T3=2135&RechType=RECH_naturel&Submit=Rechercher
 See also Regulation (EC) n°1360/2002 of 13th June 2002 adapting for the seventh time to technical progress
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002R1360:en:NOT   Council Regulation (EEC) n°3821/85 on recording equipment in road transport (Text with EEA relevance)
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0451:FIN:EN:PDF   and Commission Regulation (EU) No 1266/2009 of 16 December 2009 adapting for the tenth time to technical progress http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:339:0003:0023:EN:PDF Council Regulation (EEC) No 3821/85 on recording equipment in road transport.
54   Proposal for a Regulation of the European Parliament and of the Council amending the Council Regulation (EEC) N. 3821/85 on recording equipment in road transport and amending Regulation (EC) N. 561/2006 of the European Parliament and the Council. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0451:FIN:EN:PDF

positioning system, which would allow for better monitoring and provide important information for organising the logistics chain. The proposed regulation also aims to improve the technical capabilities of the digital tachograph and make it a real 'smart' tachograph linked into current ITS developments. According to the European Commission, the proposal includes non-technical measures such as improving the trustworthiness of the workshops, introducing a minimum degree of harmonisation of sanctions, of training of control officers and simplifying rules on the use of tachograph.

2.4 Enforcement

Member States are obliged to enforce Directive 2006/22/EC[55], as amended by Directive 2009/4/EC and Directive 2009/5/EC, which determines the minimum level of enforcement required to ensure compliance with the rules set out in the Driving Times and Rest Periods and the Tachograph Regulations. It provides common methods to undertake roadside checks and checks at the premises of undertakings as well as strengthening cooperation between Member State authorities in charge of road transport enforcement. In addition guidelines[56] were adopted in 2009 on countermeasures to detect and prevent the manipulation of devices.

Part 3 Focus on the Social Rules

This next section covers different issues related to the social rules including enforcement, training of control officers, levels of fines, combating fraud, providing information to drivers on interpreting the rules and preventing fatigue and, finally journey planning and infrastructure rest area requirements. Improvements in these areas would lead to better fatigue management for HGV drivers.

3.1 Enforcement

'A significant share of the vehicles checked by national police or enforcement officers are found to be breaching the social rules.'[57] On average, at any point in time, around 45,000 vehicles are in breach of EU tachograph rules.[58] Some of

these breaches can have a negative impact on road safety. The EU regulations on driving and rest time and on tachographs are not enforced in a harmonised way across Europe. Instead, what exists is country specific or even sub national enforcement areas resulting in a lack of consistent legal interpretations, control practices and sanctions policy. The European Commission has issued guidance notes to clarify ambiguous provisions in the Regulations. CORTE, the Confederation of Organisations in Road Transport Enforcement, aims at the development and agreement of common interpretations in the field of Road Transport, Road Safety and Road Security Legislation and Enforcement and harmonised Best Practice enforcement methodologies. The organisation has developed a number of factsheets on interpretation of different parts of the Regulations.

The Commission undertook a review of the implementation by Member States of the legislation on social rules in road transport for the term 2007-2008.[59] The report stated that "a total of 3,244,997 offences were reported, which is a very significant increase on the number of offences reported in the previous reporting period (i.e. 1,016,755). This is due to the greater number of controls (39% more working days checked) and to the increase in the frequency of offences detected. Occurrence of offences has doubled in terms of offences detected per working day checked, reaching 3.9 offences, on average, per 100 working days checked, which indicates that the checks have become more efficient and effective since the introduction of the new enforcement regime"[60]. The report also demonstrated disparities in the enforcement process and highlighted a number of issues. The Commission stated that enforcement of working time rules for mobile workers is a complex process, which does not always guarantee that the results of checks are reliable. The report also highlighted varying enforcement approaches across the EU in that 'Some countries declare that they carry out regular targeted checks. In other countries, checks are organised solely on an ad hoc basis in reaction to complaints, requests from drivers or transport undertakings or evidence of irregularities received from other enforcement activities.'[61] Furthermore, many Member States are focusing too much on

55 Directive 2006/22/EC of 15 March 2006 on minimum conditions for the implementation of Council Regulations (EEC) n° 3820/85 and (EEC) n° 3821/85 concerning social legislation relating to road transport activities and repealing Council Directive 88/599/EEC. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:102:0035:0043:EN:PDF
56 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:021:0087:0099:EN:PDF
57 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0451:FIN:EN:PDF
58 http://ec.europa.eu/employment_social/dsw/public/actRetrieveText.do?id=8903
59 http://www.uni-mannheim.de/edz/pdf/sek/2011/sek-2011-0052-en.pdf
60 http://www.uni-mannheim.de/edz/pdf/sek/2011/sek-2011-0052-en.pdf
61 Ibid

random checks and not enough on targeted ones especially those to be carried out at undertakings' premises (as required by the legislation). The quality of enforcement differs across countries depending on the approach taken by national governments and how this area is prioritised and resourced by the relevant agencies.

The Commission prepared guidelines to support Member States in the national interpretation and application of Regulation (EC) n° 561/2006. However, it is noted 'that the guidelines are not legally binding and have therefore not achieved their aim of uniform transposition in Member States'[62].

A recent exploratory study[63] looking at compliance and enforcement of safety and security regulations of international road freight transport in the Baltic Sea Region (CASH Project) found that some hauliers neglect safety and security issues under heavy cost pressures brought about with the economic downturn. Collaboration between authorities and hauliers and drivers' training were mentioned as the developments which had most improved road freight safety.

3.1.1 New Proposals on Technology

The use of different analysis software across Europe results in different interpretations and therefore different enforcement practices. 'The ways to download the data are provided in the regulation, together with guidelines for data interpretations, but the technical design of the downloading and interpretation tools are left to Member State responsibility. The recording equipment is not supposed to evaluate if there are infringements of the drivers' hours regulation. It is only supposed to record data without evaluating it; interpretation of the data is up to enforcers, drivers/operators.' Consequently, 'there are large disparities among Member States regarding the capacity and the efficiency of enforcer's instruments for road side and company checks.'[64]

The European Commission has launched a new proposal[65] to revise the tachograph legislation with a view to improving the system, facilitating better enforcement of the social rules and reducing unnecessary administrative burden. In relation to the standardisation of tachograph equipment, the consultation informing the new proposal highlighted 'an acceptance of the need for some minimum standards to be set by regulation, alongside scope to innovate for tachograph and other manufacturers beyond these minimum standards.'[66] Further improvements in the technology aimed at making road side checks more efficient were also envisaged and supported.

A number of the changes to be implemented through the proposed Regulation offer the potential to further harmonise and improve the existing tachograph system. These include:

- 'Remote communication from the tachograph for control purposes (Article 5): this measure will give control authorities some basic indications on compliance before stopping the vehicle for a roadside check. Compliant undertakings will avoid unnecessary roadside checks and could thereby benefit from a further reduction of administrative burden.'
- 'Automated recording of precise location through GNSS (Article 4): this provision will give control authorities more information for checking compliance with social legislation. By using automated recording, it will also help to reduce administrative burden'.
- 'Ensure integration of digital tachograph in Intelligent Transport Systems (ITS) (Article 6): by providing for a harmonised and standardised interface of the tachograph, other ITS applications will have easier access to the data recorded and produced by the digital tachograph.'[67]

3.1.2 Liability

Under Article 10(4) of Regulation (EC) n° 561/2006 consignors, freight forwarders, tour operators, principal contractors, sub-contractors and driver employment agencies must ensure that contractually agreed transport time schedules comply with the provisions on drivers' hours (rest and driving time). A report from the European Parliament in 2010 noted that this obligation was only explicitly referred to in the national legislation of Denmark, Estonia, Finland, Poland and Sweden.[68] Furthermore, there are varying approaches across

62 http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A7-2010-0130+0+DOC+PDF+V0//EN
63 http://www.cash-project.eu/en/Frontpage
64 http://ec.europa.eu/transport/road/consultations/doc/2010_03_01_background_info.pdf
65 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0451:FIN:EN:PDF
66 http://ec.europa.eu/transport/road/consultations/doc/2010_03_01_responses_summary.pdf
67 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0451:FIN:EN:PDF
68 http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A7-2010-0130+0+DOC+PDF+V0//EN

Member States on how control authorities check compliance with these rules by each of the actors involved. It is difficult to clearly identify who is responsible for infringements. For example, 'the undertaking must take all reasonable steps to comply with this requirement. If a contract with the customer includes a provision for transport time schedules to respect the EU rules, then the requirement would normally be satisfied. However, a driver employment agency is unlikely to absolve itself from the liability if it is found to have been offering back-to-back jobs to drivers where it will be impossible for the driver in question to take a daily or weekly rest in between those jobs.'[69] Some Member States are already moving more towards a concrete application of Article 10 underlining the chain of responsibility and focusing on consigners. This recognises, especially in the case of large companies/consigners, that they are responsible for taking the decisions in terms of scheduling of work rather than individual drivers. There is an onus on all Member States to ensure that the chain of responsibility is enforced and that all of those involved take necessary steps to prevent driver fatigue through the appropriate application of the rules. 'Ultimately any satisfactory scheme to regulate the working hours of commercial drivers should be built on mutual obligations or requirements.[70]'

a) Italy

In Italy steps have recently been taken to ensure that the chain of liability is enforced. Italian law 127/2010[71] contains a series of measures concerning the carriage of goods for hire or rewards including agreeing minimum costs for carriers, new rules on terms of payment and shared liability covering the entire transport chain. Each month, the Ministry of Transport (and in the future a special State Observatory of Transport Costs) calculate a minimum cost per kilometer travelled which must be adhered to by contractors (e. g. if "costo minimo" is 1.8 euros per km, contractor and hauler are free to agree on 1.9, or 2.2 or 2.5 etc- but not below 1.8). Negotiation is free and EU competition law is respected. This aims to ensure that minimum transportation costs are always covered thereby reducing pressure on providers to deliver more / faster in order to simply cover costs. In particular, according to Articles 7 and 8 of the

law, the police must assess the liability of both the client and the carrier along with that of the driver of the vehicle when they carry out roadside checks. Italian law requires a specific separate document of instructions ("scheda di trasporto") to be kept on board by the driver which is also completed and signed by the contractor thereby allowing the police to check and enforce co-liability and impose sanctions. The law also provides clarity in terms of interactions with the Highway Code.

b) Ireland

The Road Safety Authority has produced a guidance leaflet for those involved in the industry explaining the chain of responsibility for breaches of the rules on driving time, breaks and rest time. The simple two page leaflet clearly underlines that the rules relating to drivers' hours are not just the responsibility of drivers. They are also the responsibility of anyone who, as part of their business, manages, operates, schedules or uses road transport services. The RSA advises the following steps should be followed to ensure responsibilities are fulfilled:

- 'You must ensure that all journeys undertaken on your behalf are properly planned and allow sufficient time for the driver to take account of reasonably foreseeable traffic congestion, roadworks and bad weather conditions.
- In planning the journey, you must also ensure that consideration is given to any places where delays generally occur and to how well the driver knows the route.
- Any contractually agreed time schedule with a transport undertaking must comply with the EU and national rules on driving times, breaks and rest periods.
- You must ensure that drivers are not encouraged to disregard the drivers' hours rules and that no incentive is provided to drivers to breach these rules.
- In planning journey times, you must ensure that the driver's requirements for daily living are taken into account – for example eating, breaks, rest and so on. The drivers' hours rules specify maximum daily driving periods and minimum daily and weekly rest periods for drivers.
- Time schedules: you must allow the driver to

69 http://www.fta.co.uk/_galleries/downloads/email_news/vosa_rule_on_drivers_hours_tachographs.pdf pg 44
70 ETSC, (2001). The Role of Driver Fatigue in Commercial Road Transport Crashes. http://www.etsc.eu/documents/drivfatigue.pdf pg 22
71 http://www.altalex.com/index.php?idnot=11741

take the required daily and weekly breaks and rest periods.'[72]

In summary the key message is that a person who influences driver and haulage contractor behaviour can be legally held responsible if that behaviour results in non-compliance with the tachograph and driving time rules.

3.1.3 Complementary methods of Enforcement

Effective enforcement requires commitment from Member States in terms of resources for equipment, personnel and training and the traditional methods of enforcement focusing on manual checks are man power intensive. 'The main method of achieving compliance has been enforcement based on designated officers observing the offence.'[73]

In an attempt to increase the efficiency of enforcement some Member States are developing complementary approaches that maximise and target resources. 'Smart enforcement' methods include initiatives in the area of targeted checking of poorly performing companies, developing gap analysis mechanisms and working closely with the industry to develop self assessment based approaches.

'The current trend in trucking enforcement includes:

- Electronic detection of non-compliance;
- Use of information technology to gather and apply information on patterns of behaviour, to enable the focussing of enforcement resources on high-risk drivers and operators;
- Use of accreditation and safety ratings schemes to encourage the application of safety management systems; and
- Imposition of legal requirements on off-road parties with control over truck operations.

Improved information technology enables more rapid and efficient processing of detected breaches and the development of operator compliance and risk profiles. That enables the targeting of high-risk operators, either through safety ratings, compliance scores or operator licensing schemes'[74] Agencies involved with enforcement need to conduct periodic reviews of their enforcement methods. These reviews need to look at the type of inspections to be conducted (prior notice of checks, unannounced checks) and the nature of the check – internal management systems, procedures, records for the purposes of effectiveness and efficiency, increasing deterrence, promoting compliance and addressing persistent offenders who don't take corrective action after detection. Agencies need to explain the enforcement methods to industry associations, collaborate where possible-particularly in terms of information and guidance, and develop mechanisms for understanding between the agencies and those being regulated. Ideally these activities need to take place against a wider road safety strategy context that promotes road safety across all socio-economic groups.

a) The Netherlands

In the Netherlands, a country with high HGV traffic, there are only 55 enforcement officers and 30 traffic police which limits what can be done in terms of traditional enforcement action. To overcome this, enforcers are working with companies to help them achieve a high level of compliance with the social rules and therefore reducing the need to target them in random checking. Experience to date has demonstrated that cooperation with companies to build trust gives good results in terms of compliance and reduces the need for sanctions.

The IVW (Inspectie Verkeer en Waterstaat / Transport & Water Management Inspectorate) supervises compliance with legislation and regulations in the transport sector including the driving and rest time legislation. To fulfil this role they have a targeted approach using five types of supervision namely 'Object Inspections, Company Inspections, Audits, Enforcement and Digital Inspections.'[75] The Inspectorate recognises that flexibility is required and that a 'one size fits all' approach to enforcement of the legislation is not appropriate given the diversity within the industry in terms of company type and characteristics. The system of 'audits and enforcement agreements' involves 'supervision of the systems, processes and methods for ensuring compliance with the laws and regulations.'[76] This serves to reduce the regulatory burden on companies by encouraging them to actively comply with legislation.

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72   http://www.rsa.ie/Documents/Tachograph_Enf/Tacho%20Cards/Tacho%20Guides/drivers_hours_dl_low_res.pdf
73   Moving Freight with Better Trucks, Summary Document OECD/ITF 2011 pg 15. http://www.internationaltransportforum.org/jtrc/infrastructure/heavyveh/TrucksSum.pdf
74   Ibid.
75   Road Transport Audit Charter, Audits and Enforcement Agreements, Inspectie Verkeer en Waterstaat, 2010.
76   Ibid.

'In order to test whether a company is in fact in control of its systems and processes, the Inspectorate uses the following criteria:

- The management demonstrates its responsibility for compliance with the laws and regulations.
- The personnel (planners, drivers, etc.) understand the importance of compliance with the laws and regulations and act accordingly.
- The responsibilities and powers of those who deal with the compliance with the laws and regulations are clearly defined and well known within the organisation.
- The personnel possess sufficient knowledge and the proper attitudes in order to be able to comply with the laws and regulations.
- The personnel possess adequate means for complying with the laws and regulations.
- Demonstrable control measures have been integrated into the primary, supporting and management processes in order to guarantee compliance with the laws and regulations.
- The management monitor and check at demonstrably regular intervals the guarantee of compliance with the laws and regulations for effectiveness and possible improvements and intervene whenever and wherever necessary.'[77]

The audit process consists of three steps: a self-assessment, an audit and monitoring as depicted below (good results are required at each stage in order for a company to move on to the next stage).
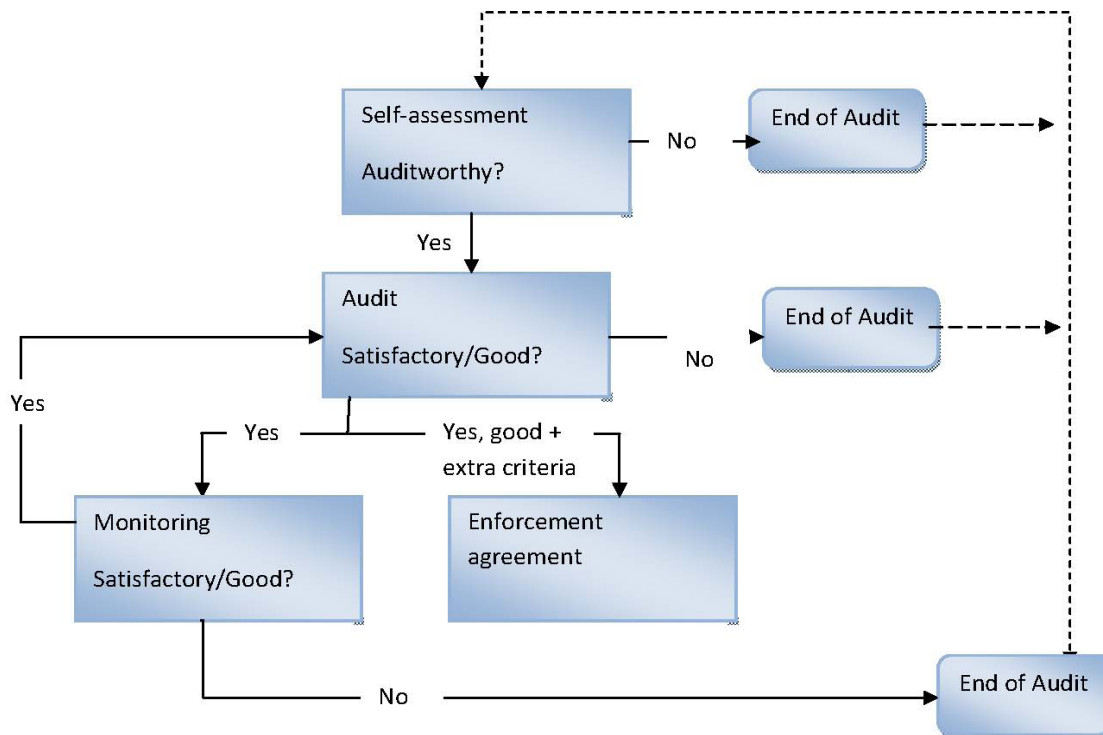
Good results of an audit may result in the signing of a covenant or enforcement agreement between the companies and the inspectorate. 'In the enforcement agreement…more detailed agreements are reached in order to improve compliance with the laws and regulations, reduce the supervisory burden and expand the services.'[78] The company must also demonstrate above-average compliance with what the Inspectorate supervises and good reputation with other inspection services where applicable.

If an organisation satisfies these conditions, the Inspectorate makes covenants about how it conducts supervision and therewith departs from the regular form of supervision. In the new form of supervision, the Inspectorate assesses the quality of the control measures and guarantees for complying with laws and regulations and minimising risks. This control must be based on a plan-do-check-act methodology.

'The objective of this covenant is to establish the agreements which the Parties have made on the basis of their own responsibility in order to achieve an effective and efficient supervision with a minimal supervisory intensity.'[79] Under the covenant the company will agree to a set of conditions including,

77 Ibid.
78 Ibid
79 Ministry of Infrastructure and Environment, Transport and Water Management Inspectorate Covenant.

for example, provision of a management system that checks compliance and works towards continual improvement of this, regimes for reporting on risk management and incidents that occur and ensuring that any third parties which are contracted also fit with the quality requirements. In return, the Inspectorate agrees to conduct as minimal as possible a number of audits or inspections to verify the activities of the company instead of the normal checking procedures and to evaluate the reports submitted by the company. The Inspectorate works in consultation with the company and designates specific persons to fulfill a consultation role.[80]

b) Ireland

In Ireland a risk based and intelligence led approach to enforcement has been taken facilitating a more targeted use of enforcement resources for premises inspections. There has been a focus on informing and educating the industry and using a stepped approach to enforcement, instead of turning to penalties and sanctions in the first instance, in order to support those wanting to comply with the social rules legislation but struggling with the practicalities. The RSA work with operators, who clearly demonstrate a commitment to addressing compliance issues in an effective and robust manner, through education and guidance, while reserving more punitive measures for persistent offenders. Education and enforcement are critically interlinked and key components of the enforcement and compliance strategy being implemented by the RSA.

The RSA has developed various guidance material for drivers that is distributed at roadside checks as well as at CPC training courses[81]. As part of a major reform programme of the commercial vehicle testing system in Ireland, the Road Safety Authority is planning to implement a commercial vehicle information system (COVIS) intended primarily as a business intelligence and management tool which will capture inter-alia infringement data, commercial vehicle test results and maintain risk registers with regard to operators and other relevant entities.

The COVIS information will be available to enforcement personnel for roadside and premises checks. Operators who meet compliance standards will be rewarded through going about their business with minimal disruption while those who do not keep their fleet in a roadworthy condition or fail to comply with the social rules will experience frequent targeted compliance and enforcement checks.

c) UK

Since 2006 the Vehicle Operator and Services Agency (VOSA)[82] have been using Operator Compliance Risk Score (OCRS) as a tool to help target those operators who are perceived to offer a greater risk to public safety through non-compliance. OCRS scoring is calculated from VOSA's records of compliance of a specific operator over a rolling two year period and fed from a central server to a hand held Mobile Compliance Device kept by traffic examiners at the roadside. An operator is rated over the two years by comparison with other operators' of a similar type and given a relative score based largely on history of encounters with VOSA and ranking this into a percentile. The figures are updated weekly so an operator's scoring is constantly changing. Even though the operator's specific historic record may not change his scoring may change due to a general improvement or deterioration in the records of the industry comparators. Scores are allocated for 'roadworthiness' and for 'traffic', the latter of which is based on the history of VOSA prosecutions and roadside encounters in relation to non mechanical infringements such as driver's hours, tachograph and overloading offences.

The system is being further developed to bring in the system of graduation of penalties to OCRS scoring. The introduction of the graduated element of fixed penalties into OCRS will better define more serious levels of offending which will be reflected in operators OCRS. This improved approach recognises the fact that there are 'different reasons why operators might be non-compliant, ranging from a simple lack of awareness of regulations to wilful non-compliance based on a perception of cost'[83]. This suggests that different responses to non-compliance would be appropriate. In developing the graduated approach VOSA are aiming to partner willing operators into compliance through engagement and education while dealing with hardened and serial evaders through more punitive measures.

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80   Dit is een uitgave van de Inspectie Verkeer en Waterstaat (2010), Auditstatuut Wegvervoer (Audits en Handhavingsconvenanten), only in Dutch.
81   http://www.rsa.ie/en/RSA/Professional-Drivers/Driving-Safely/Driver-Hours/
82   http://www.vosa.gov.uk/
83   KSBR Brand Futures: Road to Compliance, 2009

d) Germany

A more classical enforcement approach is taken in Germany where roadside checks continue to make a substantial contribution towards supervising the legal framework for road freight transport. The Police from each Federal State and the Federal Office for Goods Transport (BAG) are responsible for the enforcement measures: apart from roadside checks, on site checks and control measures in the premises of the haulage companies take place. The BAG is an independent Federal authority within the domain of the Federal Ministry of Transport, Building and Urban Development. The BAG is also the authority responsible for issuing fines for offences by residents and non-residents covering social rules in transport such as working time, driving and resting time and tachograph regulation. It is organised on a decentralised basis with 11 branches nationwide. Eight of them are responsible for on-site checks and offences procedures. About 240 inspectors are deployed on Germany's roads every day and also on weekends and at night. They have around 120 vehicles equipped with special IT technology, this enables a direct link to the respective branch via UMTS. Approximately 1.4 to 1.5 million vehicles are controlled every year by both enforcement authorities in relation to rest- and working time, 2/3 by the police and 1/3 by BAG. The latter has produced an information leaflet in several languages concerning the content and the procedure of the inspections to have a better communication with the drivers (see 3.5).

In the context of the Freight Transport and Logistic Action Plan[84] from the Federal Ministry of Transport, Building and Urban Development, improvement of safety in the haulage sector is foreseen by stepping up enforcement of social legislation. Several measures are undertaken to increase the level of compliance, among others, detailed analysis of the enforcement data and identification of target groups. In cooperation with the stakeholders, proposals are to be developed on training, improving the enforcement strategy and, if appropriate, on carrying out special checks.

3.1.4 Co-operation across Europe

'According to Directive 2006/22/EC, Member States must, at least six times per year, undertake concerted checks in cooperation with at least one Member State. According to the information available, most Member States participate regularly in concerted checks and other bilateral or multilateral initiatives. However, the threshold set by the Directive is not always reached.'[85]

a) Risk rating system

Article 9 of Directive 2006/22/EC requires Member States to introduce a risk rating system for undertakings based on the number and severity of infringements committed. The aim is to increase checks on undertakings with a poor record concerning the compliance with driving times. In addition, the Commission has undertaken to analyse the risk rating systems introduced by the Member States, in accordance with Article 9 of Directive 2006/22/EC.'[86] This approach obliges MSs to exchange data and opens the door for a European Risk Rating System through which poorly performing companies could be identified and targeted at the EU level. This requires good relationships and cooperation between enforcement organisations across borders.

b) Good Practice

Euro Contrôle Route (ECR) is a group of European Transport Inspection Services working together to improve road safety, fair competition and labour conditions in road transport through activities related to compliance with existing regulations. ECR's activities focus on providing coordinated cross border checks, education and training, multi and bilateral inspector exchange programmes, harmonising and consolidating points of view and influencing decision making processes. Euro Contrôle Route currently has 14 members covering 20 countries. Euro Contrôle Route, with the help of its 'complaint desk' tool, is drawing up an inventory of the main enforcement problems, to gain insight and understanding in this area, and passing this information on to the various countries.[87] CORTE also run help desks (see Section 3.4) and has issued a range of explanatory notes and guidelines on the social legislation and the use of tachographs. TISPOL, the European Traffic Police Network runs regular joint truck enforcement campaigns[88].

Member States

Many Member States have already well developed lines of communication across borders between enforcement authorities which can be further built upon.

84 http://www.bmvbs.de/DE/VerkehrUndMobilitaet/Verkehrspolitik/GueterverkehrUndLogistik/Aktionsplan/aktionsplan_node.html.
85 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2011:0391:FIN:EN:PDF pg 8
86 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:021:0087:0099:EN:PDF
87 http://www.euro-controle-route.eu/site/
88 https://www.tispol.org/

The Irish and Northern Irish Authorities have established an 'All Island Freight Forum' (AIFF). The core purpose is to provide a mechanism for consultation on road freight transport issues involving the development of ideas for the movement of goods in a competitive and sustainable manner. The work is, being taken forward by working groups focused on competitiveness and sustainability, safe, compliant and eco-efficient road freight transport, rail freight and other alternatives, international connectivity, and data and network management. The Forum is committed to taking action to improve compliance across the north and south of the island of Ireland and to establish a level playing field in the internal market. It is recognised that having a joined-up approach to vehicle operator compliance between neighbouring areas is vital in achieving meaningful improvements on the roads. One of the initial ideas to emerge from this is developing a compliance strategy spanning the entire island and this will be taken forward by the relevant agencies.

c) Cooperation between European Enforcers and the road transport Industry

National enforcement authorities and their European Associations have been cooperating with the IRU (International Road Transport Union) and its Members for several years, through dialogue, exchange of information, joint events and projects aimed at making enforcement more efficient and improving regulatory compliance. In 2010, the IRU and enforcement authorities sought to expand and formalise this cooperation through negotiations that led to the signing, in March 2011, of a Declaration of Intent with two European enforcement organisations, Euro Contrôle Route (ECR) and TISPOL. This document is accompanied by a work programme of concrete measures and joint initiatives aiming to:

- Establish a common EU enforcement environment to complement the common regulatory framework for road transport in the EU which should improve the functioning of the regulatory framework, reduce costs and improve fair competition and road safety;
- Improve standards of regulatory compliance, enhance road safety, develop new contemporary enforcement techniques, and

a better working environment for operators, drivers and enforcement officers;
- Encourage the creation of a progressive and cooperative enforcement culture across Europe that improves control efficiency and industry's regulatory compliance through alternative ways of enforcement and preventive measures.

Recommendations to the EU

- 'Create an effective and appropriate coordination instrument at the European level'[89] to achieve a harmonised approach to checks.
- Establish an EU wide type approval system for digital tachographs interrogation software and analysis tools used by enforcement authorities across the EU in order to ensure consistent and reliable interpretation of the tachographs and driving time rules.
- Improve the collection of statistical information so as to enable more meaningful analysis of the effectiveness of enforcement and promote a harmonised approach by the Member States to enforcement issues.[90]
- Ensure that the Member States respect the amount of checks to be organised as referred to in Article 2 (3) of Directive 2006/22/EC.
- Support the implementation of the European Risk Rating System and deal with any existing barriers to data sharing.
- Encourage Member States to allocate adequate resources to enforcement of these rules.

Recommendations to Member States

- Ensure that comprehensive information flows exist between national enforcement. authorities and also between the latter and domestic and foreign road transport operators. This should include information on national rule changes, as well as new enforcement practices and requirements. Member State information points providing such information should be obligatory and interconnected until such a time as there is full harmonisation of control techniques and requirements in the EU.
- Provide adequate resources to facilitate enforcement.
- Develop targeted enforcement programmes focusing resources on the most serious / repeat offenders.

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89   http://www.europarl.europa.eu/sides/getDoc.do?type=REPORT&reference=A7-2010-0130&language=EN
90   Ibid

- Consider the development and application of 'smart' enforcement methods, including gap analysis and self assessment, working in partnership with industry.
- Determine together how to use the gathered information more efficiently; Conduct more frequent and accurate checks at transport firms' offices (e.g. to define highly targeted checks).

3.2 Non-Compliance and Fraud

When the regulations on working hours and tachographs are ignored or circumvented, the lives of drivers, passengers and other road users may be put at risk[91]. Non-compliance also gives undue competitive advantage to those breaking the law, with negative impacts on the functioning of the internal market.[92] Euro Controle Route defines tachograph fraud as: 'the deliberate and deceptive action to interfere with the authentic recording process of the tachograph to facilitate the production of falsified records, including:

- the preliminary acts and attempts with the same intention and
- the possession of objects or instruments specifically meant, intended or used for that purpose.[93]'

Different types of fraud occur ranging from 'occasional' fraud, undertaken perhaps anything from once a month to once a year with actions that may not have an implication for road safety to 'structural' fraud, when an entire company is fraudulent and malpractice and manipulation are part of everyday working. This may also spread to the consigner or contractor giving instructions which clearly do not respect the social rules legislation. Common types cover, for example, counting loading and unloading times as breaks, removing the driver card while driving, using the driver card belonging to the mechanic or using the driver card of an injured or sick colleague. The International Union of Professional Drivers is currently undertaking a study trying to uncover the causes behind fraud[94]. Stakeholders point at the lack of drivers and client pressure to deliver in

a tighter timeframe and cut costs to a minimum. More sophisticated ways to interrupt the signals sent to the digital tachograph have also been created, including the use of magnets located near the gear box. This interferes with the recording equipment and can show the vehicle at rest when actually in motion. Furthermore, the use of a magnet will interfere with the anti-lock braking system and will bypass the speed limiter - thereby allowing the vehicle to attain any speed. This also means none of the controls on the dashboard will be operational[95]. In the UK, VOSA[96] and the police have stepped up their enforcement activities and drivers found to be using a magnet, or any other method, to falsify their drivers' hours records are now facing prohibition and fixed penalty notices and/or arrest.

3.2.1 EU legislation to Counter Tachograph Fraud

The European Commission has launched a new proposal[97] to revise the tachograph legislation to make fraud more difficult. During the consultation phase leading to the legislative proposal, representatives of both employers and employees jointly stated that: 'The tachograph should be made effectively resistant to fraudulent manipulation so that the device provides the reliable and trustworthy data on driver activities that is crucial for its functions[98]'. A number of measures are proposed. One is making use of satellite positioning to replace manual recording by automatation and to monitor freight in the logistics chain. Another measure included to reduce fraud is a higher standard demanded of the workshops which install and calibrate the tachograph. The European Commission's impact assessment showed that seals to tachographs are still far too easy to manipulate. Seals are meant to detect by visual inspection any tampering with the mechanical interface between different parts of the tachograph. The Commission will give a mandate to the European Committee for Standardization (CEN) for developing European standards for seals to be used on tachograph systems. Moreover, the driver card will be merged with the Driving Licence to prevent driver cards being handed easily to other drivers. This new package follows on from

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91 EU OSHA (2011) A Review of Accidents and Injuries to Road Transport Users. http://osha.europa.eu/en/publications/literature_reviews/Road-transport-accidents.pdf
92 http://ec.europa.eu/employment_social/dsw/public/actRetrieveText.do?id=8903
93 Euro Controle Route Fraud http://www.euro-controle-route.eu/site/en/info/tacograph/fraud/
94 UICR Driver Questionnaire on Tachograph Manipulation.
95 http://www.cheshire.police.uk/advice--information/roads-policing/commercial-vehicles.aspx
96 http://www.dft.gov.uk/vosa/newsandevents/pressreleases/2008pressreleases/16-12-08vosavoicesconcernovertachographscam.htm
97 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0451:FIN:EN:PDF
98 http://ec.europa.eu/employment_social/dsw/public/actRetrieveText.do?id=8903

measures[99] adopted in January 2009 which aimed specifically at detecting and preventing abuses of the system. In particular they required Member States to develop dedicated equipment and software that can be used to analyse the data from the digital tachograph. A Commission Recommendation[100] sets out best practice guidelines for national control authorities when carrying out checks of vehicles and the recording equipment, whether at roadside, at company premises, or at workshops. Manipulating the tachograph is considered a very serious infringement in EU legislation, with sanctions going up to the loss of the Community licence and the right to operate a road transport undertaking under Regulation (EC) No 1071/2009.

a) ECR/TISPOL

The ECR/TISPOL Tachoweb Working Group (TWG) undertakes a number of different activities to support fighting fraud. It has created a manual which is aimed specifically at enforcers and includes up-to-date information on digital tachograph fraud and reports on new cases. The working group has also organised master classes on tachograph fraud involving control officers and enforcement managers from different EU countries with the objective of sharing and augmenting the knowledge on fraud and tachograph manipulation. The workshops allowed officers to discuss different experiences and enforcement techniques. They also involve practical work looking at best practice in roadside checks and an overview of manipulations including indications and clues for investigation and different vehicle devices.

b) The Netherlands

Due to the increased concern about the magnitude of (digital) tachograph fraud, also based on the experiences gained during the TWG tachograph fraud master classes, the decision was made in the Netherlands that all enforcement staff, inspectorate as well as police, should undergo dedicated training on tachograph fraud. The training takes several days and is composed of both theoretical and practical education completed by a test.

Recommendations to Member States

- EU MSs should equip their enforcement officers with knowledge and equipment to be able to spot fraud and prevent it from occurring.
- Establish "hotlines" so that drivers and operators can report suspected fraudulent, illegal and non-compliant behaviour.
- Risk systems to include not only tachographs and driver's hours non-compliance but also other risk areas which present a risk to other road users such as overweight vehicles and defective vehicles.
- Establish effective data sharing arrangements between agencies within Member States.
- EU MSs should actively participate in the TWG communication network by appointing a contact person whose task it is to communicate the fraud details (figures and findings) to the TWG network.
- EU MSs should provide dedicated training to the involved enforcement staff.
- EU MSs should implement and execute severe, dissuasive and deterrent sanctions for tachograph fraud infringements (See also the Annex IV infringements Regulation 1071/2009/EC).

Recommendations to Employers

- Report suspected fraudulent or non-compliant behaviour to the relevant agency.
- Promote a safety culture and demonstrate commitment to same.
- Promote education/train drivers on work, drive and rest time regulations and on the proper use of the tachographs thus minimising inadvertent breaches of the rules.
- Promote best practices and raise awareness about the importance of tackling fraud.
- Keep drivers cards at work so no other HGV driving is done in the spare time.
- Give bonuses for compliance.
- Work with enforcement officers and member associations to identify and eliminate the causes of tachograph fraud.

3.3 Training of Control Officers

In terms of procedures and application of the legislation there is room for interpretation which means that the decisions of control officers vary not only across Member States but also within individual countries. Different interpretations by control officers in turn make it difficult for drivers and companies to understand what is expected from them or how to ensure compliance. As mentioned previously, the lack of consistent enforcement can add to stress for the driver thereby jeopardising road safety.

Training relating to road checks should also cover identifying appropriate sites for checking including a consideration of elements such as road infrastructure and congestion, so that it can be carried out in a manner that will not endanger the safety of other road users. Consideration should also be given to drivers' access to facilities when being stopped at a roadside checks especially in cases where the control officer requires them to take a rest period.

The recent proposal from the European Commission on revising the tachograph legislation underlines the need for more efforts in the area of training of control officers specifically setting out the following requirements:

- 'Member States shall ensure that control officers are appropriately trained for the analysis of the data recorded and the control of the recording equipment.
- Member States shall inform the Commission about the training requirements for their control officers by [6 months after the date of application of this Regulation].
- The Commission shall adopt decisions on the methodology for the initial and continuing training of control officers, including on techniques to target controls and to detect manipulation devices and fraud.'[101]

a) UK

VOSA trains enforcement officers using a mixture of formal training and on the job mentoring. Formal training is classroom based with an agreed training syllabus that covers all aspects of their job description. This consists of 11 weeks with different modules to cover EC and domestic regulations plus VOSA policy and guidance. This is followed by prescribed and measured local training and mentoring. It is not expected that VOSA examiners will be deemed fully effective for at least one year and normal performance management is tailored to suit this expectation. VOSA examiners are also supported throughout their career with regular update training which is delivered in a variety of ways – cascade, e-learning and if required formal classroom.

b) Italy

The "Comitato Centrale per l'Albo degli Autotrasportatori" (governing body of Italy's National Road Haulers' Register[102]) composed by representatives of national professional organizations and public authorities, in collaboration with the Ministry of Transport and the Ministry of Internal Affairs, has organised and financed special training courses for control officers. The courses focus in particular on EU and ITF/CEMT legislation, Italian law and procedures. Professional organisations (Confartigianato Trasporti and CNA FITA) are involved in the development of the courses which include theoretical and practical sessions. The courses are organised based on three educational levels ranging from general knowledge to specific knowledge and professional knowledge for the sector that verifies tachograph devices.[103]

3.3.1 ECR

The ECR Training working group focuses primarily on the training of inspectors by organising multilateral and bilateral exchanges each year. The main objectives of this initiative are to increase knowledge about inspection procedures and national and international regulations, but attention is also devoted to teambuilding and language training. In 2010 multilateral exchanges were organised in France, the United Kingdom and Hungary with an overarching theme of the methodology of the roadside check.

The ECR Harmonie working group deals with the coordinated international road checks and also works constantly on data exchange concerning infringements, risk companies and fraud. In addition, the working group's attention is focused on streamlining inspection procedures, the transposition of European regulations, sanctions and techniques. The results of this work ease the tasks of the inspectors and make European roads much safer.

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101   http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0451:FIN:EN:PDF
102   www.alboautotrasporto.it
103   http://www.alboautotrasporto.it/index.php?option=com_content&view=article&id=87&Itemid=82

The TWG group (Tacho Web Group) is a joint working group of ECR and TISPOL[104]. Its main focus is the gathering and updating of information on digital fraud. Over the years the scope of the working group has widened to include the following joint ECR-TISPOL ambitions including formulating recommendations on the best way to enforce the regulations and providing legislative support and instruction to enforcement bodies. ECR produced a Multilingual lexicon (in 12 languages) providing practical step-by-step guidance for control officers carrying out roadside checks.[105]

3.3.2 TRACE[106]

Directive 2006/22/EC requires that 'roadside checks are executed efficiently and quickly, with a view to completing the check in the shortest time possible and with the least delay for the driver.' They are conducted to monitor compliance with 561/2006 and 3821/85.

The European Commission is co-funding TRACE (Transport Regulators Align Control Enforcement), a project to develop a harmonised training format for enforcers on the Drivers' Hours Rules Regulation (Regulation (EC) No. 561/2006) and to consequently support a common interpretation of the Regulation.

The project aims to:

1. Create training modules and a generally applicable curriculum for control officers of European road transport legislation; the modules and the curriculum should be designed to be easily adaptable to the national organisational and legal situation in all Member States in order to improve and harmonise training of control officers;

2. Produce modules designed for the initial and continuous training of control officers throughout the EU;

3. Train the relevant people in each Member State to disseminate the training modules.

Standard training modules are to be delivered to enforcement officers across the European Union. TRACE can offer a valuable contribution to clarifying enforcement issues and should continue to be built upon both at the EU and national levels.

Recommendations to EU

- Support the dissemination and adaption of TRACE outputs at the MS level.
- Support further research into the training of control officers in a harmonised manner.
- 'Draw up recommendations and European minimum standards for the training of inspection bodies and for coordinating cooperation between the inspection bodies'[107].
- 'Improve the collection of statistical information so as to enable more meaningful analysis of the effectiveness of enforcement'[108].

Recommendations to Member States

- Support the dissemination and use of the outputs of the TRACE project.
- Develop specific training modules (where possible based on TRACE outputs) as standard for control officers in their own countries as part of continuous training.
- Ensure a harmonised approach to training within enforcement authorities in their countries.
- Exchange experiences and best practices with other Member States.
- Establish guidelines on the priorities for roadside checks with a focus on road safety.
- Train enforcement staff in the latest developments in data collection and, in implementing common standards, work closely with the European Commission in order to promote a harmonised approach to checks, thus creating legal certainty[109].

3.4 Levels of Fines

Article 19 of (EC) 561/2006 states that 'Member States shall lay down rules on penalties applicable to infringements of this Regulation and Regulation (EEC) No 3821/85 and shall take all measures necessary to ensure that they are implemented. Those penalties shall be effective, proportionate, dissuasive and non-discriminatory. No infringement of this Regulation and Regulation

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104   https://www.tispol.org/
105   http://www.euro-controle-route.eu/site/en/info/recommendations/
106   http://www.traceproject.eu/
107   http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A7-2010-0130+0+DOC+PDF+V0//EN
108   Ibid
109   http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A7-2010-0130+0+DOC+PDF+V0//EN

(EEC) No 3821/85 shall be subjected to more than one penalty or procedure.'[110] Directive 2006/22/EC originally contained an Annex III with a non-exhaustive list of what is to be regarded as an infringement. This Annex III has been replaced upon the adoption of Commission Directive 2009/5/EC and the new Annex III contains guidelines on the categorisation of infringements against the two Regulations.

A report was produced by the Commission in 2009 which analysed the penalties for serious infringements against the social rules in road transport provided for in the legislation of the Member States.[111] The report concluded that 'The rules on penalties applicable to serious infringements of the social legislation vary appreciably between Member States as regards the types of penalties, the level of fines and the categorisation of infringements'. 'For drivers and undertakings engaged in international transport, it is therefore very difficult to receive a clear message concerning the gravity of possible infringements when they do not comply with certain provisions of Regulation (EC) No 561/2006 and Regulation (EEC) No 3821/85, as the penalties they risk in the different Member States give contradictory feedback.'[112]

Manipulation of a driver's tachograph, for example, is penalised with a fine of up to 586 euro in Lithuania but 2,460 euro in Poland. In other countries, the fine can be even higher for such an infringement – 4,601 euro in Spain; up to 6,232 euro in Italy; and up to 30,000euro in France, with the additional possibility of a one-year jail sentence. In the UK, deliberate falsification of tachograph records can result in a £5,000 fine, and a jail sentence under the more general conviction of fraud.[113]

The new proposal from the European Commission on revising the tachograph legislation includes the intention to ensure a minimum degree of harmonisation of sanctions in relation to the tachograph rules. Proposed Article 37 of the future tachograph regulation on minimum harmonisation ensures that infringements against the tachograph rules which are classified in EU legislation as 'very serious infringements'

and as 'most serious infringements' will attract the highest category of penalties in national legislation.[114]

The disparity in terms of type and level of penalties, both financial and other, has arisen as a result of socio-economic factors, differing legal systems and differing policy approaches to road safety. As such, there are large disparities across Europe in the type and level of penalties or sanctions and general acceptance of the need to move towards a more level playing field. However, this can result in a situation where the overarching aims of improved road safety may not be upheld by the system and levels of sanctioning. Anecdotal evidence suggests that if fines are too low then companies simply provide for their cost within their budgets and operators are prepared to make infringements and pay fines in order make gains in terms of time savings. The result can be an increase in the number of fatigued drivers on the roads. 'A basic principle of enforcement is that the risk of punitive consequences for violation of regulations should weigh more heavily than the gain accrued through the violation. Both the risk of detection and the size of the penalty are important.'[115]

The White Paper for Transport (2011)[116] underlines a commitment of behalf of the European Commission to move towards further incorporating a social dimension in road transport. The aim should be to construct the system in a manner that means sanctions are not required and to ensure that, when sanctioning is required, penalties are proportionate to the infringement in terms of its road safety impact. The sanctions which are applied should also be decided upon based on the nature of the infringement and should rectify the infringement that has occurred for example by ensuring that a driver takes appropriate rest. Further harmonisation across the EU in terms of categorising severity of infringements and setting appropriate sanctions would be useful also in terms of reducing stress for drivers. Finally, alongside the use of fines one could also consider the positive impact of the ERRU (international register of companies and sanctions) as a means to incentivise compliance.

110 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:102:0001:0013:EN:PDF
111 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0225:FIN:EN:PDF
112 Ibid
113 Ibid
114 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0451:FIN:EN:PDF
115 http://www.etsc.eu/oldsite/drivfatigue.pdf pg26.
116 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0144:FIN:EN:PDF

3.4.1 Complaints Desk

ECR administrates a 'Complaint Desk' online to get a better understanding of the enforcement of the European regulations on driving and rest times. This facilitates complaints of drivers and transport companies due to actions of enforcement bodies throughout Europe while enforcing the rules of the driving and rest time regulations including reposting on what the industry and drivers feel are disproportionate fines.[117][118] CORTE's 'Monitoring the Implementation of the Digital Tachograph Platform' also runs a Help Desk for its members[119]. A second help desk run by CORTE responds to questions from its members on driving hours[120]. More than 50,000 questions on legislative and enforcement issues have been answered since 2005 through CORTE's help desks.

Recommendations to EU

- Work with Member States to lay down minimum and maximum penalties for each breach of the rules on working time.
- Monitor Member State adherence to the principles on which sanctions should be set (i.e. effective, dissuasive and proportionate) and intervene if necessary to defend these principles.
- Provide more specific guidance on how to link fines to infringements.

Recommendations to Member States

- 'Adopt national legislation that has an effective, proportionate and dissuasive effect and that takes due account of how serious an infringement is'.[121]
- Achieve further approximation of the types of penalties and of the levels of fines, a categorisation of fines linked to a categorisation of penalties, and minimum and maximum penalties for each infringement against the social rules in road transport. In streamlining penalties make sure that fines are proportionate in the different Member States in accordance with objective criteria (such as GNP or geographical factors) and are balanced

by an effective deterrent against serious infringements.[122]
- Find 'legislative and practical ways' to reduce the differences in the types and levels of penalties applied.
- Enact the ability to immobilise vehicles for the most serious road safety risk causing infringements.

3.5 Training and Information to Drivers

Improving drivers' understanding of the dangers of driving while fatigued is extremely important and can be achieved through appropriately targeted educational initiatives and information. Changing drivers' attitude and behaviour is the key to reducing their likelihood to drive while fatigued. To maximise the effectiveness of road safety campaigns promoting safe driving behaviour, it is recommended that campaigns and initiatives should adopt a multidimensional approach, using a range of methods...It is suggested that more emphasis be given to primary prevention efforts, such as improving understanding of drivers about the importance of getting sufficient sleep prior to driving, the proactive use of naps to reduce hours of wakefulness prior to commencing a drive, and avoiding circadian performance troughs when planning journeys.'[123]

A survey conducted in Germany concerning the training needs of HGV drivers[124] revealed that the EU Social Rules take 7th place in a ranking of 13 training topics considered as important. The topics viewed as most important were first aid measures and general traffic rules, while those considered least important were customs regulations and (foreign) languages. However, 64% of the drivers stated that they would like to have EU Social Rules included in qualification and further training measures.

There is a responsibility on the relevant authorities in each Member State and on employers and trade unions to provide effective means of communicating the requirements under the social rules and general mechanisms for improving health and well being and this may require specific

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117   http://www.euro-controle-route.eu/site/forms/inventory_fines_en.php
118   As part of their cooperation with ECR and TISPOL, the IRU has agreed to co-host this complaints desk on their website in order to help the gathering of data that shall contribute to the analysis of fines and their effect.
119   http://www.eu-digitaltachograph.org/HelpDeskHome.asp
120   http://www.corte.be/HelpDeskHome.asp
121   http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A7-2010-0130+0+DOC+PDF+V0//EN
122   Ibid
123   http://www.pacts.org.uk/docs/pdf-bank/rswp21report.pdf
124   Fühauf; Roth und Schygulla: Aus-und Weiterbildung von LKW-und Busfahrern zur Verbesserung der Verkehrssicherheit. Berichte der BAST, Heft M 197, 2008. http://www.bast.de/nn_171170/DE/Publikationen/Berichte/unterreihe-m/2009-2008/m197.html

inter-agency liaison involving health promotion measures.

3.5.1 Legislation

EU professional drivers are now required to have followed professional training as set out under Directive 2003/59 on the initial qualification and periodic training of drivers of certain road vehicles for the carriage of goods or passengers. Further information on this can be found in PRAISE Thematic Report 3 'Fit for Road Safety.'[125] The Annex of the Directive goes into more detail on the topics to be included on the curriculum. This includes training on the 'principles of healthy, balanced eating, effects of alcohol, drugs or any other substance likely to affect behaviour, symptoms, causes, effects of fatigue and stress, fundamental role of the basic work/rest cycle.'[126] Member States will issue the driver with a certificate of professional competence, referred to as 'CPC', certifying their initial qualification or periodic training. These skills and knowledge will be kept up to date through periodic training. The requirement for CPC provides a useful means to ensure that drivers receive training on EU Drivers' Hours Rules and responsibilities relating to the operation of tachographs. The annex states that 'drivers must reach the level of knowledge and practical competence necessary to drive in all safety vehicles of the relevant license category' and then lists the subjects that should be included in training. It is unambiguous about the importance of such subjects. Member States should therefore ensure an adequate level of consideration of these issues, and fatigue management in general, in their driver training curricula.

Regulation (EC) No 1071/2009[127] of the European Parliament and of the Council established common rules concerning the conditions to be complied in pursuing the occupation of road transport operators. According to the Regulation, operators must fulfil four criteria to access the profession, namely good repute, financial standing, professional competence and effective and stable establishment in a Member State. A transport manager who is responsible for ensuring that the road transport legislation is respected must be designated by each road transport operator.

Many National Authorities and other industry related organisations have already taken the initiative in developing tailored training programmes that include social rules training.

3.5.2 Good Practice - National

a) Germany

The Federal Office for Goods Transport (BAG) has published a comprehensive leaflet in German, English, French, Polish, Russian, Romanian, Hungarian and Czech language informing truck drivers about inspections, their procedures and the content. This enables a better communication between the enforcement officers and the drivers.[128] In German, guidelines on the social rules in transport have been developed[129] alongside guidelines on digital tachographs[130] and can easily be downloaded. Furthermore, in the context of the programmes De-Minimis[131] and further qualification[132] financial support is given to those companies which would like to invest in better technologies and in training their employees to be better drivers.

"Keep awake behind the steering wheel" – Wach am Steuer

The German Social Accident Insurance Institution for the transport industry offers specific training to raise the awareness about fatigue in road transport to their member companies. This training scheme was tailor-made for truck drivers and was tested and evaluated by Ford Gmbh in Cologne. The drivers learn to develop strategies against fatigue, e.g. to recognise first indicators of fatigue. The two training units are 90 minutes long and are complemented by an individual conversation with the trainer before the training units and after them. The conversations can be undertaken in a flexible way, so that the whole training can be easily adapted to the daily workload of the drivers.

b) Ireland

The Road Safety Authority of Ireland has produced a suite of information and guidance material aimed at both drivers and operators to assist in understanding the rules and

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125   ETSC, (2010) PRAISE Report, Fit for Road Safety' http://www.etsc.eu/PRAISE-publications.php
126   Ibid
127   http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:300:0051:0071:EN:PDF
128   http://www.bag.bund.de/cln_008/SharedDocs/Downloads/DE/Broschueren/Strassenkontrollen_en.html?nn=13156
129   http://www.bag.bund.de/cln_008/SharedDocs/Downloads/DE/Merkblaetter/Leitfaden_Rechtsvorschriften.html?nn=12502
130   http://www.bag.bund.de/cln_008/SharedDocs/Downloads/DE/Merkblaetter/Leitfaden_Kontrollkarte.html?nn=12502
131   http://www.bag.bund.de/cln_008/DE/Navigation/Foerderprogramme/Deminimis/Deminimis_2011/demin11_node.html
132   http://www.bag.bund.de/cln_008/DE/Navigation/Foerderprogramme/AW/AW_2011/aw11_node.html

responsibilities in the area of tachographs and driving hours and underlining their importance in terms of combating fatigue and improving road safety. The leaflets present the Directives in a clear and simple manner and are used in professional driver CPD training as well as for general distribution.[133]

- Guide to Digital Tachographs
- Guide to EU Rules on Drivers Hours
- Guide to Road Transport Working Time Directive

The RSA have also produced a pocket-size card summarising the key facts and driver responsibilities that is handed out to drivers at roadside checks. The information leaflets have been made available in a number of languages reflecting the makeup of drivers in the Irish freight sector.
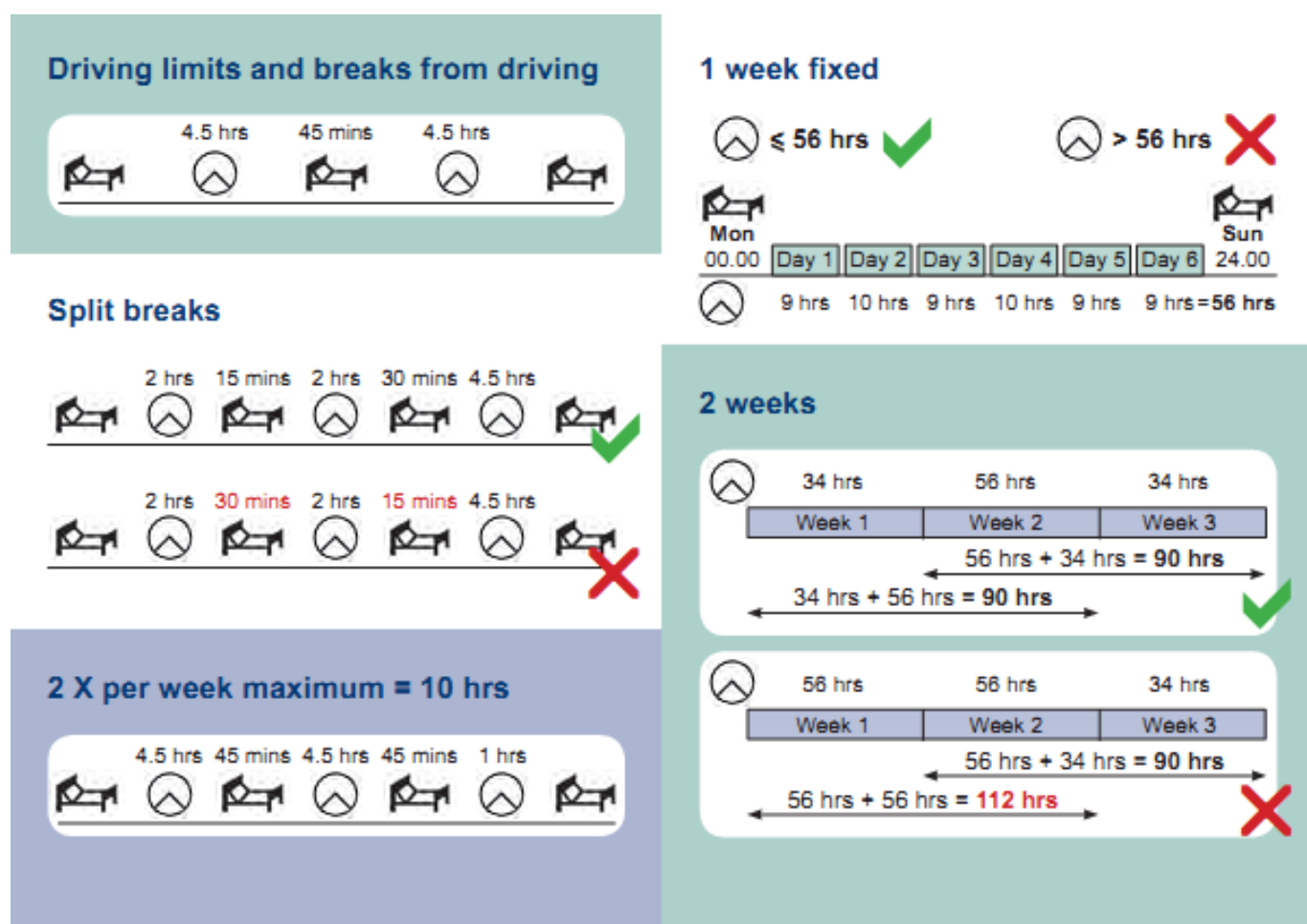
The RSA training modules for driver CPC includes information on diet, exercise, stress and maintaining general well being as well as work/rest cycles, drugs and misuse of drugs. The key message is that in order for a driver to remain safe on the road and be a safe road-sharer, they must take care of all aspects of their general health – this includes maintaining a healthy diet, taking regular exercise and maintaining a healthy sleep and rest pattern. They need also be aware of their stress levels and any effects of drug and alcohol.

c) UK

VOSA provides a range of licensing, testing and enforcement services with the aim of improving the roadworthiness standards of vehicles ensuring the compliance of operators and drivers with road traffic legislation, and supporting the independent Traffic Commissioners.

As part of their work they have produced a suite of publications dedicated to giving useful information to operators, drivers and other staff involved in the use of goods and passenger-carrying vehicles. This includes a pocket size leaflet for drivers entitled 'Staying legal – the basics'. The leaflet uses pictorial representation to outline the basic requirements of drivers' hours and rest time rules and performing a daily vehicle check. The use of pictures, as illustrated below, overcomes language barriers faced by foreign drivers.[134]

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133 http://www.rsa.ie/en/RSA/Professional-Drivers/Driving-Safely/Driver-Hours/
134 http://www.dft.gov.uk/vosa/publications/manualsandguides/drivershoursandtachographguides.htm

Research carried out by VOSA demonstrated that '24% of operators have limited knowledge of or feel uncomfortable dealing with driver and vehicle legislation and regulation issues'.[135] To counteract this, they are developing a collaborative approach to enforcement and education and have 'committed to engaging with and educating all industry sectors to enable them to comply, resorting to enforcement action only where necessary'.[136] In order to support the industry through education and information, a series of initiatives have been developed as part of the VOSA business plan that will be driven forward by a specialised Commercial Vehicle Compliance Forum. This includes exploring options for Trade Associations and other organisations to adapt or develop publications aimed at promoting higher compliance standards.[137]

d) Romania

The UNTRR (Uniunea Nationala a Transportatorilor Rutieri din Romania) is involved in a 2-year European Project, co-financed by the European Social Fund, called 'Adaptability for increasing the competitiveness of the Romanian road transport sector'. One of the project's aims is to build and enhance companies' capacity to develop well trained human resources, particularly through specialised professional training, focused on the new technologies. In the framework of this project, UNTRR is providing free training programmes for Romanian road transport employers, managers and professional drivers in a number of fields including driving and rest time rules and tachograph training, road safety and speed management, human resources management for road transport companies and a training of trainers programme. As part of the programmes the trainees learn how to organise their driving and rest times in order to comply with EU regulation and to avoid fines; practical schemes and advice on the organisation of a driving day/week/month, followed by practical exercises using a digital tachograph simulator.

e) The Netherlands

"Steering on Safety" is an initiative of the Dutch Trade Associations in road transport together with the Dutch Ministry of Infrastructure and Environment; its overall aim is to improve road safety. It has developed different tools that allow companies to undertake scans including also a "fatigue scan". To raise the level of "safety culture" a company can evaluate their existing levels of fatigue and identify possible solutions. The site also has a tool which includes benchmarks of measures to improve road safety performance in the road transport industry. A last important functionality of the site lies in the possibility to register a transport company in the Network of Road Safety Professionals. Once registered, members need to prove that they continuously work on road safety in their company. Two other sites are organised by the social partners in the Netherlands which advise HGV drivers on how to avoid fatigue: www.gezondtransport.nl and www.fitopderit.nl.

3.5.3 Good Practice - Employer

a) IRU Academy[138]

The IRU Academy is a professional road transport training organisation focusing on road transport training and enhancing the development of professional competence in the road transport sector. The Academy offers a number of training programmes through a network of accredited training providers in a range of languages that works towards a harmonisation of training standards, and incorporates international best practices.

The IRU academy has developed a social rules training package (Tachograph Programme) aimed at ensuring that drivers and managers know how to properly use all features of a tachograph, from card use and data recording to printing and troubleshooting error messages as well as know how to comply with driving and rest time rules. The IRU Academy Tachograph Programme training materials are designed to make the learning interactive and to maximise impact, and including elements such as instructor materials with over 200 slides, a question bank with over 400 Tachograph and Drive and Rest Time Rules questions and an online Tachograph Interactive Training Module. In this way the IRU Academy has made the improvement of road safety a priority via these efforts to improve the quality of training in these important areas. Training must be current and reflect the practical/real world application of the regulations.

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135   VOSA Customer Research 2009
136   http://www.dft.gov.uk/vosa/repository/VOSA%202011-12%20Business%20Plan.pdf
137   http://www.dft.gov.uk/vosa/repository/VOSA%202011-12%20Business%20Plan.pdf
138   http://www.iru.org/en_about_academy

b) Iron Mountain

Iron Mountain is an information management service company based in the UK. The company manages information assets, including business records, electronic files, medical data, e-mails and more for organisations around the world. They have approximately 700 vehicles across Europe and have developed a number of initiatives to improve the road safety performance within the company based on a risk and training needs assessment. Poor tachograph compliance and/or procedure in some areas were identified as areas which could be targeted by appropriate training. As part of their approach the company developed targeted training programmes and a driver handbook. The driver handbook is a working document, i.e. issued every day with updates and bulletins along with guidelines on driving techniques, internal processes, vehicle checks and tachograph use. One of the indicators for monitoring success of the initiatives to improve road safety was tachograph management and infringement ratios. Tachograph Infringements per recording were monitored and showed significant improvements with an 85% reduction between the years 08/09 and 09/10, consistently tracking at 30% less than the industry sector average. Iron Mountain are committed to further reductions (target zero), through increased education and understanding: they download digital driver cards weekly and vehicles monthly to accelerate opportunities to capture anomalies and have introduced KPI's to monitor and gap analysis. This contributes to a decrease in the costs of sanctions / fines for the company and its drivers and an increase in its reputable standing.

Recommendations to the EU

- Develop an 'easily understandable brochure in all official languages of the European Union for undertakings and for lorry drivers; this brochure should give the drivers and undertakings concerned more information about the relevant social rules and the penalties applicable to infringements in the various Member States.'[139]
- Make such a brochure available to undertakings and drivers from third countries.
- Explore and support the use of intelligent transport systems to provide drivers with information in real time.[140]
- Ensure an adequate level of consideration of fatigue management in the training curricula in the context of the CPC Directive.

Recommendations to Member States

- Work with the industry to identify knowledge gap areas requiring clarification.
- Target professional drivers with measures to combat fatigue. This can be achieved through information, education and training about the dangers of driving when tired. Efforts should be made to target transport subgroups such as small firms and self-employed workers.
- Ensure training on combating fatigue, complying with driving/resting/working hours and use of tachographs is included as part of driver CPC.
- Promote and support training courses, providing accredited trainers and raising awareness of the importance of complying with EU social provision (legislation, resources, finance).
- Develop information and awareness material for drivers (pictorial or/and multilingual where possible) highlighting specific national interpretations or related legislation.
- Give information for driving at ports (or during crossings) to aid driver awareness and driver experience on a systematic basis. This information could include the permitted speed limits for HGV guidelines and suggestions on driving hours and taking regular breaks.[141]
- Develop educational programmes and training for the general public should be developed to ensure that all road users are aware of how to share the road safely with commercial vehicles.

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139 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2011:161E:0058:0061:EN:PDF
140 Ibid.
141 Mainland European Truck Accidents in the UK-Key Issues for Drivers (2009) Danton, R, Kirk, A and Hill, J.
142 Partly adapted from Will Murray, Interactive Driving Systems, Fleet Safety Gap Analysis; ROSPA Fatigue Facts; ROSPA 2002.
143 http://www.etsc.eu/documents/PRAISE%20Report%203.pdf

Recommendations to Employers[142]

- Include written guidelines on eliminating driver fatigue in the health and safety management policy and driver handbook.
- Ensure drivers are made aware of the dangers of fatigue and are advised on strategies to manage it. This should include line managers to ensure drivers are made aware of the need to get an adequate amount of good quality sleep before starting to drive. Employees should be reminded of the dangers of common practices such as 'moonlighting' (having a second job in the evenings), spending too long engaged in evening hobbies, etc. Most important, employers must stress that when feeling sleepy drivers must stop in a safe place as soon as practicable.[143]

3.6 Journey Planning

Transport operators must ensure that their drivers are able to comply with the regulations. They must ensure that the transport time schedules are in line with the regulation and may not award bonuses related to distance travelled as this endangers road safety. High quality journey planning and the use of ITS can contribute to ensuring that the obligations under the working time regulations are met. Directive 2010/40/EU[144] on Intelligent Transport Systems and the ITS Action Plan request the Commission to define specifications for the provision of information and reservation services for safe and secure parking places for trucks and commercial vehicles. This information is also important for planning routes and resting periods and managing fatigue. This is covered in more detail under the infrastructure management and parking section of this report.

In the Freight Transport Logistics Plan[145], the European Commission has also identified that ITS tools could 'constitute a core enabler for the management of logistic chains, notably in maintaining a paperless information trail in the management of the physical flow of goods (eFreight)[146]'.The concept of 'intelligent cargo' is developed further under the ITS Action Plan meaning that goods become 'self-, context- and location-aware as well as connected to a

wide range of information Services'[147]. Under the ITS Directive, one of the priority areas is the intention to define the necessary measures in ITS applications. Notably, this includes the tracking and tracing of freight along its journey and across modes of transport for freight transport logistics (eFreight). This would be based on the availability of the ITS technologies and use by their application developers and the integration of positioning results in the traffic management tools and centres[148].

3.6.1 Rostering

With regard to rostering of drivers, employers need to comply with the working and driving times scheduled for individuals over periods of weeks and months, not just days, in order to allow them to avail of adequate rest in both the short and long term. Some of the principles of good roster management include providing notice and predictability in roster patterns, preserving regularity in the 24 hour cycle and ensuring weekly rest to prevent the accumulation of fatigue. Managers should also provide a mechanism, including consultation, for the continuous improvement of the roster system to fulfil and reconcile technical, operational and individual needs[149].

3.6.2 Route Planning

Action Area 1 of the ITS Action Plan includes multimodal door-to-door journey planners that would also be of relevance to HGVs. Technologies to help with journey planning can also direct drivers along the most efficient routes. They can be linked to technologies used out of the vehicle to do with scheduling of shifts and linked to managing fatigue. Some satellite navigation applications (satnavs) and journey planners already take into account school times to direct drivers away from schools during peak times'[150].

Other outside influencers also affect driver fatigue. Time pressure, stress, pay structures, consumer/customer demands, a lack of safe and comfortable rest areas[151], loading or delivery queues, inadequate driver numbers, and poor roster planning and management have also been identified as potential sources of commercial driver

144   http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:207:0001:0013:EN:PDF
145   http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0607:FIN:EN:PDF
146   http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0886:FIN:EN:PDF
147   ibid
148   ibid
149   http://www.etsc.eu/oldsite/drivfatigue.pdf
150   http://www.etsc.eu/documents/PRAISE%20Report%201.pdf pg14
151   Sabbagh-Ehrlich et al., 2005

fatigue.[152] In many areas a major proportion of freight movements are associated with deliveries to retail and commercial premises and are short trips. Changes in the delivery patterns currently operated could offer significant benefits in terms of reducing congestion on the roads, increasing productivity for transport operators and reducing stress on drivers and 'just-in-time' deliveries. Options such as night-time deliveries and the development of freight consolidation centres to break down and consolidate large loads using smaller fleets for the final delivery stage should be considered to achieve these goals. However, the ability to dramatically alter delivery patterns is in turn restricted by diverse factors such as restrictions on HGV access, night delivery bans and working time rules which limit employers' ability to deploy both drivers as well as the non-mobile personnel who are required to take possession of those goods at the point of delivery.

3.6.3 Good Practice-National

a) Spain [153]

The Trade Union Federation of communication and transport of CCOO (Federación de Comunicación y Transporte de CCOO) carried out a study on 'The risk of occupational fatigue in road transport – A coordinated prevention initiative'. The project was a study of occupational fatigue as an important risk factor for road collisions by a trade union with government funding and included a number of sector-specific publications one of which focused specifically on drivers and rest. The aim was to analyse driving and rest time issues among truck drivers, in order to support their companies to develop their own time schedule, according to legal provisions. Issues covered included driving and rest time, work breaks, speed registration systems (tachographs) as control systems, and the responsibilities of the transport companies.[154]

3.6.4 Good Practice-Employer

a) Suckling Transport UK[155]

Suckling Transport specialises in fuel distribution in the UK. It operates 65 articulated tanker vehicles, employs 190 people and delivers two billion litres of fuel each year.

The company recognised that Journey Planning needed to go beyond basic route selection and consider other issues including production of a site and route risk assessment. Following talks with the workforce, a major programme was then launched to identify safe parking locations for rest breaks. The Safe Haven programme, as it was called, produced a list of approved parking locations to ensure employees were safe when taking rest breaks. A team of managers began conducting behavioural safety observations to ensure drivers were compliant with policies and procedures. Over 100 such observations were completed in 2010. Journey management checks were conducted to check speeding against local limits and to ensure that drivers were not recording their rest break whilst making the delivery (something that is not identified through normal tachograph analysis). The Company was able to benchmark its drivers' performance on compliance issues against the national average and sector average. This showed that its drivers' recorded just 2 infringements per 100 shifts worked in relation to rules on driving hours, compared to a national average of 40 infringements and a sector average of 35.

b) Arla Foods and The National Research Centre for the Working Environment (NRCWE), Denmark

The vast majority of work collisions sustained by goods transport drivers are related to loading and unloading, i.e. they are non-traffic related. Working conditions in loading areas are frequently poor and responsibility for the safety of drivers in these conditions is unclear. Experienced drivers are familiar with the problems that exist but their knowledge has previously been untapped. Arla Foods sought to increase organisational learning in relation to hazards connected with loading areas. Managers, in collaboration with drivers, have developed a scheme (participatory design) which was subsequently used to gather information about working conditions in over 500 different loading areas. This information has been integrated into the company's IT system so that it is available to drivers when they print out their daily route. The issues covered include agreements with clients. For drivers it was particularly important that the measures took account of the limited time for making deliveries[156].

152   Jackson, P. et al (2011) Fatigue and Road Safety: A Critical Analysis of recent Evidence, DfT http://assets.dft.gov.uk/publications/fatigue-and-road-safety-a-critical-analysis-of-recent-evidence/rswp21report.pdf
153   http://osha.europa.eu/en/publications/reports/managing-risks-drivers_TEWE11002ENN
154   http://www.fsc.ccoo.es/webfsc/menu.do?Actualidad:Salud_laboral:Publicaciones
155   http://www.etsc.eu/documents/PRAISE%20Fact%20Sheet%202.pdf (available in EN and DE)
156   EU OSHA (2011) Managing Risks to Drivers in Road Transport http://osha.europa.eu/en/publications/reports/managing-risks-drivers_TEWE11002ENN

Recommendations to Employers

- In dealing with clients, avoid making any concessions that might adversely affect road safety, such as changes to driving hours and waiting times or agreements to overload vehicles.
- Establish schedules that allow drivers enough time to obey speed limits and avoid peak hours driving. If speed-limiting devices are fitted, check they are not tampered with.
- Monitor and control driving hours within recommended safe limits and legal requirements[157].
- Review scheduling, rostering and load route planning arrangements and proactively address driver stress in the context of a health and safety plan.
- Use best practice in the selection of facilities for drivers when they are away from base.
- Provide advice and training in personal sleep and fatigue management and provide a mechanism, including consultation, for the continuous improvement of the roster system to fulfil and reconcile technical, operational and individual needs'[158].
- Manage working time in order to ameliorate fatigue; this should be an essential part of mandatory qualification standards for transport operators[159].

3.6.5 Infrastructure

Directive 2008/96/EC[160] on road infrastructure safety management recognises that a sufficient number of safe rest areas are important for crime prevention and road safety. This legislation also ensures, through road safety impact assessment and gap analysis, that adequate and safe parking areas are foreseen when new road sections are built. Furthermore, Directive 2010/40/EU[161] on Intelligent Transport Systems and the accompanying ITS Action Plan request the Commission to define specifications for the provision of information and reservation services for safe and secure parking places for trucks and commercial vehicles. Under this Action, a number of specific aims of the Commission are identified, including building a

European network of intelligent, secure truck parking areas.[162]

The issues surrounding the lack of, and inadequacy of, parking and the related impact this has on fatigue of drivers is recognised by drivers and industry alike. The IRU and ETF have produced a joint statement on truck parking calling on action from the EU and Member States. 'The lack of a significant number of parking slots together with the lack of a sufficient number of secure parking areas and accurate information about their location, coupled with the more stringent social regulations being put in place by governments, and in particular by the introduction on the EU territory of the digital tachograph...has led to drivers being forced to stop in insecure areas.'[163]

In order for drivers to be able to gain adequate and compliant rest, appropriate truck parking infrastructure is critical so that drivers are able to leave their trucks in safe and secure locations. Inappropriate truck parking can cause more problems than denying drivers proper rest, it can also cause nuisance in residential areas, contribute to congestion or pose a risk in terms of road safety. Appropriate facilities for truck parking are necessary to ensure the security of the truck and its loads and also to accommodate truck drivers in adhering to required rest and break periods.

Studies from 2002 identified approximately 111,000 existing parking spaces in Europe and a shortfall of approximately 50,000 parking spaces. The scarcity in parking spaces differs between the Member States with some countries having large overcapacities. Large deficit countries are Germany, France, Austria, Sweden and Spain[164]. A general overall shortage may also occur if the rate of building and/or utilisation of existing parking areas will not keep up with the forecasted growth in freight road transport.

In case of inability to find a purpose built parking area, or when a parking area is overcrowded, the driver has to decide whether: (a) to continue driving or (b) to park in undesignated areas. Experience shows, that in case of overcrowded parking areas,

157   http://osha.europa.eu/en/publications/factsheets/18/view
158   http://www.etsc.eu/oldsite/drivfatigue.pdf pg 25
159   http://www.etsc.eu/oldsite/drivfatigue.pdf pg 28
160   http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:319:0059:0067:EN:PDF
161   http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:207:0001:0013:EN:PDF
162   http://www.polisnetwork.eu/uploads/Modules/PublicDocuments/intelligent-transport-systems-in-action_its-action-plan.pdf
163   http://www.iru.org/cms-filesystem-action?file=mix-publications/Pirates_en_low.pdf
164   'Setpos Workshop, Brussels 29.04.2009 Alexia Journé' http://content.moveandpark.com/USB-stick/PPTs/pp-journe.pdf

the drivers' park in potentially dangerous and undesignated areas rather than exceeding their allowed driving times.[165]

Professional drivers' needs for rest and other facilities, to allow them to carry out their jobs in a healthy and safe environment, are met to varying degrees across Europe. A deeper understanding of the needs of drivers, industry and society in terms of provision of truck parking facilities is required.

3.6.5.1 EU Projects

a) LABEL[166] project

Growing awareness of the problems relating to HGV parking has led to several initiatives of the European Parliament and the European Commission being undertaken with the aim of boosting and coordinating efforts at a local and national level to provide truck drivers with information on the location of secure and comfortable rest areas. In addition to increasing numbers and improving the general quality of truck parking areas there is also a need for reliable location, security and service information to be made readily accessible to potential users to help decision making and support the appropriate use of Truck Parking Areas (TPAs). The LABEL project, building on a previous European project called SETPOS,[167] tackled these issues. The result is a set of commonly acknowledged security and service criteria that parking sites should meet in order to correspond with the desired classification level.[168] At the conclusion of the LABEL project, the European Commission handed over the results to the IRU and ITF so that they could be incorporated and implemented via the latter two organisations' TRANSPark initiative.

Service levels according to LABEL	
Service Level 1	Providing the Basics Level 1 Truck parking Areas (TPAs) offer some basic service features: toilets, water taps, waste bins. Walking and driving across the area should be safe
Service Level 2	Also Providing Washing Facilities and a More Convenient Lay-out of the Parking Area In addition to the sevice criteria of Level 1, Level 2 TPA's offer washing facilities and a more convenient lay-out of the parking area. Level 2 is more geared to a truck driver making a longer stop. Moreover, service Level 2 is an intermediate category between level 1 (basic) and level 3 (providing a broader range of services)
Service Level 3	Providing Services for Personal Hygiense and Shop/Fuel Station In addition to the sevice criteria of Level 2, Level 3 TPA's offer more services, of which the most important; showers, a shop and a fuel station.
Service Level 4	Providing Full Service for Driver and Vehicle In addition to the sevice criteria of Level 3, Level 4 TPA's offer more services, of which the most important; a snack bar, laundary, a spare parts shop and leisure facilities
Service Level 5	Providing the High End of Comfort Levels In addition to the sevice criteria of Level 4, Level 5 TPA's offer more services, of which the most important; a restaurant, truck wash, electricity and snow/ice removal equipment. Level 5 is the highest comfort level.

TRANSPark[169]

TRANSPark is a web-based application jointly developed by the IRU and ITF to help drivers/operators to identify and locate safe truck parking best suited for their needs along their routes. TRANSPark enables truck drivers, logistics planners, transport managers and others involved in road transport operations to search, locate, select and contact truck parking areas around a location within a 100-km radius, or along their planned routes. The application contains truck parking sites in approximately 44 countries with around 3,200 truck parking areas currently listed, some 2,100 of which are GEO-identified. All facilities available at the selected parking area are listed (security features, truck repair, vehicle wash, hotel, restaurant, etc.), and can be used as parking search criteria. Full contact details and location maps are also provided. TRANSPark can be accessed free of charge on the IRU and ITF websites and is also available in PDA format for easy use from the truck cabin.
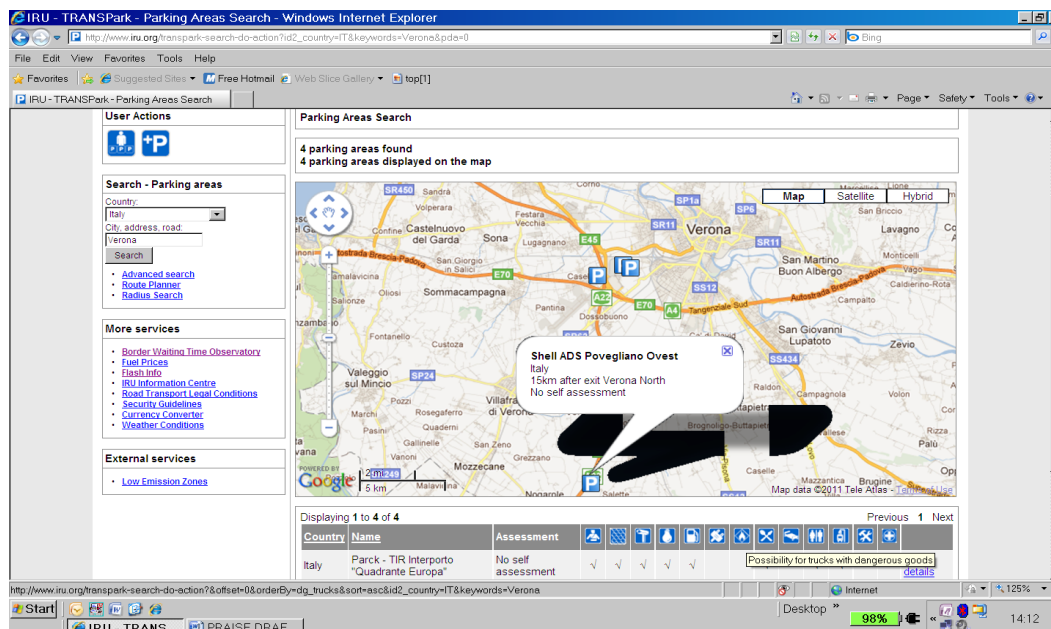
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165   Ibid
166   http://www.truckparkinglabel.eu/
167   http://www.setpos.eu/about_setpos.htm
168   Security and Service at Truck parking Areas Along the TRANS-European Road Network. Handbook for Labelling, EC 2011. http://www.setpos.eu/handbook/SETPOS-project-handbook.pdf
169   http://www.iru.org/transpark-app

At a joint EU Presidency/European conference entitled 'Improving European Truck Parking', held in Brussels on 25-26 October 2010, the IRU and the International Transport Forum were mandated by the European Commission to implement and sustain the LABEL project outputs in the future. This mandate was supported by the European Council in its Resolution of November 2010 on Preventing and combating Road Freight Crime and Providing Secure Truck Parking areas[170].

Recommendations to the EU

- Make safe and secure rest facilities a long term commitment and an ongoing work programme priority, featuring a set of annual objectives as well as providing EU funding such as through the TENs programme or via the European Investment Bank.
- Ensure that a basic level of service for truck parking areas is agreed and provided across the EU.
- Carry out an EU-level comprehensive mapping exercise to identify where the shortfalls in parking facilities exist and contribute to the collection and dissemination of information on the location and characteristics of truck parking areas.
- Carry out actions relating to intelligent truck parking under the ITS Directive.
- Encourage Member States to reinvest money from Eurovignette in road safety including truck parking provision and upgrading.
- Periodically publish, in the most appropriate format, the facilities available across the European Road Network providing information on the services on offer for road sector professionals[171].

3.6.5.2 Member States

The development of appropriate truck parking infrastructure requires a high level understanding of transport and logistics trends and journey patterns. Member States should encourage relevant agencies and the freight industry to work together on this.

Planning authorities and highways agencies should work together with the national government and the industry. Land-use plans should include provision for the safeguarding, and potential upgrading of, existing lorry park facilities and for identifying appropriate sites for further development. The need for new sites for lorry parking and freight transfer facilities should be assessed against current provisions and in consultation with stakeholders regarding location, but with consideration for residential areas and other sensitive environments.

In many Member States there are already positive examples of partnership working between relevant authorities and the freight sector to improve delivery systems such as by agreeing preferred routes, re-examination of delivery time restrictions, etc. Such partnerships can be taken forward effectively through the formation of area Freight Quality Partnerships as in the UK.

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170 http://www.iru.org/cms-filesystem-action/transpark/117580.pdf
171 http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A7-2010-0130+0+DOC+PDF+V0//EN

a) UK

The UK Highways Agency has carried out a survey of lorry drivers to identify behaviour in terms of lorry parking and attitudes towards service provision. The survey showed that 'lorry drivers are generally deterred from safe parking in lorry parks due to their cost...Worryingly, 20% of drivers are happy to park in a lay-by to save money at the risk of their safety. The main reasons for choosing to park in lorry parks...was their security closely followed by the availability of facilities such as showers and toilets. Not surprisingly, cost was the main reason for parking in lay-bys followed by the drivers not having any choice and lay-bys being convenient and not requiring detours from their routes.'[172]

The Department for Transport in the UK, recognising the importance of the truck parking provision and current issues in this regard and in response to demands from industry, has developed a Strategy for Lorry Parking Provision in England[173]. The Strategy has six Strategic Objectives under which action is proposed:

- Build on the current understanding of lorry parking provision and investigate the demand requirements up to 2014–2019 and beyond if necessary.
- Define the position of lorry parking policy at national, regional and local levels where required.
- Support Industry by providing Best Practice Guidance and further information to help stabilise business.
- Create an environment where lorry parking schemes can be brought forward by the private sector as more feasible investment opportunities. To help to make lorry parking businesses more sustainable and competitive.
- Increase awareness of existing lorry parking locations and encourage their appropriate usage. Increase the awareness of areas in need of lorry parking.
- Encourage the development and use of secure lorry parking locations with an added intention of improving working conditions for drivers.

The Department also updated the Truck Stop Guide in conjunction with the Highways Agency to ensure that drivers and operators have the most up to date information on the facilities available to them.

b) France

Research in France estimated a deficit of approximately 2,000 parking spaces on the motorway and of 2,500 parking spaces on the public network. One action taken to try to increase the number of parking areas available is the introduction of clauses in the contractual arrangements with motorway operators which are re-negotiated every five years. Any future contracts will have to take into account the construction of new parking spaces. The first such contract signed with Autoroutes du Sud de la France (ASF) included the creation of 389 secured parking spaces by 2011.[174]

c) Germany

The provision of an adequate number of HGV parking areas is designed to improve working conditions and enhance road safety. An optimum use of these parking areas would increase the efficiency of them. On German Highways alone there are 50% more trucks parked than available spaces: this is a current deficit of 14,000 parking spaces.'[175]

The Freight Transport and Logistics Action Plan[176] from the Federal Ministry of Transport, Building and Urban Development supports good conditions of working and training in the freight transport sector. One of the aims is to increase the amount of parking areas by constructing more. In addition to the 3,000 new parking spaces constructed in 2008/09, 8,000 will be provided until 2012. Considerable investment is being made in tackling the problem: in 2010, at least 130 million Euros were made available. Currently 15 pilot projects are running to trial the use of telematics applications for efficient parking management. A parallel research project will evaluate the findings.

3.6.5.3 Employers

a) The Lübeck Port Company (Lübecker Hafengesellschaft, LHG), Germany

The company has taken innovative steps to provide heavy goods drivers with a comfortable area for both relaxation and exercise.

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172   http://www.tap.iht.org/objects_store/200911/lorrybaseline.pdf
173   http://assets.dft.gov.uk/publications/lorry-parking-in-england/lorryparking.pdf
174   http://www.setpos.eu/docs/ppt-bourgois.pdf
175   http://www.adac.de/infotestrat/tests/strassen/labeltest/default.aspx?tabid=tab
176   http://www.bmvbs.de/cae/servlet/contentblob/61432/publicationFile/30825/aktionsplan-gueterverkehr-logistik.pdf

Key elements include:

- Rest area has an informal design and is comfortably furnished.
- Drivers are able to keep an eye on their vehicles with the help of video surveillance.
- Snacks and drinks are served.
- A film is shown demonstrating suitable exercises that drivers can do to both work and relax their muscles, to make up for the long time behind the steering wheel in static postures.
- After the fitness exercise the drivers can use the showers provided.[177]

Recommendations to Member States

- Promote the development and operation of Distribution and Servicing Plans for freight intensive developments.
- Identify recommended preferred routes for freight transport for key locations such as ports and airports.
- Provide safe and secure truck parking facilities at appropriate locations including major transport corridors through the planning process.
- Provide more information about availability of parking facilities and levels of services available.
- Ensure and improve communication to drivers of suitable places to rest both by local authorities and transport/fleet managers.
- Include the provision of secure parking areas into contracting arrangements for road infrastructure.
- Define lines of responsibility on terms of parking provision and operation.
- Encourage and finance schemes for the construction of secure parking areas'[178].

Recommendations to Employers

- Work with Member State authorities and other organisations to identify needs in relation to parking infrastructure.
- Consider the location of safe, secure and appropriate parking areas in journey planning and scheduling.
- Communicate with Member State authorities and other relevant organisation in relation to information on the location and characteristics of truck parking areas.
- Ensure drivers have access to existing resources and websites regarding location of parking facilities and provide training on their use.
- Prepare budgets that allow drivers to park in higher quality parking areas where alternatives are detrimental to their health and safety.

Part 4 Safety Culture

Across Europe employers must draft a road safety plan based on the business case and thus contribute to a growing 'safety culture'. Moreover, they have a legal obligation in accordance with Framework Directive 89/391/EEC, to evaluate the safety and health risks of their employees[179]. This next section looks at what makes up a 'safety culture' and how this can be linked to managing fatigue. It then presents good practice and puts forward recommendations in this area.

Safety culture 'characteristics' include safety policies and procedures issued by senior management, the commitment to implementing safety policy shown by line management and the willingness to comply with safety rules shown by the workforce[180]. Safety culture can also be defined as shared attitudes, values, beliefs and behaviours related to safety.

A holistic approach is needed and top management must be involved in the development of road safety plans that should include a strategy linked to measurable targets. These can cover areas such as fleet safety guidelines developed by road safety organisations, driver selection and induction procedures, vehicle selection, driver training and education, driver management, monitoring fleet safety performance, creating a continuous cycle of improvement. The Haddon Matrix is particularly useful as a framework for undertaking an overall review of the organisational safety context into which the driver assessment, monitoring and improvement programme should fit. Haddon

177   http://osha.europa.eu/en/publications/reports/managing-risks-drivers_TEWE11002ENN
178   http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A7-2010-0130+0+DOC+PDF+V0//EN
179   http://etsc.eu/documents/PRAISE%20Report%202.pdf
180   ERSO (2007) http://ec.europa.eu/transport/wcm/road_safety/erso/knowledge/Fixed/60_work/work_related_road_safety.pdf

provides an all-encompassing pre-crash, at-scene and post-crash systems-based framework for fleet safety. As well as classifying improvement interventions to be piloted, implemented and embedded, it can be used as a gap analysis and investigation tool[181].

The adoption of a safety culture also involves a proactive rather than reactive approach to safety. The International Civil Aviation Organisation (ICAO) defines this as: an organised approach with set goals, levels of authority, policies and procedures and clear accountabilities for operational safety.[182] The approach is data-driven with procedures for collecting and analysing data which is then used as a basis for managing risk.

4.1 Fatigue Management Systems

The 'safety culture' approach should also be extended to managing fatigue through 'Fatigue Risk Management Systems' (FRMS). As presented in a recent UK Department of Transport Review, FRMS is an 'explicit and comprehensive process for measuring, mitigating and managing' the actual fatigue risk to which a company is exposed[183]. FRMS is adapted to the specific company and the risks their drivers face and provides a more in-depth complement to 'one size fits all' driving hour compliance. It is data-driven and the idea is that 'by measuring actual fatigue risks and developing tailored controls within an organised safety system, an FRMS is able to identify multiple sources of fatigue and provide integrated, multiple defences against fatigue.'[184]

It has six core components[185]:

- A company fatigue management policy
- Fatigue risk management procedures
- A process for employees to report fatigue to management
- A process for investigating the potential role fatigue plays in incidents
- Fatigue management training and education for employees and management and
- A process for the internal and external gap analysis of the FRMS.

For employers, the level of compliance with the laws regarding road safety, rest and driving times, weights and dimensions and driver's licenses provide an indication of the road safety culture within a company and vice-versa. Strong communication links and interaction with drivers is necessary to support a safety culture including explaining the importance of the social legislation to road safety and driver wellbeing and ensuring drivers are fully aware of their responsibilities and rights in this area. Managing fatigue has to be the responsibility of both employees and employers as the cause of fatigue may stem from work related issues such as the roster or personal health or stress[186].

The table below gives an overview of the main recommendations of two major Australian studies[187] that have had global reach in influencing academia and decision makers on developing policy and legislation. These recommendations present a useful checklist for employers and regulators and echo those made over the past 10 to 15 years by other researchers and committees.

Topic	Quinlan	Neville
Flexible Hours	Require long haul trucks to carry safety management plans	Incorporate time of day considerations into allowable driving times and rest periods; increase allowable rest periods
Code of Practice	Code of practice to focus on the causes of the problems not symptoms	Develop a National OHS Safety Standard and Code of Practice
Safety Management Systems (SMS)	Carry specific SMS for each long haul trip	Develop specific driver fatigue management strategies for each major interstate route
Education	Education programs for other road users for HGV awareness	Education programs for transport operators to develop business skills

181   Murray, W., Pratt, S., Hingston, J. & Dubens, E. (2009). Promoting Global Initiatives for Occupational Road Safety: Review of Occupational Road Safety Worldwide (Draft), www.cdc.gov/niosh/programs/twu/global
182   ICAO (2008) cited in Fourie C. et al (2011) Fatigue Risk Management Systems, DfT.
183   Holmes and Stewart (2008) in Fourie C. et all (2011) Fatigue Risk Management Systems, DfT.
184   Fourie C. et all (2011) Fatigue Risk Management Systems, DfT.
185   ibid
186   ETSC (2001) Role of Driver Fatigue in Commercial Road Transport Crashes. and Fourie C. et al (2011) Fatigue Risk Management Systems, DfT.

Topic	Quinlan	Neville
Regulation/licensing	Compulsory licensing of transport operators, freight forwarders, consignors, brokers and agents	National Operator Accreditation Scheme with a national agency to supervise it
Wages	Ensure employee driver and owner/driver rates are set at a minimum to ensure compliance; prohibit bonus/penalty system that relate to delivery times	Include fatigue management in all employment awards
Laws	Remove anomalies in OHS legislation that provide comfort to law breakers; provide protection for contractors and drivers who refuse to engage in unsafe work; WorkCover NSW[188] to ensure information, education and compliance at an acceptable level.	Develop laws which make driving while fatigued an offence; develop fatigue measuring technologies; review impacts of economic policy and practice on drivers and other road users.

4.1.1 Good Practice Examples - Employers

a) Reynolds Logistics, Ireland

Reynolds Logistics is a transport and logistics company based in Ireland with operations in the UK. They specialise in providing services to the oil industry covering products like Petroleum, Diesel, Aviation Fuel, Bitumen and Lubricants. They operate approximately 150 vehicles and employ approximately 260 staff based in 14 operating locations; approximately 66% of their fleet is based in Ireland. The 'Reynolds Logistics Behavioural Based Safety Driving Programme' is designed to equip drivers with the tools necessary to identify problems, predict or anticipate what might happen, decide on the safest action to take, and then execute the plan by taking control of the situation.

The Defensive Drive programme is backed up with additional training such as 'Awake' training; here they help drivers to identify the early signs of driver fatigue. The initial training was provided by Dr Paul Jackson's team from the Sleep Research Centre at Loughborough University. All members of Reynolds Logistics staff including Directors where taken through a fatigue training session. The session for drivers was presented in such a way as to include pointers for their family members. They also make use of telematics, FleetBoard – the onboard internet based telematics services. FleetBoard performance analysis evaluates the individual driving style grades, and analyses the data for the entire fleet. Using the data in an objective way makes it possible to further develop a driving style that not only saves fuel and reduces vehicle wear and tear but also helps in the area of driver fatigue.

Over the past two years they have partnered with the Road Safety Authority in Ireland and now operate an interactive display vehicle for them. Responsibility for all of their innovations is part of a three way team made up of the head driver trainer, technical director and CEO. Reynolds is also tracking vehicle collision rates per million kilometres, which has reduced by 20% over the past 3 years. Their personal injury levels per hour worked have reduced by 5% over the past three years. They also set long term targets and annual targets to cover safety performance in all areas of safety performance. In 2010 they adopted their long term safety theme 'Drive to Zero' which is used in all communications relating to safety.

Recommendations to EU and Member States

- Provide easy to understand information and guidance on developing, implementing, and maintaining an FRMS and make the process of developing an FRMS easy to follow for operators.

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187   McKinnon, Peter Laurence (2004) Tired of Dying Fatigue and Stress in Long Distance Road Transport.
House of Representatives Standing Committee on Communications, Transport and the Arts: Beyond the Midnight Oil, Report into an Inquiry into Managing Fatigue in Transport, Parliament of the Commonwealth of Australia October 2000 (The Neville Report) and Quinlan, Michael, Report of an Inquiry into Safety in the Long Haul Sector of the Road Trucking Industry, Motor Accident Authority of NSW.
http://arrow.uws.edu.au:8080/vital/access/manager/Repository/uws:657
188   New South Wales Health and Safety Government Agency http://www.workcover.nsw.gov.au/Pages/default.aspx

Recommendations to Employers[189]

- Adopt Fatigue Risk Management systems that are endorsed at all employer levels and are part of a more general safety culture.
- Set acceptable driving durations and distances through consultation with employees.
- Ensure that the current shift patterns, journey planning, employment contracts and work schedules do not contribute to driver fatigue and stress.
- Ask employees to report to their managers when their sleep may be interrupted, for example by having to care for young children or sick or elderly relatives at home during the night.
- Carry out reactive monitoring: drivers should be encouraged and thanked for reporting instances when they felt tired at the wheel, and crashes while driving for work should be investigated to determine whether fatigue may have been a contributory factor.
- Give particular consideration to night shift workers especially regarding journeys home after work, for example providing taxis home or sleeping facilities on site.

189 partly adapted from Will Murray, Interactive Driving Systems, Fleet Safety Gap Analysis; ROSPA Fatigue Facts; ROSPA 2002 and Fourie C. et al (2011) Fatigue Risk Management Systems DfT

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Preventing Road Accidents and Injuries for the Safety of Employees

Driving for Work: Managing Speed

European Transport Safety Council

PRAISE

Work-Related Road Safety

PRAISE
Work-Related Road Safety

PRAISE is a project co-funded by the European Commission and implemented by ETSC on Preventing Road Accidents and Injuries for the Safety of Employees (PRAISE). The project aims to advance work-related Road Safety Management and provide the know-how to employers who have to take on that challenge. It also aims to present the work-related road safety standards of EU Member States and carry out advocacy work at the EU level: work-related road safety is an area of road safety policy that clearly needs renewed political commitment.

Driving for Work: Managing Speed
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ETSC
European Transport Safety Council

Introduction

This report offers employers an insight into tackling speeding amongst employees driving for work. Speeding can be defined as driving in excess of legally set speed limits and/or driving at speeds which are inappropriate to the prevailing conditions. Speeding is the main cause of road traffic collisions, deaths and serious injury. Loss of control of the driving task, and thus potentially of the vehicle, arises when the demands of the driving task exceed the available capability of the driver. As speed increases the task demand rises and the driver's capability is reduced[1]. Employers have a clear responsibility to reduce incentives to speeding and to raise understanding of the serious consequences it can have. Part one looks at the impact that speeding can have and presents levels of compliance with speed limits for different road user types. The second part focuses on management issues covering topics from journey planning to payment schemes with advice on how such practices can help to manage speeding in the work context. The third part of the Thematic Report looks at what employers can do from risk assessment of potential speeders and identification of training - including also eco driving synergies - to the promotion of safer and more economic driving. It also looks at what can be done to rehabilitate speeding offenders. The final part looks specifically at different speed management technologies which can also be a useful additional tool in managing speed. A policy mix is needed to effectively tackle speeding and this report aims to present recommendations to reduce speeding across the board amongst those who are driving for work.

Part 1 Speeding: State of Play

1.1 Scope of the Speeding Problem

Excessive and inappropriate speed is the number one road safety problem[2]. Speeding is a primary factor in about one third of road traffic deaths and an aggravating factor in all collisions[3]. Exceeding speed limits is widespread, thus a large number of non-compliers are required to change their behaviour to redress the problem. Employers also have a strong role to play in making sure that

their employees are driving safely and respecting the speed limits. From an economic perspective, collisions and insurance claims involving vehicles travelling at higher speeds also tend to cause the most asset and human harm. Experience shows that there is not one single measure to reduce speed. Rather it takes a combination of measures including credible speed limits, enforcement, education and individual behaviour change, combined with 'self-explaining' roads and vehicles[4]. In organisations these must be addressed with policies, processes and procedures around speed and other key collision causation factors.

Speed affects the dynamics of a collision in four ways[5]:

1. Speed reduces the time drivers have to identify and react to a problem. They have less time to identify a risk and react to what is happening around them. Drivers need time to process information: first they need to identify a problem, after they need time to decide whether or not to react to the problem and what reaction is appropriate, and finally, they need time to take the appropriate action.

2. Speed increases the distance needed to stop a vehicle. It takes more for a vehicle to stop from higher speeds[6]. The distance between starting to brake and the complete standstill of the vehicle is longer.

3. Speed increases the risk of injuries and death. As a vehicle gains speed the kinetic energy or energy of motion exponentially increases. This energy, accumulated by the vehicle will eventually be released in an impact to be absorbed by hard metal, soft flesh and brittle bone. More kinetic energy means a more violent impact and more serious or fatal injuries.

4. Speed reduces the ability of a vehicle and its safety devices to protect the occupants. New safety devices in vehicles are not sufficient to protect the passengers in a high speed collision. The kinetic energy gathered by a fast moving vehicle increases the force of the impact. The exterior body of a vehicle and its technical devices are not always sufficient to absorb the forces and protect the passengers inside. Safety measures do

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1 Fuller, R. (2005) Towards a general theory of driver behaviour. Accident Analysis and Prevention, 37, 461-472. Fuller, R. (2011) Driver Control Theory: From Task Difficulty Homeostasis to Risk Allostasis, Ch 2 in B.E.Porter (Ed.) Handbook of Traffic Psychology. Amsterdam: Elsevier. pp 13-26.
2 Aarts, L. & van Schagen, I. (2006). Driving speed and the risk of road crashes: a review, Accident Analysis and Prevention, vol. 38, issue 2, p: 215-24.
3 OECD/ECMT (2006) Speed Management
4 Wegman, F. and Aarts, L (2006), Advancing Sustainable Safety. National Road Safety Outlook for 2005-2020.
5 ETSC (2008) Managing Speed, Towards Safe and Sustainable Road Transport, Ch 2, pp: 6-8.
6 European Road Safety Observatory (2006) Speeding, www.erso.eu http://www.dacota-project.eu/Links/erso/knowledge/Fixed/20_speed/Speeding.pdf
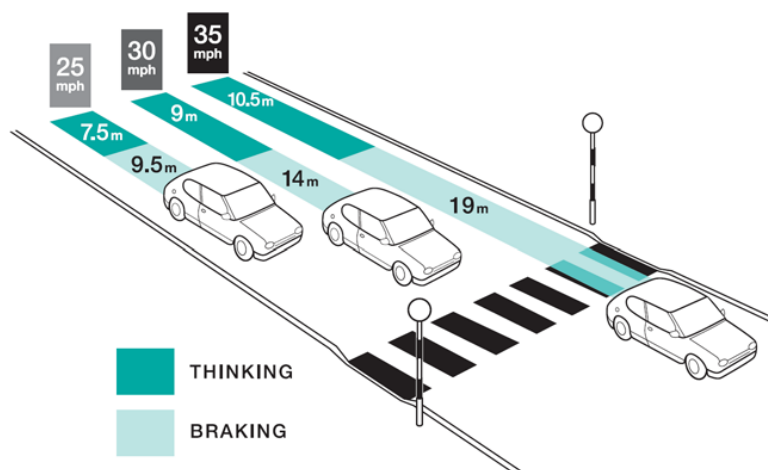
Figure 1: Stopping Distances at different speeds[7]

not do much to protect vulnerable users outside the vehicles. Therefore, active and passive safety devices are no substitutes for speed reduction.

The relation between speed and crash rates is not linear but can best be described as having a power function or an exponential function: the crash rate increases much faster than the increase in speed[8]. While the risk linked to speed varies across road types, a sound rule of thumb is that, on average, a 1% reduction in the mean speed of traffic leads to a 2% reduction in injury accidents, a 3% reduction in severe injury accidents and a 4% in fatal accidents[9]. It follows from the high risk associated with speed that reductions in driving speeds (even minor ones) will make an important contribution to reducing the numbers of road traffic deaths and injuries. 'Low level' speeding is often overlooked but has an important role on safety outcomes as it is far more common than driving at extremely high speeds. Applying the "Power Model" to current numbers of deaths indicates that if every driver slowed down by only 1 km/h, more than 2,200 road deaths per year could be prevented, among them 1,100 on urban roads, 1,000 on rural roads and 100 on motorways[10].

Research also suggests that cutting speed has a positive impact on the environment, a relation dealt with in part 3 of this report.
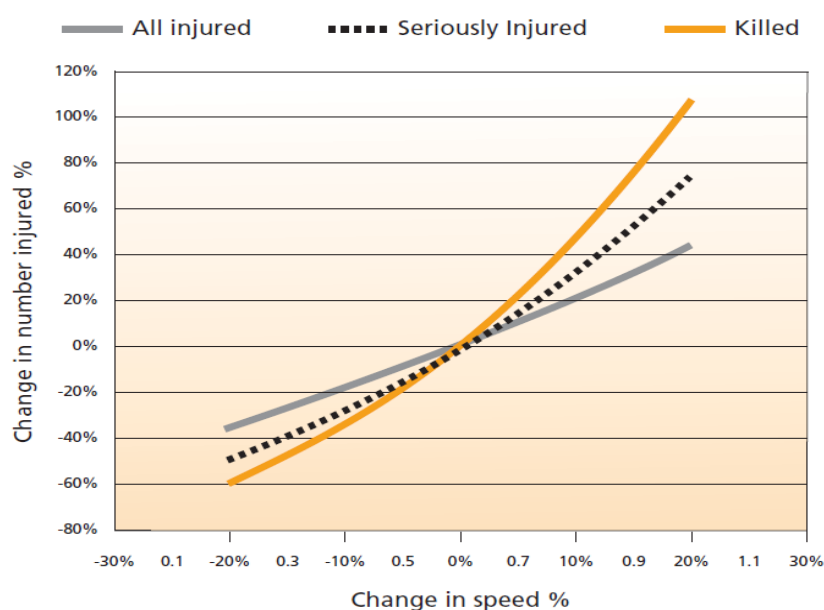
Figure 2: relationship between change in speed and change in the number killed and seriously injured[11]

7 http://www.rospa.com/roadsafety/info/workspeed.pdf
8 SWOV (2009).FactSheet: The relation between speed and crashes. http://www.swov.nl/rapport/Factsheets/UK/FS_Speed.pdf
9 Aarts and van Schagen 2006
10 ETSC (2010) 4th Road safety PIN Report Chapter 3, p. 58
11 Nilsson, 2004a in ETSC (2008) Managing Speed - Towards safe and sustainable Road transport, p. 6

1.2 Current general speed limits in EU Member States[12]

The general speed limit for motorways in EU Member States is mostly 120 or 130 km/h. The general speed limit for rural roads in EU Member States is mostly 80 or 90 km/h and for urban roads 50 km/h, with a widespread use of 30 km/h zones in residential areas. EU countries apply a lower speed limit for heavy good vehicles[13] (HGVs) and buses/coaches. The majority of countries only apply an overall maximum speed limit for HGVs (generally 80 km/h) and buses (varying between 80 and 100 km/h). Some countries apply lower HGV and bus speed limits for different road types (e.g. Denmark, Ireland and the United Kingdom).

1.3 Levels of Compliance with Speed Limits in the EU

Exceeding the legally set speed limit is widespread. The ETSC PIN report regularly evaluates progress and found that, in countries where data on speed measurements in free-flowing traffic are available, up to 30% of drivers exceed speed limits on motorways, up to 70% on roads outside built-up areas and as many as 80% in urban areas[14]. There have been improvements in recent years. Among the countries monitoring speed, drivers, in particular car drivers, have slowed down. Best progress has been made on motorways, where 'only' about 30% of drivers now exceed the speed limit, the highest average level of compliance among the three types of roads. Most of this progress followed the introduction of extensive automated speed enforcement schemes based on safety cameras coupled with stricter sanctions like penalty point systems including speed offences and higher fines. Also, within some countries, average speeds have decreased on some rural roads but increased on others. Compliance with speed limits on these roads is low in many countries. In 8 out of 11 countries monitoring speeds on rural roads, the percentage of drivers exceeding the speed limit varies from 30% to 72%. Average speeds have decreased also on urban roads in several countries. But, in comparison with motorways and rural roads, the proportion of cars travelling above the limit is highest on urban roads, roads where limits have been set at the lowest level to protect the most vulnerable road users - pedestrians and cyclists.

ETSC's PIN analysis also points out that these findings are in stark contrast with the drivers' self-reported behaviour. In a survey carried out in 2002-2003 in 23 countries, drivers in all countries reported committing most violations on motorways and least violations in built-up areas. The percentage of car drivers that reported violating the speed limit 'often', 'very often' and 'always' in European countries on different road types was 28% on motorways, 19% on main roads between towns, 13% on country roads and 7% in built-up areas[15].

The PIN Report uses as an indicator of mean speed and levels of compliance of vehicles in free-flowing traffic (i.e. the proportion of vehicles exceeding the posted limit). These are the two most commonly used speed indicators in European countries. To see an example of the data gathered and analysed in figure 3 showing that in free-flowing traffic, up to 30% of the drivers exceed the speed limit on motorways in 2009[16].
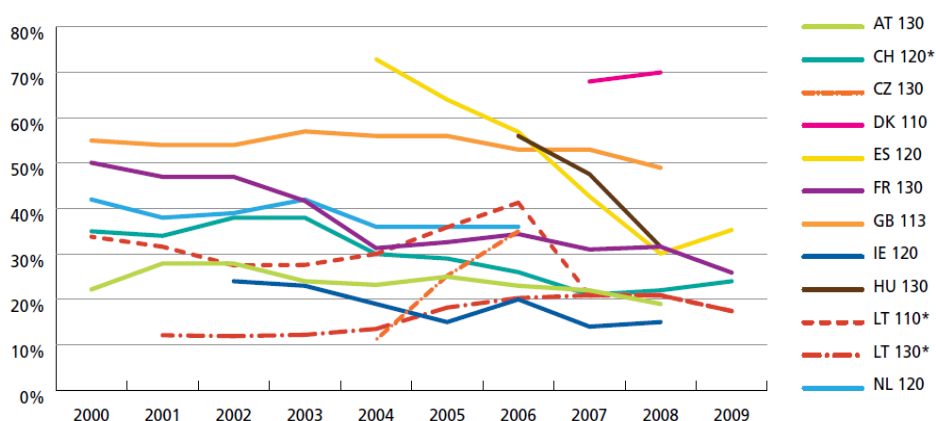
Figure 3: Percentage of cars and Light Commercial Vehicles[17] (LCV's) exceeding the speed limits on motorways. *All traffic

12 European Commission, (2011) Current Speed Limit Policies http://ec.europa.eu/transport/road_safety/specialist/knowledge/speed/speed_limits/current_speed_limit_policies.htm
13 Heavy Goods Vehicle – EU term for any truck with a gross combination mass (GCM) of over 3,500 kilograms
14 ETSC, PIN (2011) Road Safety Target Outcome: 100,000 fewer deaths since 2001 http://www.etsc.eu/documents/ETSC_2011_PIN_Report.PDF and http://www.etsc.eu/documents/05.05%20-%20PIN%20Flash%2016.pdf
15 European Drivers and Road Risk SARTRE 3 (2004) http://sartre.inrets.fr/documents-pdf/repS3V1E.pdf p. 52
16 In some jurisdictions a distinction is made between the posted limit and an enforcement threshold (e.g., currently, in Great Britain, limit + 10% + 2 mph) such that a driver detected travelling at 30.1 – 34.9 mph will be counted as non-compliant with the speed limit in an urban 30mph zone but is not considered to warrant prosecution. Indeed UK figures show that typically below half of those exceeding the speed limit are exceeding the enforcement threshold.

1.4 Speed of Different Vehicle Types and Driving for Work

This section gives a short overview of available studies looking at speeding in relation to different vehicle types used for work. Research shows that the data available on work-related journeys is not fully reliable. In order to inform those (government, employers) engaged in taking preventative measures, improvements need to be made in collision reporting in terms of recording if the trip was one completed for work.

Company Cars

A British study found that speeding amongst company car drivers was common for over half the sample, and excessive speeding was common for 13% of the sample. The most important reason was the desire to arrive at meetings on time, even if this meant breaking the speed limit, combined with a reduced perception of excess speeding as an important accident risk factor and lower driving experience[18]. Other research, also from the UK, demonstrated that, 'In terms of the speed of an individual driver relative to the speed of all drivers, faster drivers tend to be younger rather than older and to drive high annual mileages in company cars; they were also likely to be in the managerial, administrative or professional occupational groups and to be travelling without passengers for business purposes.'[19] Industry data also suggests that speed is the most common drivers licence violation type received by most company car drivers in the UK[20].

HGVs and Buses

Speeding of commercial vehicles in member countries has increased in recent years according to a report of the OECD[21]. This is partly due to the fact that trucks are equipped with more powerful engines to handle heavier loads and to maintain trip times. Furthermore, the demands of industry for "just in time" delivery, place additional pressure on transporters to operate trucks at higher speeds to make up for potential delays[22]. Great Britain – and among others (France, Finland) - regularly monitors speed of HGVs[23]. Speed measurements in Great Britain in 2008 show that over 85% of HGVs exceeded the speed limit on dual carriageways other than motorways and 75% on single carriageways outside built up areas[24].

During the EC SafetyNet project, in-depth data were collected using a common methodology for samples of collisions that occurred in Germany, Italy, The Netherlands, Finland, Sweden and
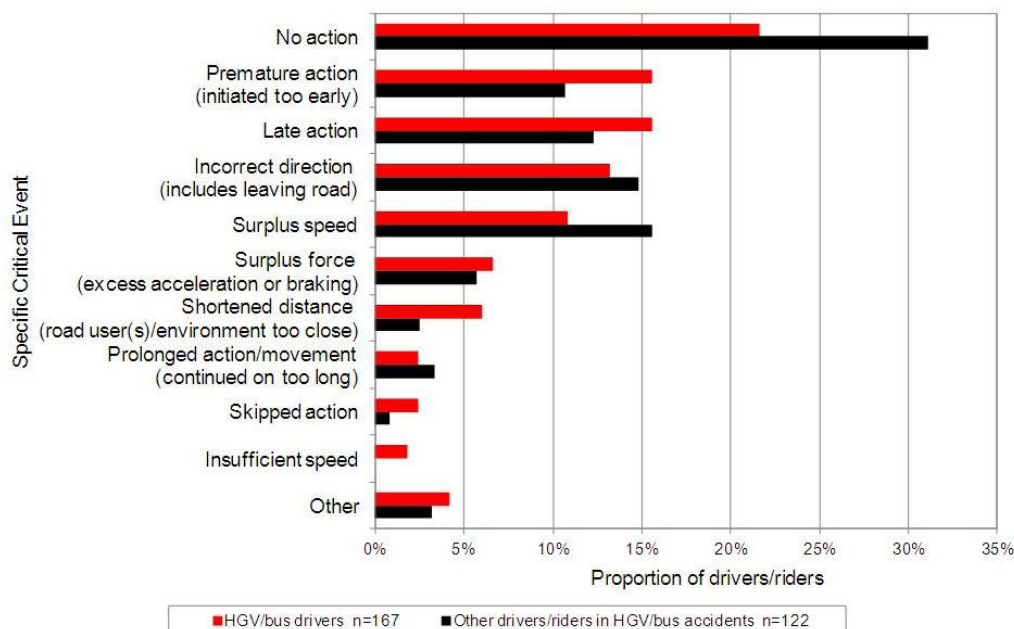
Figure 4: Distributions of specific critical events for HGV or bus drivers and other drivers or riders in HGV/bus collisions

17 LCV: goods vehicles with a gross vehicle mass of up to 3.5 tons use in Europe
18 Adams-Guppy, J. and Guppy, A. (1995) Speeding in relation to perceptions of risk, utility and driving style by British company car drivers. Ergonomics, 38, 12, 2525-2535
19 Maycock, G., Brocklebank, P. J. and Hall, R.D. (1998). Road layout design standards and driver behavior. TRL Report 332. Transport Research Laboratory, Crowthorne, UK.
20 Typical industry data from one EDECS supplier shown in figure 9 below suggests that speed is the most common driver licence violation type received by most company car drivers in the UK.
21 ITF/OECD (2006) Speed http://www.internationaltransportforum.org/Pub/pdf/06Speed.pdf
22 Ibid
23 Department for Transport, Road Statistics 2009: Traffic, Speeds and Congestion http://www.bournemouth.gov.uk/PlanningBuildings/Planning/Policy/Local/CoreStrategy/CoreStrategyFiles/SubmissionFiles/BackgroundDocs/Websiteversions/4-19-RoadTrafficStatistics2009.pdf
24 Ibid

the UK. This SafetyNet Collision Causation Database was formed between 2005 and 2008 and contains details of 1,006 collisions covering all injury severities. Figure 4 below compares the distributions of specific critical events for HGV or bus drivers and other drivers or riders in HGV/bus collisions[25]. "Surplus speed" describes speed that is too high for the conditions or manoeuvre being carried out, travelling above the speed limit and also if the driver is travelling at a speed unexpected by other road users. "Surplus speed" is noted as the cause for approximately 10% of the HGV and bus drivers and 15% of the other drivers and riders involved in HGV and Bus collisions. Further analysis by SafetyNet gives the most frequent links between causes for HGV or bus drivers/riders.

Light Commercial Vehicles (LCV's)

There has been an increase in Light Commercial Vehicles. The LCVs sold in Europe have been gradually equipped with more powerful engines, allowing them not only to travel at higher speed, but also with higher loads.

In the UK an examination of the severity of collisions showed that LCVs are more likely than other vehicle groups to be involved in serious collisions resulting in deaths. About a quarter of deaths caused by LGV drivers involve breaking the speed limit; these include cases where the driver is breaking the applicable limit for a vehicle of that class, as well as those ignoring posted speed limits.[26]

In Germany, the Federal Highway Institute has undertaken a study of real-world collisions which involved LCVs. One of the results of the study is that LCVs drive and collide at similar speeds as cars but only 20 % of the van drivers wear seat belts[27].

In Ireland, a recently completed MSc research[28] study explores the provision of training and prevalence of work related road incidents amongst commercial van drivers. The results showed that 35% of drivers had never received training from employer while 30% had reported receiving training in the previous 2 years. Speeding was amongst the top three most committed behaviours on both motorways and residential roads. These vehicles are a particular risk, as they are un-regulated in comparison to large goods vehicles – with no specific driver licence, driver hours, tachograph or speed restriction requirements. They also tend to operate more in highly populated urban areas, where the risks of collisions with people are greatest.

Powered Two Wheelers (PTWs)

Motorcycle riders and passengers have at least 18 times the corresponding risk for a car driver of being killed in a road collision for the same distance travelled[29]. The SafetyNet Collision Causation Database also evaluated collisions involving riders of powered two wheelers (PTW – motorcycle or moped). These represented 17% (175) of the total collisions investigated[30]. "Surplus speed[31]" is noted as the most frequently recorded specific critical event for PTW riders[32]. In France, motorcyclists have reduced their speed since 2002, but not to the same extent as other road users (Fig. 4). In 2008, more than 30% of motorcyclists were still riding at least 10km/h over the legal speed limit, against 12% for cars and heavy good vehicles.

25 European Road Safety Observatory "Traffic Safety Facts - Heavy Goods Vehicles and Buses" http://ec.europa.eu/transport/road_safety/pdf/statistics/dacota/bfs2010_dacota_intras_hgvs.pdf, p. 13.
26 PACTS (2003), Speed Cameras: 10 criticisms and why they are flawed, PACTS & SSI, London, p4 http://www.slower-speeds.org.uk/files/10myths031220.pdf
27 DEKRA Transporter Werden Immer Sicherer (German Only) Press Release http://www.dekra.de/de/pressemitteilung?p_p_lifecycle=0&p_p_id=ArticleDisplay_WAR_ArticleDisplay&_ArticleDisplay_WAR_ArticleDisplay_articleID=4384967
28 Driving for Work: A study of incidents, training and behaviour in four Irish transport companies. Fiona Dunne. M.Sc.
29 ETSC (2010) 4th Road safety PIN Report http://www.etsc.eu/documents/ETSC%20PIN%20Report%202010.pdf
30 European Road Safety Observatory (Traffic Safety Facts 2010 Motorcycles and Mopeds) http://ec.europa.eu/transport/road_safety/pdf/statistics/dacota/bfs2010-dacota-ntua-motomoped.pdf
31 Surplus speed describes speed that is too high for the conditions or manoeuvre being carried out, travelling above the speed limit and also if the driver is travelling at a speed unexpected by other road users.
32 European Road Safety Observatory (Traffic Safety Facts 2010 Motorcycles and Mopeds) http://ec.europa.eu/transport/road_safety/pdf/statistics/dacota/bfs2010-dacota-ntua-motomoped.pdf
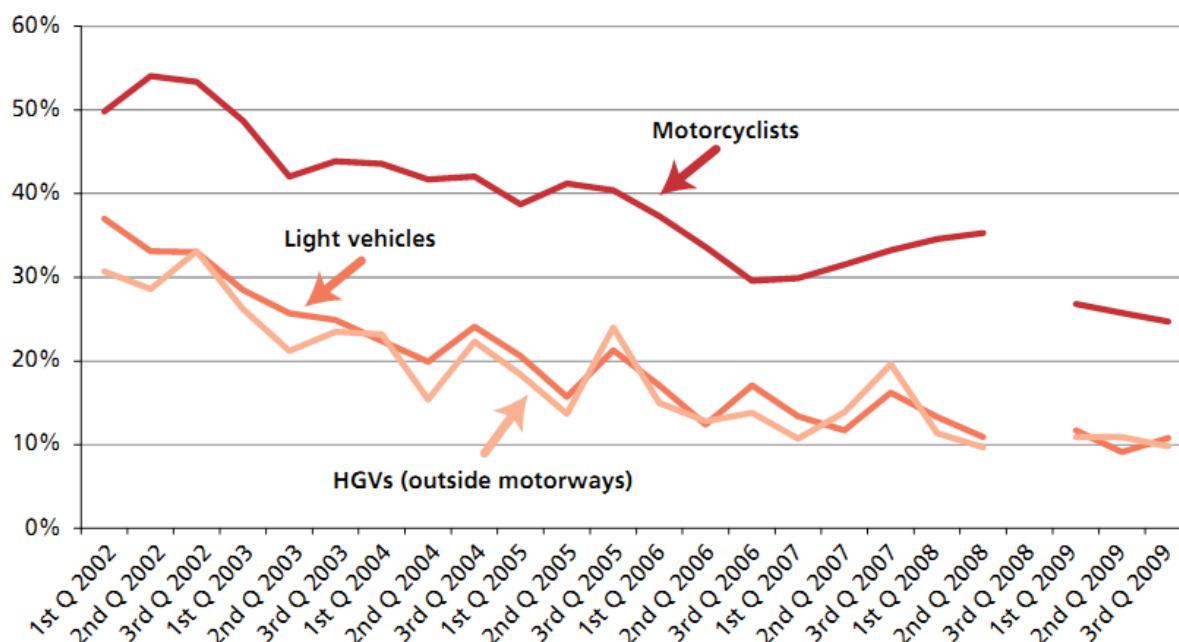
Figure 5: Percentage of Vehicles travelling at least 10 km/h above the speed limit in France[33]

1.5 Why Do Drivers Speed?

This next section looks at the different reasons why drivers speed. Motives for exceeding the speed limit are both rational and emotional and may depend on the temporary state of the driver or the actual situation[34]. The Sartre survey is a large survey of European Drivers based on self-reporting including a whole battery of questions around speeding[35]. As background it cites surveys of drivers caught speeding. They reveal a variety of reasons around why they speed: these can be temporary (e.g. "I'm in a hurry"; "I didn't know the speed limit") or more permanent (e.g. "I'm more skilled that other drivers so can drive faster and still be safe"; "This car is designed to be safe when driven fast"). Moreover, three other common reasons may influence speeding behaviour identified as: type of vehicle driven, the posted speed limit and the perceived likelihood of enforcement. Who else is in the car can also influence the choice of speed. Reasons as to why people speed vary also depending on age and gender. Demographic and psychological factors can also influence speed choice. For example, there are differences in the speed characteristics of different ages and gender (with younger male drivers typically driving faster) and psychological traits (e.g. 'sensation seeking') have also been found to influence the choice of

driving speed. Enjoyment of speed, though, was cited by one in ten in the Sartre project[36]. One of the main findings of this report, which should be key information to employers trying to manage speed, is that in general drivers do not appreciate that speed is associated with risk where their own driving is concerned. For example, 18% of drivers report driving faster than average, only 4% report being more dangerous[37].

In the work context, there is also a feeling that there is a work-driver effect, caused by the extra pressures of work including time pressures, time sensitive deliveries, payment by results, as well as other work distractions, which can all cause drivers to speed or lose concentration. This is covered in more detail in Part 2. As drivers at work are travelling in areas which may not always be familar to them, it is important that proper and adequate signing of speed limits is in place[38].

Evaluating the Risk — Comparison with Drink Driving

Drivers are usually aware of the increased risk of being involved in a fatal collision after drinking but largely underestimate the increased risk of being involved in a fatal collision when speeding. Driving with 0.5g/l Blood Alcohol Concentration

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33 ONISR, Observatoire des vitesses, 2010. There is a break in the series as speed measurements stopped during the last four months of 2008. (Statistics for all road types except for HGV's which excludes motorways) http://www2.securiteroutiere.gouv.fr/IMG/pdf/observatoire_vitesse.pdf)
34 European Road Safety Observatory (2006) Speeding, www.erso.eu http://erso.swov.nl/knowledge/Fixed/20_speed/Speeding.pdf
35 European Drivers and Road Risk SARTRE 3 (2004) http://sartre.inrets.fr/documents-pdf/repS3V1E.pdf
36 Ibid.
37 Ibid
38 TISPOL Excess Speed Policy Document https://www.tispol.org/policy-papers/speeding/tispol-excess-speed-policy-document

(BAC) increases the risk of a fatal crash by a factor of 5, the same as driving about 50% faster. The increased risk of driving at 75km/h on a 50km/h road, 135km/h on a 90km/h road or 180km/h on a 120km/h motorway is therefore similar to the risk of driving with a 0.5g/l BAC[39]. Speeding should be socially unacceptable, as is the case now for drink-driving in most EU countries.

A recent European 'Eurobarometer'[40] opinion poll survey demonstrates that while 94% of people considered "driving under the influence of alcohol" a major road safety problem, this number was 78% for exceeding the speed limit (see below). In reality speed remains the biggest killer on Europe's roads. This underlines the need for a change in attitudes in order to combat speeding.

Perceptions about the seriousness of road safety problems

Q2. In terms of road safety, do you feel the following constitutes a major safety problem, a minor safety problem, or is not a problem [IN OUR COUNTRY]?
Base: all respondents, % EU27
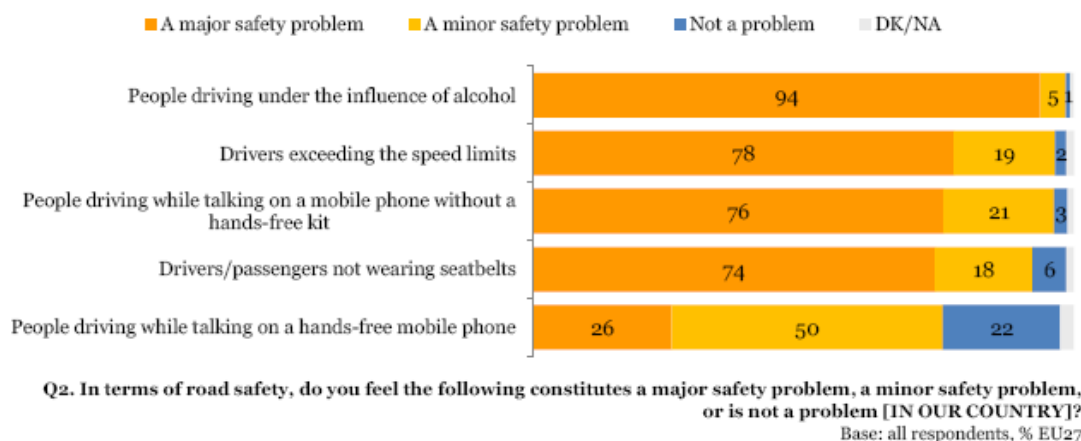
Figure 6: Perceptions about seriousness of road safety problems Eurobarometer 2010

A recent interview survey of a representative sample of 1,005 drivers from across the United Kingdom was undertaken to explore driver knowledge, attitudes and behaviour regarding speed choice. As further background as to why drivers' speed of those surveyed, one-third said that they do not always know the speed limit of the road they are driving on[41]. Drivers reported that they were quite likely, or very likely, to break the speed limit when overtaking (54%), keeping up with the traffic (37%), when running late (33%), on

an empty road in daytime (32%) and on an empty road at night (30%). Nineteen per cent said they were likely to exceed the speed limit when they thought the posted limit was too low for the road. Thirteen percent said they were likely to break the speed limit when feeling angry or when 'someone is driving close behind me', and 12% when feeling stressed. Two percent said they were likely to speed in order to stay awake. Only 20% of this sample agreed or strongly agreed with the statement 'I really enjoy driving fast' (see Figure 6[42]).
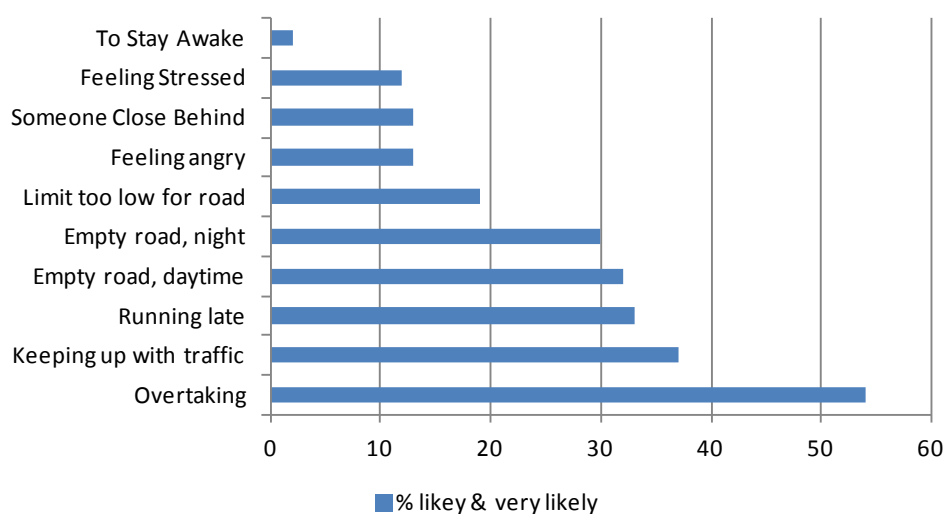
Figure 7 Reasons given for breaking the speed limit (% likely + very likely)

39 ETSC (2010) 4th Road safety PIN Report http://www.etsc.eu/documents/ETSC%20PIN%20Report%202010.pdf
40 Eurobarometer (2010) Road Safety http://ec.europa.eu/public_opinion/flash/fl_301_en.pdf
41 Department for Transport (2008) Road Safety Research Report 93 http://www2.dft.gov.uk/pgr/roadsafety/research/rsrr/theme2/safety93.pdf
42 Ibid

Another topic that came up in this survey[43] is the amount of time that one might save by speeding. This is now referred to as the 'speed fallacy' where drivers believe that by excessive speeding they will instantly make up lost time. When asked to guess how much journey time they would gain or lose by driving 10 mph faster or more slowly than initial speeds of 30 mph and 60 mph, drivers significantly overestimated both the time gained by driving faster and the time lost by driving slower than 60 mph[44]. Clearly there is a need to clear up the misinformation about time that can be saved by speeding. In particular on short journeys, the perceived gain of time is much larger than the real time gain which is just marginal.

Original speed (km/h)	50	70	90	110	130
Extra time taken (minutes)	1.33	0.66	0.39	0.26	0.18

Figure 8: Extra time taken for a journey of 10 km when speed is reduced by 5 km/h[45]

Research has identified three types of drivers. The majority (52%) are generally compliant and usually observe speed limits, admitting to only occasional, minor, inadvertent breaches. A second group of moderate speeders sometimes exceed speed limits, but only when it seems to them to be safe to do so, and typically by up to, but not more than, 10mph over the posted limit (33% of drivers) and finally excessive speeders who routinely exceed speed limits, often by substantial amounts (14% of drivers)[46]. When employers, governments and the EU are coming up with countermeasures they should tailor specific actions to target all of these groups.

Recommendations to Member States

- Monitor development of speed patterns and publish regular overviews of change for different road users;
- Use effective signage and road marking to inform road users of speed limits and continue to research to attain the best design, placing and maintenance of signs and markings that are explicit to ensure acceptance and compliance by road users;
- Improve data collection of speed as a factor in collisions;
- Improve investigation of collision causation involving at work drivers to identify key causal factors including speed. In the context of driving for work, this will enable a better understanding of work related collision causes and enable employers to adopt preventative measures;

- Work with Police to develop a course on identifying and investigating speed collisions;
- Work with private companies to monitor the speed of their drivers;
- Collect purpose of journey data as part of police collision recording process, to better understand the importance of any journey related factors. Several coding systems are available for this purpose.

1.6 Business Case to Manage Speed

For businesses there is a clear link between safety, quality, customer service, efficiency and the environment. Road safety has a massive impact on society, and for this reason can play a major role in improving – or damaging an organisation's corporate social responsibility (CSR). This can be reflected in different ways[47]:

- Reduced running costs through better driving standards (fuel consumption/vehicle maintenance costs/insurance costs/collision costs)[48];
- Fewer working days lost due to injury;
- Reduced risk of work-related ill health;
- Reduced stress and improved morale / job satisfaction;
- Less need for investigation and paperwork;
- Less lost time due to work rescheduling;
- Fewer vehicles off the road for repair;
- Fewer missed orders and business opportunities, reduced risk of losing the goodwill of customers;
- Less chance of key employees being banned from driving.

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43 ibid
44 ibid
45 ETSC (1995) Reducing Traffic Injuries from Excess and Inappropriate Speed http://www.etsc.eu/documents/Reducing%20traffic%20injuries%20from%20excess%20and%20inappropriate%20speed.pdf
46 Department for Transport (2008) Understanding Inappropriate Speed http://www2.dft.gov.uk/pgr/roadsafety/research/rsrr/theme2/safety93.pdf
47 PRAISE Thematic Report 2 http://etsc.eu/PRAISE-publications.php
48 Eco driving can results in savings of up to 30% on fuel costs see elaborated in Part 3.

Employers have to identify which safety feature gives what benefit. Each safety feature needs a detailed investment-based business case, linked to the risks they have identified. Finally, a proactive road risk program can also keep organisations ahead of and protected from regulations and legal requirements and help them gain a competitive advantage compared to more 'reactive' competitors.[49]

Driving at speeds which are appropriate to the prevailing conditions can offer cost saving across the board not only through a reduction in collision costs but also in terms of reduced vehicle wear and tear, reduced fuel consumption and reduced air and noise pollution. This is presented in more detail in Part 3.

Part 2: How Employers Can Prevent Speeding

2.1 Work Practices and Management

A mix of measures is necessary to effectively tackle the problem of speeding. In this regard, speed management can be achieved by taking action in a number of areas including vehicles, drivers and work practices, allowing for an effective approach to be developed by employers. Speed management can be defined as a set of measures to limit the negative effects of illegal or inappropriate speed.

In the work context the issue of speed management is a shared responsibility that must be taken on by all levels of employees from CEO through management and junior staff. People who drive for work have a responsibility as individuals to ensure that they drive at appropriate speeds at all times to ensure their own safety and the safety of other road users. However, junior and senior managers and CEO's also have a critical role in speed management, in creating a safety culture and in taking decisions which prevent and discourage unsafe driving. By the time an individual employee gets behind the wheel to carry out his job many decisions that impact on his propensity to speed have already been taken such as the type of vehicle and supporting safety equipment available, person specification and job

selection, driver selection, access to driver training and assessment, route planning and scheduling and pay structures.

There are a number of things which employers should do in order to ensure that employees driving for work do not speed. This section takes a specific look at how general work practices and employer led initiatives can assist in this regard.

2.2 Speed Policy

Duty of care as well as health and safety compliance are legal necessities in most EU Member States, and an essential consideration for employers. Employers should make sure that their employees are able to comply with the law for example on using work equipment in a safe manner. Before an employee is allocated with a vehicle for driving for work purpose the employer should assess their abilities, needs and vehicle options. 'Company cars tend to be larger and more powerful than privately owned ones[50].' Drivers of higher performance cars are more likely to speed and to have speeding convictions. Employers should ensure that the performance characteristics of vehicles are matched to the competence level of their drivers...try to offer a choice including smaller-engine vehicles.'[51] Employers should also be aware of the various types of vehicle technologies on the market that can assist with speed management (see Part 4 of this report) and should include the most appropriate of these as standard requirement when purchasing or leasing vehicles.

But equally important, it makes sound business sense to draw up and implement a safe driving for work policy. [52] This should include measures to discourage and prevent speeding. A good practice approach involves incorporating such issues into a wider health and safety policy by way of establishing a 'safety culture' in the organisation.

A policy in relation to speed is effectively an agreement between the employer and employee whereby both make commitments to ensure that speeding need not occur. The focus of the policy should be a commitment to drive at safe speeds

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49 PRAISE Thematic Report 2 http://etsc.eu/PRAISE-publications.php
50 Work-related Road Accidents, TRL, 2003 prepared for DfT UK http://www.orsa.org.uk/guidance/pdfs/trl582.pdf
51 RoSPA Driving for Work Safer Speeds http://www.rospa.com/roadsafety/info/workspeed.pdf
52 Health and Safety Authority, Ireland Driving for Work http://www.hsa.ie/eng/Vehicles_at_Work/Driving_for_Work/

appropriate to the prevailing road environment and the conditions of the time (weather, presence of other road users, road surface quality etc) as well as to complying with the legal speed limits. The adaptation of driving speed to the prevailing conditions and speed limits is a primary way of controlling the crash risk of the driver. A company car can usually also be used for private purposes. Any policy should also include this private use. Employers should ensure that the policy is clearly articulated and broadly communicated[53] so that employees are aware of their responsibilities. Good practice is to ask employees to undertake comprehension checks – this forces them to read the material at least once, and increases the chance that they will follow the advice given – it also provides a very robust audit trail for employers as not only can they prove that they have given these documents to employees, but that employees have also read and understood them. Employees should be requested to sign that they have read and understood the policies and policies should also be uniformly enforced.[54]

One important consideration is to what extent driving for work policy should cover employees driving employer-owned vehicles or their own vehicles whilst on business (grey fleet). Employee responsibility for their vehicle needs to be clearly outlined in the policy. Employers can have a huge influence in fostering improved road safety compliance for employees using their own vehicles for work purposes. Large employers can also influence policies in Small and Medium Enterprises [SMEs] when they subcontract out work further along the supply chain by insisting that subcontractors adopt the same conditions and standards in relation to driving for work.[55] Large employers should be encouraged to also share their good practice with smaller companies who may not have the facility of human resource management found in many larger companies.

Further, senior managers should be expected to lead by example and should drive at speed appropriate to the prevailing conditions while driving for work. It is also the role of the top management to make sure that systems of work do not pressurise staff into speeding while driving for work. This may include an analysis of how the working day is structured and a consideration of payment structures. Job and Finish: 'as soon as all your jobs/deliveries/visits are done you're free to

go' rewards speedy transit between job locations. Managers should also be held accountable for policy enforcement. Commitments to these ends should form part of the 'speed policy'.

The employer should also ensure that there are clear incident and collision reporting mechanisms and that staff are aware that they must always report such events. This should be backed up by an investigation process which will facilitate identification of the cause of any incidents and help employers to identify when speed is a contributory factor. Preventative measures or remedial action can then be implemented by the employer. Similarly, the policy should include a commitment on behalf of employees to report all incidents and to cooperate fully with monitoring and reporting procedures. This again is why employees should sign to say they have read and understood the company policies.

The primary goal of company policies should be to prevent speeding and their undesired consequences for the organisation. Reducing the risk does not only mean developing a policy, but also managing the risk proactively and uniformly through collective and individual measures across the company by setting up a monitoring process as part of the company safety management system, for example through journey planning practices and/or the use of technology. Promotion of a safety policy can range from very simple measures, for example some companies have chosen to place warning stickers on the dashboard of company vehicles reminding individual employees about the dangers of speeding. Other much more advanced solutions such as the use of telematics for real time monitoring of speed are being applied, which is looked at in more detail in Part 4.[56]

A policy on speed should:

- Include a clear statement setting a standard for what is expected of those driving for work (i.e. commitment to drive at safe speeds appropriate to the prevailing road environment and the conditions and never exceed the legal speed limit);
- Define the responsibilities of both employees and managers in terms of managing speed;
- Ensure management level buy in to the process;
- Include a commitment to regularly asses work practices including journey planning to ensure

53 RoSPA publication: Safe Driving for Work Handbook
54 http://www.etsc.eu/documents/praise/PRAISE%20Thematic%20Reports%201-6.pdf
55 Ibid
56 Ibid

that they do not contribute to speeding;

- Assess and train drivers in eco-driving techniques which encourage consistent and lower speed driving;
- Include a commitment to monitoring driving practices; develop incident reporting and investigation mechanisms following which, specific individual as well as generic remedial action may be required;
- Avoid incentives to speed, track speeding offences and provide for remedial action as required including training and disciplinary action;
- Liaise with police, monitor and review;
- Include a documented process and audit trail in which everyone travelling to or on behalf of the organisation makes a Pledge, Undertaking or Commitment to comply with the rules of the road, and company policy at all times.

ROSPA Driving for Work – Safer Speeds[57]

This guide gives simple advice on how employers and line managers can help to ensure that their staff are not tempted or pressurised into driving at inappropriate speed and advocates a number of actions that employers can take to influence driver behaviour and prevent speeding. The document also includes a sample 'Safer Speed Policy'. The Policy can be used or adapted by organisations and is a simple one page document that sets out what is expected from all employees including various levels of managers as well as those driving for work. The focus of the policy is an agreement that 'Staff driving for work must never drive faster than conditions safely allow and must obey posted speed limits at all times. Persistent failure to comply with the law will be regarded as a serious matter and gross speeding while driving for work will be regarded as a serious disciplinary matter'.

Recommendations to employers

- Assess employee requirements in terms of vehicle type and most appropriate speed adaption and limiting technologies.
- Adopt a clear policy against speeding-this should focus on driving at speeds that are appropriate to the prevailing conditions rather than complying (as a minimum) with the legal speed limits.

- Communicate to staff the reasons why policies are in place: the risks posed to employees and others from driving at inappropriate speeds.
- If vehicles are given to staff, staff should be clear that this is subject to employees respecting company policies.
- Ensure sanctions are in place to deal with unsafe behaviour and rule contraventions commensurate with the nature and impact of the act. Also ensure reward and recognition given to drivers who comply with speed limits and rules and display safe behaviours.
- Ensure there is a mechanism in place to verify driving for work policies such as a training session to ensure that employees, including management level, are aware and understand existing policies.
- Senior managers to take the lead by respecting the speed policy.
- Provide an opportunity for specific as well as generic driver education as remedial action for employees where speed related problems are identified.
- Set up clear, standardised incident and collision reporting and investigation mechanisms to identify speed infringements.
- As well as collisions, other important data to monitor and review should include tachograph records, telemetry data and licence violations.

Just-In-Time Management

'Speeding has been associated with work-related traffic due to time pressures with individuals trying to save time whilst driving and meet scheduled deadlines. Many people feel it is necessary to exceed speed limits whilst driving for work. Time pressures may influence drivers to participate in unsafe behaviour whilst driving, such as speeding, overtaking and following vehicles closely.'[58]

The pressures of just-in-time management in the professional transport industry, and the risks this poses to road safety in terms of issues such as fatigue and speeding, are already well documented.[59] However, the industry is also highly regulated when compared with other modes, with laws limiting the maximum speed of HGV's and buses on certain types of roads and requirements for the use of tachographs which store details of the movement of vehicles and of certain work periods of their drivers.

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57 RoSPA Driving for Work Safer Speeds http://www.rospa.com/roadsafety/info/workspeed.pdf
58 http://www.devon.gov.uk/workrelateddriversfinal.pdf
59 See PRAISE Report No. 8 http://www.rospa.com/roadsafety/info/workspeed.pdf

Such initiatives provide a stronger framework in which to combat speeding.

Workloads are increasing and employees can face escalating pressures, for example pressures from clients to deliver faster and more cheaply, with issues such as 'just-in-time management', increased traffic, remote monitoring and working irregular and long hours.[60] Drivers can be over-stressed by the demands placed on them to complete work or to deliver goods to meet the schedules of modern transport systems. If they fail to meet such schedules employers may have to compensate the client for delays incurred. Two other common practices of this business perspective are the "job and finish" and the payment by customer contact. "Job and finish" means that the employee will work without payment by numbers of customers visited or loads delivered are incentives to speed and encourage the staff to travel at unsafe speeds or to exceed speed limits.[61] These situations have the potential to encourage drivers to take risk in terms of appropriate driving speeds.

2.3 Travel and Journey Planning

Travel behaviour can be influenced by Intelligent Transport Systems (ITS) applications that mainly provide the traveller with a better basis for decisions in terms of traffic and travel information. In the field of ITS, on-line travel planners have been developed. The typical solution is based on the internet giving the answer of how to get from A to B taking various requirements into account. This can also be complemented by the help of in vehicle satellite navigation systems (satnavs). This may give information on time of arrival, time of departure, travel time, travel cost and be of relevance to route planning at work. Technologies to help with journey planning can also direct drivers along the most efficient routes. Some satnavs and journey planners already take into account school times to direct drivers away from schools during peak times. Such technologies giving more precise and realistic information relating to routes, speed limits and travel times can ensure that those driving for work are better informed, more realistic, less stressed and therefore less likely to speed.[62] All employees who drive for work whether they be 'grey fleet', company car drivers responsible for their own work

schedule or professional drivers of HGV's with logistics managers can utilise journey planning and ITS to help ensure that their speeds are appropriate.

Ensuring 'that journey schedules, distances and plans allow sufficient time for drivers to complete their journeys (including delivery stops, rest breaks and foreseeable weather and traffic conditions) at safe speeds and without needing to exceed speed limits'[63] is critical. Those responsible for journey planning or scheduling including the transport operators have a responsibility to take all such factors into account. With better logistics planning employers should consider introducing "de-speeding of transport" and introduce more buffer times in the supply chain; the drivers are thus relieved from time pressure and can concentrate more on safety and energy-saving issues.[64]

Other vehicles driven for work purposes are currently less well regulated. 'Motorbikes, mopeds and scooters are becoming an increasingly popular and attractive mode of transport, particularly for fast food and other delivery riders.'[65] Just-in-time pressures can be equally strong in this sector; such workers are often paid per delivery and the types of goods they deliver (i.e. hot food) put them under pressure to deliver in a short time which creates an environment that can encourage speeding. The example below provides recommendations on how journey planning can assist in more efficient delivery times without increased risk of speeding.

'Preventing harm to messengers: Ergonomic study on the prevention of professional risks' France

A study was carried out by a trade union and an accident insurance company in France entitled, 'Preventing harm to messengers: Ergonomic study on the prevention of professional risks'. The main message of this study is that routes should be planned carefully to minimise the need for couriers to rush. This provides benefits for the customer, who will receive a better quality service with minimal delay, and for the courier who will have a less stressful journey because everything has been done to avoid unnecessary obstacles that might force him/her to speed to make up for lost time.

60 EU OSHA Website
61 ROSPA Driving for Work: Safer Speeds
62 PRAISE Thematic Report 2 http://etsc.eu/PRAISE-publications.php
63 RoSPA Driving for Work: Safer Speeds http://www.rospa.com/roadsafety/info/workspeed.pdf
64 Schade, W and Rothengatter, W. Economic Aspects of Sustainable Mobility, European Parliament Policy Department
65 European Agency for Safety and Health at Work Delivery and despatch riders' safety and health: A European review of good practice guidelines (the link is available http://osha.europa.eu/en/publications/literature_reviews/delivery-despatch-riders.pdf)

Recommendations for drivers and their employers include:

- Riders should take full advantage of being on a two-wheeled vehicle; not having to stick to a pre-planned route and being able to exit a traffic jam to take an alternative route – route planning should be intelligent and focus on manoeuvrability rather than speed, i.e. routes should not be fixed, but should be specified to include a range of possible adjustments and flexibility according to the circumstances; speed as the solution should be discouraged.
- Riders should be encouraged to ride intelligently to cut down on fuel use; the message is that speeding is costly in terms of petrol and does not necessarily save time[66].

2.4 Good Practice

Suckling Transport UK[67]

Suckling Transport specialises in fuel distribution in the UK. It operates 60 articulated tanker vehicles, employs 170 people.

The company has a 'no speeding' policy and recognises that journey planning can assist with this. At Suckling they make a point to regulate the speed according to the weather conditions as part of journey planning. The company also recognises the need to go beyond the basic route selection and consider other issues including production of a site and route risk assessment and safe havens parking areas. In an effort to continue this improvement in safety performance, the Company decided to focus on Journey Management and it launched the 'Have a safe day' project. This project focuses on the following areas:

- Policies/Compliance
- Journey Plan and Route Selection
- Site & Route Risk assessment
- Route hazard management
- Journey scheduling and checks
- Drivers' working hours
- On board computers
- Benchmarking
- Emergency Plan

A team of managers conduct behavioural safety observations to ensure drivers are compliant with policies and procedures. Over 100 such observations are completed each year. On-board computers, fitted to the company's trucks, are used to identify speeding, harsh braking, excessive engine revving, and near miss rollovers. A programme of corrective action was then put in place using intervention training, through the company's new Skills Builder Programme. In addition, 300 journey management checks are conducted each month to ensure speed compliance with local limits. As a result of the Journey Management initiatives introduced through the 'Have a safe day' project, the company saw further improvements in its crash frequency and severity Key Performance Indicators, and has now reduced its motor insurance premiums by 30% in the last two years.

Recommendations to Employers

- Create a safety culture: management should ensure work practices that do not pressurise staff to speed.
- Provide journey planning capabilities to facilitate realistic scheduling of trips and contribute to appropriate time management.
- In dealing with clients, avoid making any concessions that might adversely affect road safety, such as commitments to deliveries or completion of work packages that set unrealistic time constraints.
- Establish schedules, including those for sub-contracting chains, which allow drivers enough time to obey speed limits and avoid peak hours driving. These should be flexible and adaptable to changes such as the weather.
- Review scheduling, rostering and load route planning arrangements and proactively address driver stress in the context of a health and safety plan.
- Ensure that the current shift patterns, journey planning, employment contracts and work schedules prevent speed and do not contribute to driver stress and speeding.

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66 ibid
67 http://www.etsc.eu/documents/PRAISE%20Fact%20Sheet%202.pdf

2.5 Enforcement[68]

This next section will focus on enforcement. Enforcement of speeds can be undertaken by governments, employers and in-vehicle technology. Enforcement is a means to prevent collisions from happening by way of persuading drivers to comply with the safety rules. It is based on giving drivers the feeling that they run too high a risk of being caught when breaking the rules. Sustained intensive enforcement that is well explained and publicised also has a long-lasting effect on driver behaviour[69]. Campaigns to support enforcement can be undertaken internally by employers or at national level (covered in Part 3). The OECD[70] estimates that at any one moment 50% of drivers are exceeding legal speed limits[71]. Unlike other safety violations, such as drink driving or non-use of seat belt, enforcing speed compliance requires majority large proportion of drivers to change their behaviour. Despite a common understanding of risks linked with high speed, the prevalence of speeding remains high, the behaviour remains pervasive, and arguably socially acceptable. This presents an apparent paradox in relation to the mismatch between beliefs and behaviours, in that drivers may subscribe to one belief (that speeding is wrong or dangerous) yet regularly exceed the posted speed limit. Experience shows long lasting and greater reductions in driving speed in countries with highest levels of speed enforcement, evidencing a relationship between objective chance of apprehension and speed choices. Research conducted so far consistently shows that safety cameras are an effective intervention in reducing road crashes and related injuries[72]. A combination of fixed and mobile safety cameras to enforce speed are essential in order bring about the highest level of compliance.

2.5.1 National

Traditional enforcement methods rely on radar and laser measurements made by mobile police patrols. These offer the advantage that offenders are directly apprehended by police officers.

New automated methods on the other hand use recording devices (camera, video) that are triggered automatically by speed violations. These automatic devices can check many more vehicles. These also include section control methods[73] which can guarantee almost 100% compliance and results in more homogenous speeds and may be better accepted by drivers[74]. These offer high levels of continuous and widespread enforcement (whereas traditional methods tend to focus on the most severe offenders).[75] Safety cameras have been shown to be the single most important factor in the recent French road safety success[76].

2.5.2 Sanctions

The level of sanctions for speeding offences should escalate as the level of speeding above a speed limit increases.[77] It starts with rather small monetary fines for 'low level' speeding offences, but it can also include penalty points, vehicle seizure, temporary or permanent licence withdrawal, participation in rehabilitation programmes, community service or imprisonment. Sanctions are meant to protect society and influence the behaviour of offenders and all citizens. In cases where judges are responsible for sentencing offenders on road traffic offences the fact that a person's employment depends on their ability to drive should not be accepted as reasoning for passing a lighter sentence.

Research has found that long-term behavioural effects from enforcement are only achieved if the detection of a violation is followed by immediate feedback or sanction. It is however important that the level of sanctions is according to the risk related to non-compliance. This is also important to motivate police officers in their work, although research has found that higher sanctions have less of an impact on safety than the level of enforcement[78].

Financial fines are the most common sanction imposed by traffic police officers, or administrative officers (prosecutors)[79]. The amount of the fines is

68 ETSC 'Traffic Law Enforcement across the EU' http://www.etsc.eu/documents/Final_Traffic_Law_Enforcement_in_the_EU.pdf
69 ibid
70 Organisation for Economic Co-operation and Development
71 OECD/ECMT (2006). Speed management. Organisation for Economic Co-operation and Development OECD/European Conference of Ministers of Transport ECMT, Paris.
72 ibid
73 ETSC Speed Fact Sheet 5 Section Control http://etsc.eu/documents/copy_of_copy_of_Speed%20Fact%20Sheet%205.pdf
74 TISPOL Policy Paper Excess Speed https://www.tispol.org/policy-papers/speeding/tispol-excess-speed-policy-document
75 Ibid
76 ETSC (2010), 4th PIN report, Chapter 3, Tackling the three main killers on the road
77 http://www.etsc.eu/documents/Final_Traffic_Law_Enforcement_in_the_EU.pdf
78 SUNflower (2002): A comparative study of the development of road safety in Sweden, the United Kingdom and the Netherlands. Final report. Leidschendam. And PRAISE Thematic Report 5 http://ec.europa.eu/transport/roadsafety_library/publications/sunflower_report.pdf
79 ETSC (2006) Traffic Law Enforcement in the EU http://www.etsc.eu/documents/Final_Traffic_Law_Enforcement_in_the_EU.pdf

usually normative. It is prescribed by law, either as part of a Road Traffic Act, or subject of a special legislative provision. In some countries, limits are provided to allow Police officers to decide the actual amount of the fine according to the specificity of the traffic situation. In Finland, Sweden, Norway and Switzerland the amount of the fine is a function of the net income of the offender.

The penalty point system takes recidivism into account when sanctioning offenders by introducing the risk of losing one's license[80]. In addition to financial penalties, demerit points are issued to offenders. At the national level many countries have introduced a penalty or 'demerit' point system. A point system is one in which a driver's licensing authority issues demerits or penalty points to drivers on conviction for road traffic offenses including speeding. A major offence may lead to more than the maximum allowed points being issued (or withdrawn), or the accumulation or loss of too many points over a given period of time can lead to additional penalties, including fines and more importantly the suspension or revocation of the driver's license. A good system should also provide rehabilitation of drivers. Penalty point systems are therefore part of a greater 'chain' of road safety work that contains high levels of police enforcement of traffic rules, good public information, and the chance for recidivists to be rehabilitated.

2.6 Enforcement and Driving for Work

The effectiveness of enforcement is even more complex when considered in the context of work-related driving. Employees driving for work can be driving commercial vehicles owned by their employer, company cars-provided and paid for by employers but registered and run by the employee or their own vehicle used for work purposes. There are many different types of work-related driver. At the 'heavy or large' end of the scale, trucks and buses tend to be heavily regulated and, with the exception of a number of rogue operators, tend to be relatively well managed. Light or small commercial vehicles are less regulated, and as a result tend to be less well managed by organisations. Similarly, many organisations have excellent policies, processes and programmes in place for their company car drivers, but much less to manage what is known as their Grey Fleet – people driving their own vehicle on work business. In reality, organisations should fully understand

their exposures to the risks posed by all vehicle and driving types – and manage the risks accordingly.

In the case of the grey fleet in countries where the national law supports driver liability, any fines or sanctions for speeding violations go directly to the employee and the employer is not automatically informed. It is critical that employers are fully aware of any speeding sanctions received by their employees whilst driving for work in order to understand the extent of the problem. Having a policy on speed that includes an agreement with employees to report incidents can assist with this. Employees could be asked to sign in their work contract that they must inform their employers in case they commit a traffic offence. A more reliable way to ensure organisations are fully informed would be for the national enforcement authorities to automatically notify organisations at the time of issuing the speeding sanction. However, this would require enforcers to be able to identify not only the registered driver but also the fact that they were driving a 'company vehicle' and details relating to the company.

This issue is interlinked with that of liability which has implications in terms of enforcing speed limits especially as more and more countries are moving towards automated speed checks (i.e. safety cameras) as opposed to those carried out in person by the police. This situation differs across Europe; in some countries the person driving the vehicle is liable to any fines or sanctions whereas in others the owner of the vehicle is liable regardless of whether or not they were driving the car.

'Enforcement is based on the principle that people try to avoid a penalty, which is a disadvantage of not complying with the rules.'[81] A person's decision to refrain from breaking rules can be heavily influenced by the actual and perceived risk of them being apprehended. In this regard employers have a role to play in influencing the behaviour of their employees towards road safety compliance by increasing the risk of them being caught if breaking the rules.

2.6.1 Rehabilitation of Speeding Offenders

Training can also take the form of a rehabilitation course following a speeding offence from the government authority side. Employers should encourage their employees to go on the course if they are given the option especially, but not only if the offence was committed by their employees

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80 Ibid
81 OECD Speed Management (2006) http://www.internationaltransportforum.org/Pub/pdf/06Speed.pdf

during work time. Speed awareness courses are being offered to drivers in the UK detected speeding at a limit set by individual Police forces, as an alternative to prosecution resulting in a likely £60 (approx. 70 EUR) fine and three penalty points on their driving licence.

"It is hoped that drivers who undertake a speed awareness course will appreciate the reasons why speed limits are important and why it is unacceptable to exceed them or to drive too fast for the conditions. This change in knowledge and attitudes should then lead to a change in their driving behavior, which should apply whenever and wherever they drive"[82].

There is clearly a need to increase awareness around speed limits due to the levels of non compliance and the low levels of risk perception as discussed in Part 1. Any driver detected driving at the speed identified as suitable for an alternative to prosecution is offered a course. To be eligible they must not have already attended a course in the previous three years. The criteria an offender must fulfill to be considered is that the driver must be at the lower end of the offending scale and there are no other aggravating circumstances i.e. poor weather, additional offences at the time. The offender agrees to attend and pay for the course within a set time and complete the course by participation and staying on the course for its full duration of 4 hours. The course covers offences at the low-level speeding: speed limit + 10% plus 2-9 mph.

Effective interventions in a speed awareness course should address the following issues[83]:

- Attitudes (beliefs and values) towards speeding;
- Beliefs about the acceptability and ubiquity of speeding;
- The driver's responsibility for their own speed choice;
- Perceptions of the likelihood of being detected;
- Perceptions of the benefits of speeding and the negative consequences of being caught or of crashing;
- Perceived barriers to driving at an appropriate speed;
- The way in which speeding makes drivers feel;
- Drivers' perceptions of their ability to drive at an appropriate speed;
- When and where drivers will reduce their speed.

The DfT also stresses that the method of delivery is important: elaboration, discussion and problem solving are vital, and methods that make attendees engage and interact with the material should be used.

The courses are run through the National Driver Offender Retraining Scheme (NDORS) by Local Authority Road Safety Departments and by private companies, who are contracted or appointed as service providers for their respective Police Authorities. In 2007 content and recommended themes for the National Speed Awareness Course were developed. There are two versions of the course in the National Model: one is based solely in a training room and lasts four hours, and the other combines training room work with an in-car element and last five hours. A new evaluation has been undertaken and found that the results provide evidence that the National Speed Awareness Course produces changes in key psychological predictors of speeding, namely instrumental and affective attitudes, moral norms, self efficacy and intentions[84]. These results indicate that the course makes clients more likely to drive within the speed limits. At a follow-up, 99% of clients reported that they had applied what they had learnt on the course: driving more slowly; being more aware of the road environment, of their speed and of their responsibilities toward others with whom they are sharing the public highway; and feeling less stressed while driving. In addition, many become advocates for the course and share their new knowledge and skills with friends and family. They promote slower, more relaxed, driving styles and actively encourage others to slow down.

Recommendations to the EU

- Rigorously evaluate the benefits of speed awareness courses and if found to be successful, draft common EU guidelines on diversion-from-prosecution speed awareness courses for low level speeding offenders both for the general public and for those driving for work and encourage implementation by Member States.

Recommendations to Member States

- Introduce speed awareness courses with an optional 'bolt-on' for professional drivers.

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82 RoSPA (2005) "Helping Drivers Not To Speed" http://www.rospa.com/roadsafety/info/speed_policy_paper_may05.pdf
83 Fylan, F. Et al (2006) Effective Interventions for Speeding Motorists DfT
84 Fylan, F. (2011) Evaluation of the National Speed Awareness Course Draft

Recommendations to Employers

- Following a speeding offence encourage employees to participate in a speed awareness course.

2.6.2 Licence Checks for Speeding Offences

Employers should monitor the driving of their employees including looking at appropriate speed. Studies have identified a link between speeding violations and safety performance[85]. Employers need to be aware if their employees are involved in speeding; working closely with enforcement authorities or those holding data on offences can help with this. Visually checking licences on at least an annual basis is a good starting point, but may not be enough on its own as it relies solely on the information provided, which may not be up to-date[86]. Organisations should be fully aware if their employees who are driving for work are penalised by the authorities for committing traffic offences including speeding. National governments can assist with this by setting up mechanisms which facilitate the sharing of information between national traffic enforcement authorities and employers with the employees' permission. Such a system already exists in some Member States such as the UK via a service provided through several suppliers who are contracted to the DVLA to provide an Electronic Driver Entitlement Checking Service (EDECS). Figure 9 shows a screen grab of some typical summary data from such a service. The last table gives a breakdown of offences committed clearly showing speeding as the most common offence.
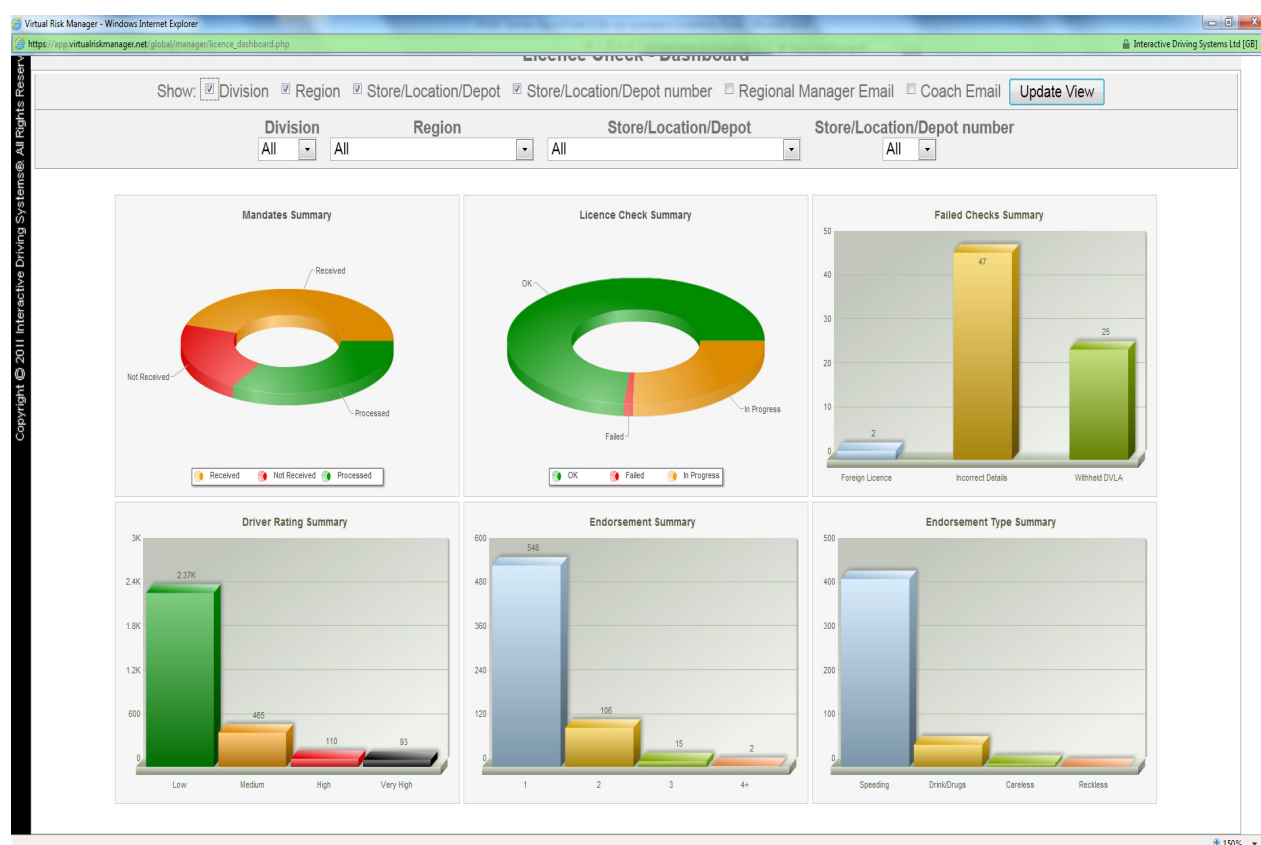
Figure 9: Example Electronic Driver Entitlement Checking Service (EDECS) outcomes data

On joining an organisation (and then periodically afterwards) employers now require their employees to sign a declaration allowing them to request information from the relevant driving licence authority on their status of their driving licence on a regular basis. Organisations can work directly with the authorities responsible for licence endorsements or employ specialist companies to manage this process for them as part of broader risk management processes. 'Trends in speeding and other penalties should be reviewed to identify driving activities where further action to improve safety may be needed'[87].

Similarly, organisations as well as individual drivers which work for them should be held accountable in instances where they create a work environment which puts pressure on or

85 The present analysis indicates that vehicles that were involved in more than one offence per year had a higher crash involvement than vehicles that committed just one offence per year. http://www.swov.nl/rapport/R-2011-19.pdf
86 EDECS (2010) A guide to the Electronic Driver Entitlement Checking Service process and scenarios. Interactive Driving Systems.
87 RoSPA Driving for Work: Safer Speeds http://www.rospa.com/roadsafety/info/workspeed.pdf

encourages their employees to speed. National Authorities should develop means of identifying if numerous employees of specific organisations are persistently or repeatedly speeding whilst on work related driving. Such an approach would allow national authorities to then work proactively with 'problem' organisations reduce speeding and engender a safety culture.

Experts also suggests that some organisations simply provide for the cost of speeding fines received by their employees within their budgets and are prepared to 'overlook' speeding and pay fines in order make gains in terms of time savings. The result can be an increase in the number of speeding drivers on the roads. This is one of the advantages of introducing penalty point systems as employers will no longer be able to continue this sort of practice. The type of sanction, the level at which sanctions are set, the methods of enforcement utilised in relation to speeding both nationally and within organisations, can all contribute to counteracting this. 'A basic principle of enforcement is that the risk of punitive consequences for violation of regulations should weigh more heavily than the gain accrued through the violation. Both the risk of detection and the size of the penalty are important.'[88]

In terms of setting sanctions there is a further opportunity for national governments to not only focus more strongly on certain behaviours but also to target higher risk drivers such as those driving for work. National governments should consider applying stricter penalties on those driving for work. It would be possible to put in place a structure of higher penalties (in terms of points or fines where applicable) to be imposed on those driving for work as opposed to private drivers. However, this may prove difficult to enforce amongst some professional drivers.

It is also important that there are clearly defined enforcement and sanctioning measures within individual organisations in relation to speeding. 'In the first instance, the approach should be positive and helpful, rather than punitive, although it should be made clear that repeat offending may lead to disciplinary procedures'[89] which could include the loss of authority to drive. The circumstances of individual speeding offences should form part of an individual employee's performance appraisal,

leading, where appropriate, to new personal performance targets.'[90]

2.6.3 Rewarding Compliance

'From psychological theories on learning and motivation it is known that rewarding good behaviour is at least as powerful as a behaviour modification tool as punishing bad behaviour. In road safety theories, rewarding has not received that much attention. However, research has indicated that it can indeed have a positive effect on traffic behaviour.'[91] While this may be difficult at the national level, at the organisational level such an approach is less problematic as new technologies such as telematics allow for driving to be continuously monitored (see also Part 4). This gives employers the potential to incentivise, employees in relation to their speed behaviour. Incentives could be in the form of vouchers or bonuses-an example linking incentivising to eco-driving is outlined below. It should however be highlighted that these programmes are difficult to implement in practice and there is not yet much evidence on their cost-effectiveness.'[92]

2.6.4 "Smart Enforcement"

In an attempt to increase the efficiency of enforcement some Member States and employers are developing complementary approaches that maximise and target resources. 'Smart enforcement' methods include initiatives in the area of improving information and data sharing between enforcing authorities and employers, identifying employers whose drivers are receiving many or repeated speeding sanctions, working cross-sectorally with health and environmental enforcement agencies (as those with poor road safety records such as speeding may also be poorly performing in other areas). This is explained in more detail in PRAISE Thematic Report 8[93].

2.6.5 Good Practices

Sweden

In Sweden, the National Society for Road Safety (NTF) can externally monitor the road safety performance of companies including speed. They work with companies to help identify the causes of collisions in which the company's

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88 ETSC (2001) The Role of Fatigue in Commercial Road Transport Crashes http://www.etsc.eu/oldsite/drivfatigue.pdf pg26.
89 RoSPA Driving for Work: Safer Speeds http://www.rospa.com/roadsafety/info/workspeed.pdf
90 Ibid
91 Hagenzieker (1999) in http://www.internationaltransportforum.org/Pub/pdf/06Speed.pdf
92 Ibid
93 PRAISE Thematic Report 8 http://etsc.eu/PRAISE-publications.php

vehicles are involved and can carry out checks or monitor company vehicles including taking speed measurements and providing information reports for monitoring. See ETSC PRAISE Fact Sheet on DB Schenker[94]. This is part of NTF's broader work with companies. They carry out ongoing benchmarking studies of different aspects leading to better road safety and act as consultants to management in developing road safety performance.

Also in Sweden, in 2008 five major buyers of transport and the Swedish Road Administration, developed a tender tool called 'Systole' that provides a meeting place for goods owners and transportation companies that value sustainability and safety. This provides for ongoing dialogue during contracts and allows hauliers to support the company with solutions. The tool also allows for the 'live' evaluation of hauliers and for communication of long term requirements. The goal orientation safety requirements include Speed as specific criteria and give it the highest priority. The goal is that 'speed should be adapted to prevailing circumstances and never exceed the relevant regulations.' To achieve this goal 7 requirements are set out which include developing procedures for planning and scheduling that take into account speed limits and traffic conditions, developing procedures for monitoring and reporting on this, having technical support for keeping to the speed limit on all vehicles and technical support for follow-ups of exceeding the speed limit on vehicles[95].

The Netherlands

The Dutch Ministry of Transport, Public Works and Water Management in cooperation with LeasePlan Nederland N.V. ran a project called BELONITOR (2005), which focused on influencing driver behaviour with respect to headway and speed. The fundamental principle of the project was encouraging drivers not to speed or tailgate while monitoring and rewarding those who drive responsibly. LeasePlan installed in-car assistance technology in 65 vehicles which offered drivers support in keeping safe speeds and distances. This equipment consists of a display on which drivers on the road receive continuous feedback regarding their following distance and speed. The trial drivers received rewards if the Belonitor

unit calculated that the vehicle was driven with a safe distance and under the speed limits. The number of points earned was displayed on the unit when the vehicle stopped. A reward point was provided for every 15 seconds of 'correct driving'. Points could be converted into prizes including holidays. Every month, the driver with the most points received € 500. To prevent the participants driving more kilometres to win extra rewards, the number of points was adjusted according to the distance travelled. From the start, the Belonitor trial tried to create a win-win situation, where Ministry of Transport traffic safety objectives were combined with the profit goals of lease companies. The project investigated and demonstrated the behavioural effects as well as the technical feasibility of rewarding desirable driving behaviour. The trial was meant to encourage fleet owners, lease car companies and insurance companies to use similar methods, and is an example of how private companies and public authorities can work together on improving road safety.

The data obtained from surveys, interviews and the in-car system show feedback and rewarding to have a very strong positive effect on safe driving behaviour. The trial also showed differences in how drivers handle speed and following distance.

Prévost Transport, France

The Prevost transport company initiated a speed limit of 80 km/h for its HGV drivers achieved by means of a number of measures. The vehicle engines are limited to a maximum speed of 80 km/h ex factory. In addition, all vehicles have an onboard computer that gives information about fuel consumption and average speed. This resulted in a reduction in fuel consumption and CO_2 emissions, and improved the health and safety of the drivers. Stickers on vehicles were used to promote the initiative and to inform other drivers about the project and the company's philosophy. Collaboration with the regional health insurance organisation was obtained. There was active sharing of the initiative and other companies have since adopted the approach. Workers have shared in the cost savings. As an incentive the company allocates a proportion of the money saved by

94 PRAISE Fact Sheet 1 http://etsc.eu/documents/PRAISE%20Fact%20Sheet1.pdf
95 PREEM presentation to ETSC-Future Directions in Speed Management 2010
96 EU OSHA (2011) Managing Risks to Drivers in Road Transport http://osha.europa.eu/en/publications/reports/managing-risks-drivers_TEWE11002ENN

the reduced fuel consumption to its workers. The company has received much positive publicity as well as saving on fuel consumption and drivers reported less stress while driving and fewer dangerous manoeuvres since the 80 km/h speed limit was introduced. Because of the speed limit trips take a little more time. This amounts to the company losing five minutes per hour, but this problem is being addressed[96].

Recommendations to the EU

- Encourage Member States to implement best practice for speed enforcement as indicated in the EC Recommendation on enforcement[97].
- Encourage Member States to include speeding offences in their penalty point systems.

Recommendations to Member States

- Incorporate speeding offences in penalty point systems, and make sure that levels of penalty or demerit points incurred towards licence suspension or driver improvement measures escalate as the level of speeding above a speed limit increases.
- Introduce penalties for "low level" speeding offences.
- Work towards a low level of appeals for penalties for speeding violations.
- Provide adequate resources to facilitate enforcement.
- Consider the relative merits and practicalities of introducing of tougher sanctioning for professional drivers and those driving for work.
- Develop processes and laws that can facilitate employers' ability to directly access information on traffic offences from enforcement authorities in a similar way to the UK DVLA Electronic Driver Entitlement Checking Service (EDECS).
- Improve data collection and storage so that work-related speeding offences can be identified.
- Work with insurance companies to see positive outcomes for companies, individuals and the government.

- Support the development and application of 'smart' enforcement methods including working in partnership with other enforcement bodies, targeted enforcement of organisations and external monitoring.
- Develop reward programmes for compliance.

Recommendations to Employers

- Monitor the driving of their employees including looking at appropriate speed.
- Co-operate with national enforcement authorities to identify and address problems relating to speeding.
- When possible, access information on speeding offences of employees directly from enforcement authorities.
- Strongly enforce the organisations speeding policy by developing a system of sanctions/ rewards and clearly communicating this to employees.
- Consider the use of incentives to support driving at appropriate speeds.
- Raise understanding of risk of speeding of employees.
- Utilise in-vehicle telemetry to monitor and coach driver behaviours.

Part 3 Risk Assessment and Training

3.1 Organisational Management and Driver Risk Assessment and Training

Risk Assessment should provide the basis for driver training on speed related risk. This part of the report will draw on ETSC's Thematic Report entitled "Fit for Road Safety: From Risk Assessment to Training" focussing in on training to prevent drivers from speeding.

In accordance with Framework Directive 89/391/EEC[98], employers shall evaluate the risks to the safety and health of workers. Risk assessment is an important starting point also including identifying drivers who may be at risk due to speeding. Subsequent to this evaluation the employer must implement the resulting preventive and protection measures, in particular the training needs required to the situation. Overall, it is important

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97 European Commission (2004) EC Recommendation on Traffic Law Enforcement http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:111:0075:0082:EN:PDF

98 Framework Directive 89/391/EEC http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31989L0391:EN:HTML

for organisations considering driver training to have an effective risk assessment-led process. Proactive organisations consult their employees from the outset to know whether they feel they ought to receive training, and what their training requirements are.

A screening process should be undertaken to determine which employees need to undergo specific and targeted training to cover issues such as speed. This can be done for example by monitoring general attitudes to driving but also specifically excessive fuel consumption, excessive tyre usage, collisions or infringements. Murray & Dubens[99] and Murray[100] suggest a 6 step approach to implement a driver assessment, monitoring and improvement programme which has been adapted to reflect the legal requirements under the Directive 89/391/EEC, as documented in ETSC's 3rd Thematic Report.

Undoubtedly driver training can be an important tool to reduce work-related road risk. Research shows that: 'driver training has been shown to reduce insurance claim rates post training'. Interestingly also the improvements in this reviewed case study, were shown to have started before the participants undertook the training. One interpretation is that an employee with enough violations to be sent on a training course improved their behaviour before driver training had occurred'[101]. However, much care should be given by employers in identifying whether driver training is a tool that suits their needs, and when it is the case which type of training they should opt for. A more extensive overview of different approaches to driver training can be found in Thematic Report 3.

Research in the field of driver training underlines five hierarchical levels permeating driving behaviour, and the need to design training to address each level. These five levels can best be visualised in the GDE matrix (Goals for Driver Education)[102]. Alongside basic vehicle manoeuvring these also include the context of driving and goals for life and skills for living. The two last and highest levels generally tend to be neglected, but should be an integral part of good training as they are very important for risk awareness[103]. A fifth level includes not only individual characteristics of the driver but rather the organisational setting within which the driving takes place[104].

	Knowledge and skills	Risk increasing factors	Self-evaluation
Level V **Company awareness, characteristics, safety situation (organisational level)**	in logistics, safety systems, management, economy	Production/protection, feedback system	Company's / organisation's company's motivational system, awareness of safety situation
Level IV **Goals for life and skills for living**	Lifestyle, age, group, culture, social position etc. vs. driving behaviour	Sensation seeking, group norms, peer pressure	Introspective competence, own preconditions, impulse control
Level III	Modal choice, choice of time, role of motives, route planning	Alcohol, fatigue, low friction, rush hours, young passengers	Own motives, influencing choices; self-critical thinking
Level II	Traffic rules, co-operation, hazard perception, automation	Disobeying rules, tailgating, low friction, vulnerable road users	Calibration of driving skills, own driving skills
Level I **Vehicle Control**	Car functioning, protection systems, vehicle control, physical laws	No seat belts, bread down of vehicle system, worn-out tyres	Calibration of car control skills.

Figure 10: GDE-5 PRO[105]

99 Murray W & Dubens E Driver assessment including the use of interactive CD-ROMs Paper presented at the 9th World Conference on Transportation Research, Seoul, 24-27 July 2001.
100 Murray, W. 2004, The driver training debate The driver training debate. Roadwise: Journal of the Australasian College of Road Safety, Vol 14 (4), May 2004, pp. 3-5.
101 Darby P, Quddus M, Murray W, Raeside R. & Ison S. (2011) Evaluation of Fleet road safety interventions. Paper presented at the 90th Annual Meeting of the Transportation Research Board, Washington, DC, January 2011.
102 Gadget http://ec.europa.eu/transport/road_safety/pdf/projects/gadget.pdf (maybe you mean this link http://heaneydriving.co.uk/gde.aspx
103 Advanced Project http://www.cieca.be/template_subsubpage.asp?pag_id=49&spa_id=74&ssp_id=76&lng_iso=EN
104 Keskinen, E., Peräaho, M. and Laapotti, S. (2010). GDE-5PRO and GDE-5SOC: goals for driver education in a wider context - professional and private drivers in their environment (unpublished manuscript). Unversity of Turku, Finland
105 Keskinen, Peräaho & Laapotti, 2010

Speed risk must be included in driver training. This GDE Matrix shows that speed should be covered already in the second level: "Driving in Traffic". The fourth level "Goals for Life; Skills for Living" should cover the dangers of sensation seeking through speeding. While at the fifth level organizations should also set their own employer expectations on respecting the speed limits.

3.2 Driver Training and Speed Management

The third PRAISE Thematic Report covers driver and rider training for different road user types. Trucks and bus drivers now have to follow professional training as set out in Directive 2003/59[106]. Whereas the legislation on driver licensing concentrates on basic driving skills, this Directive has a much broader perspective and the syllabus covers elements to improve road safety in general, as well as reducing CO_2 emissions through a special focus on reduction of fuel consumption. The Driving License Directive (2006/126), as well as the 1989 Directive 89/391, provides a basic level of driver training for all road users. Greater emphasis should also be placed on speed and its effects during novice driver training, during the theoretical and practical test.[107] In the theory test for example more questions could be set on speed and its effects to highlight the number of deaths and injury that it causes. The questions would help new drivers develop their risk perception of the dangers of speed[108]. Specific training should be developed for two other groups associated with driving for work: van drivers and powered two wheeler drivers-both should include a focus on speed[109].

Member States are currently involved in implementing their requirements of the Certificate of Professional Competence (CPC Directive) 2003/59. They can also take additional efforts to raise levels of safety amongst those driving for work. For example, in Ireland the three main government agencies dealing with driving for work: the Garda Síochána, the Health and Safety Authority (HSA) and the Road Safety Authority (RSA) run seminars to promote awareness of the importance of having Safe Driving for Work practices[110]. The seminars include the need to tackle speed as one of the most important risks. The seminars are free of charge and resources on managing driving for work are provided.

Practical tips on how to address the most common driving for work hazards include speed as well as distraction, impairment, load security and vehicle maintenance.

Recommendations to the EU

- Monitor implementation of the professional driver training Directive and provide support to Member States to train drivers on speed management.

Recommendations to Member States

- Guarantee the quality of both the initial and periodic training of professional drivers of trucks and buses to include also speed awareness.
- Develop multi-agency training for other professional drivers including speed related risk.
- Place greater emphasis on speed in the training and examination of all road users.

Recommendations to Employers

- Ensure that training on speed is rooted in the employer's health and safety at work culture.
- Comply with the requirements of the Directive on Health and Safety at Work in ensuring that proper training on speed management is given linked to the needs of the difficult employees.
- Target training on the basis of need utilising risk assessment, collision, telemetry and licence violations data to identify key areas of risk.

3.3 Awareness Campaigns

According to the EC Recommendation on traffic law enforcement[111] police checks of speed must be accompanied by information campaigns. Research stresses that enforcement must be highly visible and publicised and indicates that it is the drivers' subjective risk of being caught that must be increased if enforcement is to be successful[112]. Much can be done at the national level to raise awareness of the dangerous consequences of speeding also, whilst driving for work.

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106 Directive 2003/59 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:226:0004:0017:EN:PDF
107 RoSPA "Helping Drivers Not To Speed" (May 2005)
108 ibid
109 PRAISE Thematic Report 3 http://etsc.eu/PRAISE-publications.php
110 http://www.drivingforwork.ie/
111 European Commission (2004) EC Recommendation on Traffic Law Enforcement http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:111:0075:0082:EN:PDF
112 ESCAPE (2003) Enhanced Safety Coming from Appropriate Police Enforcement. Final report

Governments should as a minimum and, as set out in the EC Recommendation, run regular awareness campaigns linked to enforcement by the police. A manual on running awareness campaigns and setting up communications strategies in the EU has also been published[113].

Belgium

The Belgian Road Safety Institute has run a campaign on the theme of speed, which aims to convey to drivers that driving fast involves taking too many risks with no gain. The campaign slogan, "Better late than never," is explicit: it is better to be a few minutes late for an appointment or go home a little later than to take unnecessary risks and never reach home. A radio spot broadcast supports the posters along the roads to educate motorists of the serious consequences that may have little speeding may have. Furthermore information was sent to the 3000 largest companies in Belgium, as well as to companies in the construction sector. This will provide materials and activities to help fleet managers make their employees aware of the dangers of speed, including a disk containing the stopping distances depending on driving speeds.

Estonia

In Estonia in 2009 - 2011 the Estonian government ran a campaign challenging the conception that speeding saved time[114]. On a special website road users could calculate distance and time saved based on distances travelled according to different speeds. The concluding message was widely communicated, that by travelling at a slightly higher and illegal speed or + 10/Km/h one may only actually save ten minutes of their time, while the associated risk of speeding was not worth the time saved. Drivers were encouraged to leave for their appointments earlier. The campaign was actively communicated during summer (July – August) and was accompanied by extensive speed enforcement by the Police. The campaign included radio and TV advertisements, a website[115] and billboards placed so they are visible when leaving cities, as well as outside urban areas.

Germany

The German road safety campaign, "Slow down!" was launched in 2008 to raise awareness about the serious consequences of unadjusted speed[116]. The initiators of the campaign, the Federal Ministry of Transport, the German Social Accident Insurance and the German Road Safety Council (DVR) wanted to contribute to reducing the number of road traffic deaths in Germany. The three-year information campaign had the basic goals of educating road users about the high accident risk of inappropriate speed, encouraging responsible behavior while contributing to the further decline in the numbers of victims. The campaign encourages a variety of measures to a set off a broad discussion on road safety. The measures were aimed at all road users, the general public, media and political actors. In addition, multipliers in the field of traffic safety including police, firefighters and rescue workers.

Ireland

In Ireland the three main regulatory authorities involved are working collaboratively[117] to raise awareness of importance of managing Work Related Road risks. The Health and Safety Authority [occupational safety], the Road Safety Authority [road safety] and An Garda Síochána [police] have been jointly involved in Driving for Work seminars aimed at employers since 2010. A number of joint resources for employers have been developed such as instructional videos on daily vehicle pre-checks, fact sheets, posters and checklists on daily vehicle pre-checks. Joint research has also been undertaken to assess compliance with expected Driving for Work risk management indicators.

UK

UK Think! Campaign has different strands focussing on speed in urban and in rural areas[118]. The rural speed component of the THINK! speed campaign focused on the dangers of driving at inappropriate speeds on rural roads. It was particularly targeted at young men and habitual speeders who often drive for work. The rural speed campaign used a mixture of national radio advertising, national ambient advertising (including petrol pumps), posters and national and regional PR.

113 Campaigns and Awareness Raising Strategies in Road Safety (CAST) Manual Deliverable 3.2 http://www.cast-eu.org/docs/CAST_WP3_Deliverable%203.2a.pdf
114 Estonian Speed Campaign http://www.mnt.ee/kiirus/
115 ibid
116 "Slow Down" German road safety campaign http://www.dvr.de/aktionen/runter-vom-gas.htm
117 Driving for Work, Ireland http://www.drivingforwork.ie/
118 UK Think! Campaign http://think.direct.gov.uk/speed.html

Switzerland

The Swiss Council for Accident Prevention (bfu), the Swiss Insurance Association (ASA/SVV), and the Road Safety Fund (FVS/FSR/FSS) launched together an awareness raising campaign called "slow down – take it easy"[119], targeting in particular young drivers and riders, but also road users at large in 2009. Unlike many campaigns this one was not based on fear, but on positive emotions. Franky is an angel and a pop singer who sings of the benefits of taking it easy, driving the message that slowing down is both fun and cool. The campaign also stressed that speeding does not only encompass excessive speeding (driving above the speed limit) but also inappropriate speed as drivers are often driving too fast for the prevalent road/traffic/weather/visibility conditions, and overestimate their abilities.

Employer-led Information Initiatives

Employers are also encouraged to ensure that drivers are made aware of the risks of speeding. Some employers use government campaign material to inform their own employees of the risks of driving, others develop their own information.

Recommendations to the EU

• Launch a campaign on the need to respect speed limits, especially when driving for work.

Recommendations to Member States

• Undertake regular speeding campaigns linked to police enforcement targeting professional drivers.

Recommendations to Employers

• Raise awareness of the risks of speeding amongst employees either by developing organisation specific material or using existing materials.

3.4. Eco-driving and Speed

This next section presents eco-driving and speed and shows that there are clear synergies between training drivers on eco-driving and fuel-efficiency and safe driving in terms of speed management. The driving techniques and style that make drivers safer are exactly the same as those that make drivers more fuel efficient, giving both individual drivers and the organization the double benefit[120]. The environmental, safety and fuel efficiency benefits can convince different people within organisations relative to their role be they CEO, budget or fleet manager or driver. It is vitally important also to train the decisions making units managing and controlling the transport activities in logistics as well as the drivers[121]. Defensive, energy-efficient driving (reinforcement of the key elements of eco-driving within the curricula of the theoretical and practical tests) is included in the European Commission's Policy Orientations on Road Safety[122]. The Transport White Paper also states that eco driving would be included in future revisions of the driver licence Directive and its intention to accelerate it in combination with ITS applications[123]. The European Commission recognised in its White Paper that: 'reducing speed is an extremely effective way to reduce not only the risk of collisions but also fuel consumption,' particularly as this approach enjoys the support of the European public.

The European Commission's Logistics Action Plan also points to the improvement of training and education for drivers and managers in freight transport and logistics as a relevant instrument for reducing energy consumption and green house gases in the transport sector. Promoting eco-driving and in-vehicle systems that 'provide real-time information on prevailing speed limits' will also contribute to improving compliance with speed limits. Moreover if drivers behave in a more energy-efficient way, this also helps to improve the traffic flow, reduces fluctuations and the risk of congestion and traffic collisions[124]. The main arguments in favour of eco-driving are: a reduction of fuel costs, lower vehicle maintenances costs and vehicle wear and tear, reduction of CO_2 emissions by around 8%, improved company image, reduced insurance costs (lower accident rates) and a reduction of stress and fatigue[125].

Another aspect is that as more transport operators and logistics firms place emphasis on their quality reputation, it is possible to include the firms' activities towards energy saving through more efficient driver and operation into the ISO Standard 14000. Such green labels can be

119 Swiss Speed Campaign www.slow-n-easy.ch/
120 RoSPA Driving for Work: Safer Speed
121 Schade, W and Rothengatter, W. Economic Aspects of Sustainable Mobility, European Parliament Policy Department
122 European Commission (2010) Road Safety Policy Orientations http://ec.europa.eu/transport/road_safety/pdf/com_20072010_en.pdf
123 European Commission (2011) Transport White Paper http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0144:FIN:EN:PDF
124 Schade, W and Rothengatter, W. Economic Aspects of Sustainable Mobility, European Parliament Policy Department
125 ibid

successfully marketed as big logistic players have proved (e.g. DB Schenker)[126].

The European project Ecodriven has defined 5 golden rules for eco-driving:

1. Anticipate Traffic Flow	Read the road as far ahead as possible and anticipate the flow of traffic. Act instead of react - increase your scope of action with an appropriate distance between vehicles to use momentum (an increased safety distance equivalent of about 3 seconds to the car in front optimises the options to balance speed fluctuations in traffic flow - enabling steady driving with constant speed).
2. Maintain a steady speed at low RPM[127]	Drive smoothly, using the highest possible gear at low RPM.
3. Shift up early	Shift to higher gear as soon as possible. Consider the traffic situation, safety needs and vehicle specifics.
4. Check tyre pressures frequently at least once a month and before driving at high speed	Keep tyres properly inflated as low tyre pressure is a safety risk and wastes fuel. For correct tyre pressure (acc. to loading, highest pressure and speed driven), check with car's manual.
5. Consider any extra energy required costs fuel and money	Use air conditioning and electrical equipment wisely and switch it off if not needed. Electrical energy is converted from extra fuel burnt in a combustion engine, so electrical equipment doesn't work "for free" – it always costs extra energy and money. Avoid dead weight (e.g. not used tools) and aerodynamic drag (e.g. empty roof racks).

Figure11: Ecodriven Rules

There are also a number of further "silver rules" such as for example considering alternative forms of transport. These are also explained in the ECOWILL website[128].

"Safety First"

Eco driving experts stress that the main guiding factor of all of these rules is to follow the overarching principle of: "safety first". Some of the above five main rules of eco driving will also have a potentially positive impact on driver speed.[129] The first rule on anticipatory driving would be the main one of relevance, encouraging drivers to look ahead and keep an increased safety distance and maintain a steady speed. The second rule on maintaining a steady speed at a low RPM would also be highly relevant to speed management. The background is that unnecessary speed peaks and abrupt braking not only waste fuel, but also raise the stress level while driving and cause additional safety risks. Eco driving aims to achieve a smooth driving style. Under the third rule on shifting up early, it is stressed that this is only used on the flat and that the optimum gear shifting for each vehicle has to be identified individually.

3.4.1 ECOWILL

The project ECOWILL was launched in 2009 and runs for 5 years involving 14 partners and an advisory board, both private and public bodies. It aims to utilise the existing infrastructures of driving schools and advanced driver training for the large scale rollout of short duration eco driving training courses and online (e-learning) education for licensed drivers. It aims to standardise the contents of training courses and to certify trainers for providing such courses. It will also train licensed drivers of passenger cars and LCV's in eco driving and involve additional drivers through publicity and media attention. Moreover it will engage government and driving school administrations to incorporate eco driving in the driving school curriculum. ECOWILL also stresses that although drivers are encouraged to try the tips listed that best results are achieved by attending an Eco driving training given by a qualified driving instructor. Finally it will harmonise and optimise the contents and application of eco driving in the driver test for learner drivers[130] all in accordance to the Ecodriven rules.

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126 ibid
127 Revolutions per minute
128 Ecodriving Golden Rules http://www.ecodrive.org/en/what_is_ecodriving-/the_golden_rules_of_ecodriving/
129 ibid
130 ECOWILL Project http://www.ecodrive.org/en/home/ECOWILL_the_project/objectives/

3.4.2 Examples of Eco Driver Training

There are a number of training programmes on offer that address both eco-driving and safe driving. Examples for this kind of training schemes include courses reviewed in the study "To the Point 3 _- studies on drive like a pro – safe driving, both in a professional and a private context" published by the German Road Safety Council (DVR), and the German Statutory Accident Insurance[131]. A summary of some of the case studies is reproduced below.

Eco Driver Training in Germany in Real Traffic

The German Road Safety Council and the German Social Accident Insurance have since 1995 been developing a programme on "driving safely and saving gas along the way-safe, economical and environmentally friendly driving". This is primarily aimed at companies that have their own fleet. The programme demonstrates savings of up to 30% on fuel costs and highlights the benefits of this in terms of distance travelled per tank filled over a year.[132] It includes "training on the job" with driving in real traffic. This is illustrated below by two examples the first is a driver who has not had eco-driver training and the second has, showing that the trained driver can travel much further with the same amount of fuel.

20,000 km/year
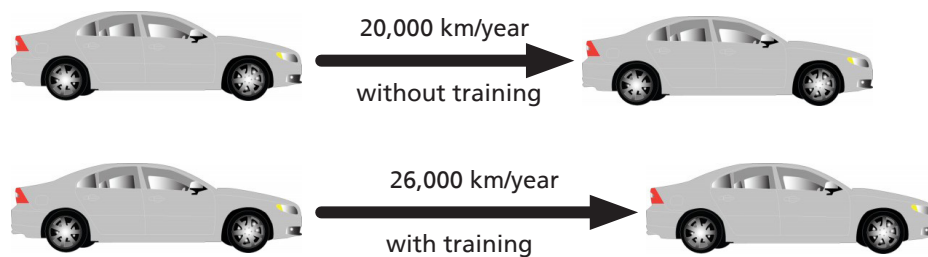without training

26,000 km/year
with training

Figure 11: Fuel Savings

Companies can benefit from the training programmes through: more safety, a better environmental performance, considerable improvements in fuel economy, reduced wear and tear as well as lower repair and maintenance costs. In order to promote participation in the training among staff members and decision-makers within a company, training modules with the contents of the "Drive safely and save gas along the way" programme are integrated into already existing seminars run by the German Statutory Accident Insurers and Prevention for Trade and Industry. Since then the DVR has continued to develop its eco driving training programmes. In 2007 it launched "Van Coaching" and "Passenger Car Coaching" two new programmes combining elements of safety and the fuel economy training for implementation in companies.

Combined Safety and Eco Driving Evaluated

A recent study of the combined safety and fuel-saving driving in Germany looked at the effects on driver's attitudes and behaviour[133]. Repeated measurements were carried out in a group of twenty drivers) who took part in the course and on a group of twenty drivers not participating in the course The course was run by the ADAC and Eco Consult and consisted of 8 hours; in the morning safety training took place and in the afternoon the eco training was added including driving in real world traffic. Subjects filled out questionnaires (e.g. Driver Stress Inventory, Driver Coping Questionnaire). Their behaviour when driving a fixed route (distance = 35 km) in real-life traffic was recorded by a psychologist using standardized data collection sheets. Different aspects were measures including "orientation efforts". This can be defined as the ability to realise the meaning of a particular traffic situation or traffic sign as well as their spatial and time relation and evolution.

One part of "orientation efforts" was to recognize the correct distance and speed. Another part is "risk related self control" which also includes conflict avoidance and keeping an appropriate speed. Results show that the participants who completed the course, showed a more relaxed and considerate driving style three months after the course. There was a significant decline in risky behaviour. Furthermore, the driving course improved drivers' attitude: training resulted in

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131 German Road Safety Council "To the Point 3 _- studies on drive like a pro – safe driving, both in a professional and a private context" http://www.dvr.de/download/broschuere_auf_den_punkt-3.pdf
132 Eco Driver Training http://www.fahrspartraining.de/
133 Strohbeck-Kuehner, P. and Geiler, M. In Combined Safety and Eco Training Zeitung fuer Verkehrssicherheit 4/2010

calmer driving and more efforts to look ahead when in traffic. Additionally, trained subjects reported a higher ability to cope with stressful traffic situations and to avoid aggressive and reckless behaviour behind the wheel. The study confirms that the combined safety and fuel-saving driving course has safety-increasing effects on drivers' behaviour and attitudes on the road.

Fuel Saving Training at "Schäfer's Brot und Kuchen Spezialitaten"

The DVR ran their "driving safely and saving gas along the way - safe, economical and environmentally friendly driving" at the Schäfer's Bakery for the first time with trucks of up to 7.5 tons of gross vehicle weight[134]. The workshops lasted for 120 minutes, with a maximum of 15 participants and introduced practical tips on how to behave in everyday traffic. The workshops were followed by real-world driver training. Every driver was accompanied on their daily delivery route (with an average duration of 160 minutes) by an instructor who gave comments and tips for a fuel-saving driving style. Afterwards the driver was provided with feedback on their driving. The training was evaluated with a pre-post study with a treatment group and a control group. Before and after the training, the drivers were questioned and their driver behavior was examined. Observers who accompanied the delivery tour noted down certain driving behavior patterns, e.g. driving errors and fuel-saving behaviour (releasing the accelerator when approaching a red light) in an observation form. Whereas in the preliminary survey the error frequency of both driver groups was similar, afterwards the driver group who had received training committed considerably fewer errors than the group without training. Their driving style was more relaxed and more defensive. The drop in risk errors was particularly evident. The members of the treatment group reacted to stressful situations – such as nose-to-tail traffic, time pressure because of tight deadlines, shoulder-runners on the highway – with less aggression and less willingness to take risks, e.g. by tailgating. In the driver group who had received the training the fuel economy in the second and third month after the training amounted to 6.8%, six months afterwards it was still at 3.7%.

HNR-Netherlands

The Dutch Programme "Het Nieuwe Rijden" HNR aims to assist professional drivers to learn a modern driving style which takes account of state of the art engine technology[135]. The eco-driving style was designed to improve driving comfort, increase road safety, reduce fuel consumption and increase driving pleasure. The intention of the survey was to identify the possible benefits of the HNR programme. The study looked at comparative economic and operational data from shipping companies. Companies which enable their drivers to participate in the HNR training and which monitor the driving behaviour of their staff were distinguished from companies which do not support their staff in this way. The latter were used as the control group. Parameters from 1996-2003 included fuel consumption, maintenance costs, repair costs incurred due to accidents as an indicator of road safety and absence from work due to diseases or accidents. Fuel consumption among the HNR companies decreased by 2.1%, at an average fuel price of 68 EUR per 100 litres, this corresponded to savings of 0.40 EUR per km. Maintenance costs could be reduced by 3.5%. This corresponded to savings of 0.19 EUR per km. The impact on road safety can be determined by looking at the repair costs for minor accidental damages. During the period of examination, they declined by more than 14%, corresponding to savings of 0.39% per km. With the help of HNR in freight traffic alone, costs for fuel consumption, maintenance and repairs could be reduced by 0.98% per km. For a lorry with a mileage of 80,000 km per year, this amounts to an annual saving of 800 EUR.

Eco Driver in Germany

LeasePlan Germany offers their corporate clients an incentive programme that periodically rewards drivers with the best fuel consumption score. Leaseplan found that a one-time seminar participation did not necessarily bring out the full potential of results. Follow-up can be taken with monitoring of fuel use via an in-vehicle monitoring system or participation in a competition linked to fuel use. "Eco driver" was set up in for those who have participated in eco driver training. Drivers with the lowest fuel consumption are eligible to win prizes quarterly. This programme is supported by an eco driving training course and online e-learning tools. The company not only improves its environmental performance, but also generates cost benefits to its fleet. Through applying eco driving techniques maintenance costs, tires, and damage can be saved in addition

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134 German Road Safety Council "To the Point 3 _- studies on drive like a pro – safe driving, both in a professional and a private context" http://www.dvr.de/download/broschuere_auf_den_punkt-3.pdf

135 http://www.hetnieuwerijden.nl/

to fuel costs, which account for up to 30 percent of vehicle costs[136]. Aspects of efficiency control have also been integrated into the company's fleet reporting systems. The computer system records CO_2 compared over time for entire vehicle groups, individual drivers and fleets.

Recommendations to the EU

- Prioritise eco driving and highlight the safety benefit through further funding of training and awareness campaigns.
- Include eco driving and safety aspects in EU driver training and testing.

Recommendations to the Member States

- Introduce initiatives for uptake of Eco driver training including the safety benefit amongst employers.

Recommendations to Employers

- Following a risk assessment target employees for eco driver training including the safety aspects.

Part 4 Focus on Technology

4.1 Speed Management Technologies

The adaptation of driving speed to the prevailing conditions and speed limits is a primary way of controlling the crash risk of the driver. Different in-vehicle technology systems exist, ranging from informative to intervening systems that can help manage and prevent speed and that should be deployed by the employer. These are presented in greater detail in our second PRAISE Thematic Report, together with issues related to data management and protection.[137] Setting up clear management systems to follow up and analyse speeding data collected is crucial to the success of a system in managing risk of speeding. This section will present a summary of these different technologies focussing on their speed applications in particular.

In its White Paper, the European Commission recognised that promoting in-vehicle systems that 'provide real-time information on prevailing speed limits' will also contribute to improving compliance with speed limits[138]. The White Paper refers to the need to harmonise and deploy road safety technologies. ETSC considers that the Commission should assume a stronger leadership role in promoting technologies, especially Intelligent Speed Assistance Systems and that managing speed should be introduced to commercial vehicle fleets as a priority.

4.2 Intelligent Speed Adaptation

Intelligent Speed Adaptation (ISA) is an Intelligent Transport System (ITS) which warns the driver about speeding, discourages the driver from speeding or prevents the driver from exceeding the speed limit[139]. Information regarding the speed limit for a given location is usually identified from an onboard digital map in the vehicle. Other systems use speed sign reading and recognition either using already built into the vehicle or aftermarket navigators.

There are two major types of systems – informative and supportive. An informative system gives the driver feedback in the form of a visual or an audio signal. A supportive system works in the form of increasing the upward pressure on the pedal or cancelling a driver's throttle demand if it demands more throttle than is required to drive at the speed limit.

A Swedish large-scale study of the effect of informative and supportive ISA, involving nearly 4,500 vehicles, shows that if everyone had informative ISA fitted, injury accidents could be reduced by 20% in urban areas[140]. Supportive systems have even greater potential to reduce fatal and serious accidents. Estimates by Carsten[141] show that a mandatory supportive ISA scheme could lead to a reduction of 36% in road traffic (injury) accidents and 59% collisions resulting in death. There would also be benefits in terms of lower fuel consumption (up to 8%) and more effective road traffic enforcement.

4.3 Speed Limiters

Another technical possibility is to impose the appropriate speed by limiting the speed of the vehicle, as is already being done in respect of

136 Leaseplan http://www.leaseplan.de/579.html?&tx_ttnews[pS]=1322216040&tx_ttnews[tt_news]=542&tx_ttnews[backPid]=847&cHash=2c4f7d6a6c
137 PRAISE Thematic Report 2 http://etsc.eu/PRAISE-publications.php
138 European Commission (2011) Transport White Paper http://ec.europa.eu/transport/strategies/2011_white_paper_en.htm
139 Regan M., Young K. (2002) Intelligent Speed Adaptation: A Review. http://people.plan.aau.dk/~agerholm/ISA%20litteratur/Intelligent%20Speed%20 Adaptation.%20A%20review.%20Australien.pdf
140 Biding, T. and Lind, G. (2002), Intelligent Speed Adaptation (ISA), Results of large-scale trials in Borlänge, Lidköping, Lund and Umeå during the period 1999-2000, Swedish National Road Administration, Publication 2002:89 E URL: http://www.isa.vv.se/novo/fi lelib/pdf/isarapportengfi nal.pdf (2004-11-04).
141 Carsten O., Fowkes M., Lai F., Chorlton K., Jamson S., Tate F., & Simpkin B. (2008), ISA-UK intelligent speed adaptation Final Report

international upper speed limits for heavy goods vehicles and coaches. Corresponding action is needed for light vehicles[142]. But speed limiters do not have the technically more advanced function to adapt the maximum speed to the prevailing conditions, as does ISA.

In HGVs and Buses

An EC Directive (92/24/ECE) requires speed limiters on trucks over 12 tons and buses manufactured after 1 January 1988; the specified limits are 90 and 100 km/h, respectively. The Directive has since been extended to light commercial vehicles over 3.5 tons, and passenger vehicles with more than nine seats (ECE 2004/11). Research showed positive effects on emissions and fuel consumption through prevention of over-speeding[143].

The EC Directive requires speed limiters to be generally resistant to tampering and not to be adjustable while the vehicle is in motion. However, the illegal modification of speed limiters to allow higher speeds continues to be a problem[144]. This is a further reason why information to the driver about why they should stick to certain speeds is so essential. Two further problems are identified by the OECD. Speed limiters do nothing to reduce speeding on roads with speed limits below the Speed Limiter setting, nor on downgrades steep enough to cause free-rolling. Secondly in some cases, truck drivers may be tempted to always reach the maximum speed set by the limiters. In addition, the overtaking between two heavy vehicles may take a long time. However, the OECD evaluates them as having contributed significantly to reducing accidents involving trucks[145].

Digital tachographs are installed on commercial vehicles, as original equipment or retro-fitted, to allow real time monitoring of speed as well as logging drivers' hours of service. Electronic tachographs have rapidly supplanted mechanical tachographs due to their ability to record data in addition to speed and time, that can be downloaded either at the end of a trip or after a certain length of time for computerised

analysis. The legislation governing tachographs is covered in more detail in the PRAISE Thematic Report 8[146].

In Light Commercial Vehicles

In 2009 the European Commission prepared a legislative proposal to reduce CO_2 emissions from LCVs. Following this proposal, the European Parliament's Transport and Industry committees both supported the introduction of a binding speed limiter set at 120 km/h for such vehicles. However, the lead committee (Environment) voted against the introduction of speed limiters. In a more recent development the European Commission announced the intention to introduce speed limiters for light vehicles in its "Road Safety Policy Orientations". The Commission's White Paper on Transport, on also makes a commitment to 'examine approaches to limit the maximum speed of light commercial road vehicles, in order to decrease energy consumption, to enhance road safety and to ensure a level playing field.'[147]

4.4 Telematics

The use of telematics and new technologies which can monitor and record speed provides employers with an opportunity to continuously monitor their employees driving and speed behaviour. This is particularly relevant to professional drivers and provides a means by which employers can identify speeding offences that may go undetected by national enforcers. Insurers can incentivise the use of such technologies by linking their use to insurance premiums. Employers can monitor driving in real-time and provide immediate feedback to drivers if their speed becomes inappropriate or the data can be fed into broader risk-rating systems which combines on the road incidents with other information such as driving licence points to ascertain an overall risk-rating for individual driver. Such an approach has already been implemented by some companies including Tesco Dotcom. Below is a depiction of their risk-rating system.

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142 ETSC (1995) Reducing Traffic Injuries from Excessive and Inappropriate Speed
143 OECD/ECMT (2006) Speed Management http://www.internationaltransportforum.org/Pub/pdf/06Speed.pdf
144 ibid
145 ibid
146 PRAISE Thematic Report 8 http://etsc.eu/PRAISE-publications.php
147 European Commission (2011) Transport White Paper http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0144:FIN:EN:PDF

Figure 12: Tesco Risk Rating

Another company uses telemetry with a similar approach to Tesco. Here fleet managers can see not only that a speed offence took place but also more precisely the speed of the driver in the different speeding zone. Many other companies use telemetry with a similar approach, by linking a range of data sets including telemetry, collision, risk assessment, fuel and licence check data.

While respecting speed limits, drivers can drive at inappropriate speeds or have an inappropriate driving style: harsh braking, taking curves and corners at the limit of the vehicle's stability, harsh acceleration, overloading, etc. Advanced telematics systems can provide insight into driving behaviour. For example, when linked to the braking system on commercial trailers, the brake system automatically intervenes when the trailer tends to rollover (a functionality called RSS, "Rollover Stability Support"), or the Electronic Stability Control (ESC) activates. Such a telematics system can send an alert to the dispatcher of the fleet each time such intervention happens, which allows the fleet owner to review the event with the driver, re-train if necessary, or take other actions.

In the example in Figure 13 below, fleet managers can see not only that a speed offence took place but also more precisely the speed of the driver in the different speeding zone. Using such data, via a data-warehouse managers at all levels in an organisation can identify the prevalent risks, then target, record and monitor relevant interventions such as training, communications and focused one-to-one discussions. Such devices can be put in all fleet vehicles, although increasingly more detailed analysis is being used to target attention to the 5-15% of drivers that are responsible for a disproportionate number of collisions and violations in most organisations. Cost effective portable or transferable telemetry devices are increasingly available for this purpose. Several proactive, risk led insurers are also becoming involved in this process. One good example is Zurich, through its Zurich Fleet Intelligence solution[148].

148 http://www.zurichfleetintelligence.com
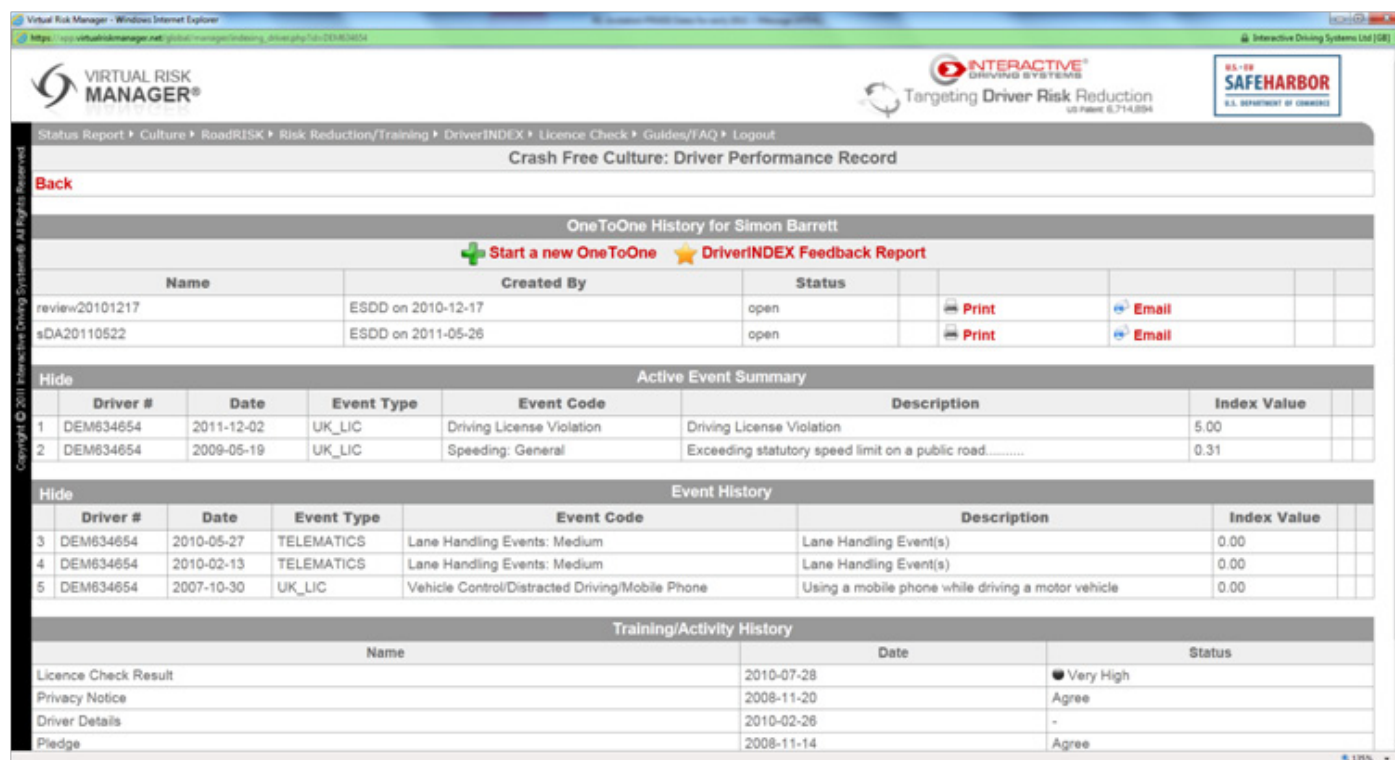
Driving for Work: Managing Speed

Figure 13: Risk Rating System

4.5 Event Data Recorders

Event or Accident Data Recording systems (EDRs/ADRs) are commonly known for their 'black box' type of use and were designed for aircraft or trains. They provide information regarding the circumstances surrounding a crash including speed. A typical example for the use of EDRs is for the authentication of an incident for insurance claims or for the rejection of insurance claims (e.g.: drivers involved in a crash because of allegedly inappropriate speed). EDRs can be used for accident investigation as well as for driver monitoring. But EDRs are typically not designed for recording driving data as a tachograph because the recording is linked to a defined event trigger threshold. This could typically be a collision impact or a harsh driving manoeuvre. This depends on the functionalities required by the customer.

Some stakeholders in Europe propose a solution to determine whether drivers display aggressive driving styles. This works through the use of in-car devices such as sensors and GPS systems that monitor the acceleration, speed, and movement of vehicles. Through these, the system analyses different types of manoeuvres and identifies for each manoeuvre performed during a trip whether it has been performed correctly or too aggressively (changing lanes abruptly, accelerating suddenly and so on). On the basis of this the system can identify risky manoeuvres, and empower drivers to manage their own safety by giving instantaneous in-vehicle feedback. When using EDRs data protection concerns must be considered at an early stage and proper explanation of the appropriate use of data given to staff. It needs to be borne in mind that recorded incidents may go up at the start because collisions that were not reported previously start to get reported.

4.6 EuroNCAP Speed Technologies in "Speed Assist"

In 2009 the European New Car Assessment Programme (EuroNCAP) introduced a new element in its star ranking. Called "Safety Assist" Euro NCAP rewards manufacturers for the fitment of a speed limitation device, as well as electronic stability control, and intelligent seat belt reminders. Currently, Euro NCAP rewards only systems which are voluntarily set by the driver. They state that in the future, systems may become available which automatically detect the speed limit at any point in the road network and limit a car's maximum speed appropriately[149]. Euro NCAP currently rewards two types of system: those which can be set by the driver and which actively prevent the car from exceeding that maximum; and those which simply warn the driver when the car's speed

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149 EuroNCAP Speed Limitation Devices http://www.euroncap.com/Content-Web-Page/b103e5e1-b536-4298-b563-3aed74e4be62/speed-limitation-devices.aspx

is above the set maximum. The functionality of the system is considered to make sure that the system can be set and unset easily and without undue distraction to the driver; the clarity of the signals given to the driver are assessed to make sure that there is no confusion about the current set maximum and to ensure that a suitable warning is given if the system is unable to limit the speed to that maximum. For active systems, a check is made to ensure the system is able to limit the speed of a car to the maximum set by the driver. At each of three speeds, the accuracy with which the set maximum can be maintained is determined. In the EuroNCAP ranking a maximum of one point is available to active systems which meet Euro NCAP's requirements. Warning-only systems can receive a maximum of 0.5 points. The points go towards the vehicles 'Safety Assist' score which is part of the overall EuroNCAP star ranking. Effectively, no car can receive the coveted five star rating without including a speed limitation device.

4.7 Good Practice Examples of Speed Management Technology Use

ISA

Examples of the implementation of ISA come mostly from Sweden. ISA systems have been installed in about 4,000 of the Swedish Road Administration (SRA) cars. A number of city municipalities have equipped their vehicles with informative ISA. The local buses in Lund for example are today equipped with an ISA system with auditory warning for the driver if they exceed the speed limit. In Sweden ISA is also already used by several companies and between 50 and 60 local authorities, such as Stockholm and Västerås, on the basis of an informative system.

Some examples of companies are:

• Transport companies: SITA, Panaxia, Alltransport
• Taxi companies: Gävle taxi, TaxiBil Syd
• Rental car companies: Hertz
• Elevator supplier and service: Kone

Speed Limiters

Speed limiters for LCV's have also been used by some companies and have been reviewed in PRAISE Thematic Report 2[150]. These limit the speed and are not as flexible as ISA. In the UK Royal Mail and Centrica have fitted speed limiters (limited to 70mph) on all vehicles including LCV's and put stickers on the back of all their vehicles to inform other road users of their self imposed speed limit.

Tesco Dotcom

Tesco Dotcom is an on line grocery home delivery company. Its UK operation delivers home shopping to over 1 million active customers, at a yearly delivery rate of approximately 361,000 per week (2009/2010). Dotcom operates from 305 operational sites utilising 2750 vans and over 9000 drivers, supported by a personal shopping and management team consisting of some 9500 additional personnel. The company introduced telematics in the form of black box technology fitted to vans to improve road safety and fuel efficiency. This resulted in a positive effect on reducing Occupational Road Risk and a sustainable change in driver's behaviours. The data produced allows the management team to monitor the performance of the driver and give a live de-brief to the driver on their return to the store. In relation to speeding the use of telemetric has facilitated a contextual speeding programme to support the companies 'no speed' policy. The object of the programme is to confront the drivers with data facts from the telemetrics regarding their own behaviour. If they are shown to be travelling over the speed limit a Google map reference is generated on a report. This is then converted into Google Street view that is printed and is shown to the driver, who is asked if his/her behaviour is reasonable. It is hard for any driver to justify speeding past a school, as a result of this project the number of speeding events has dropped dramatically. The result of the introduction of this programme has been a reduction in recorded speeding events of over 66% and a reduction in prosecutions of over 90%. The reduction in the number of Notices of Intention to Prosecute has meant that fewer Tesco drivers have incurred 3 points and a £60.00 fine. To support the continued effort to reduce the risk, all LCV's are restricted to 58 miles per hour.

Balfour Beatty Utility Solutions[151]

A UK company, Balfour Beatty Utility Solutions introduced a GreenRoad's service across its commercial fleet of 1400 vehicles as part of its ZERO HARM programme. The technology based system takes a holistic approach to improving driving behaviour, combining immediate objective, in-vehicle feedback with detailed reporting,

150 PRAISE Thematic Report 2 http://etsc.eu/PRAISE-publications.php
151 Information from GreenRoad http://www.greenroad.com/balfour-beatty-utility-solutions-targets-zero-harm/

coaching, risk analysis and alerts. 'GreenRoad customers typically reduce crash costs by up to 50% and reduce fuel usage and emissions by up to 10 percent.' In the first 3 months of its operation the at Balfour Beatty Utility Solutions there was a 63% reduction in driver risk, reduced insurance premiums and reduced fuel consumption by 10%.

Shell Bulgaria

Shell Bulgaria EAD is part of Royal Dutch Shell plc. The company employs 80 people in Bulgaria and currently has a network of 111 retail stations. Shell has defined 4 Key performance Indicators for its professional drivers in terms of road safety namely; speeding, working hours, harsh breaking, and harsh acceleration. Drivers' are observed in real time through GPS and are immediately informed in case of a breach in any of these areas. If repeated breaches occur additional training is organised with the respective driver to improve performance. The company also obliges its contractors to comply with Shell rules about speed limit on motorways which is limited to 80 km/h which is lower than the legal limit.

Recommendations to the EU

- Encourage further roll out of speed management technologies including ISA amongst particular user groups such as government vehicle fleets, public buses and company vehicle fleets including those of rental car companies.
- In the medium term adopt legislation for the mandatory fitting of all fleet cars with speed management technologies including Intelligent Speed Assistance systems.
- Contribute to the development of harmonised standards for Intelligent Speed Assistance (ISA) systems towards eventual universal fitment.
- Develop a European standard for a "speed limit service", i.e. over the air provision to in-vehicle systems of current geodata on road speed limits.
- Require member states to provide a standardised "speed limit service" over the air.
- Extend the mandatory use of speed limiters and tachographs, which already exists for HGVs, to LCV's 3.5 tons GVM, as a first step to introducing ISA to these vehicle types.
- Contribute to the research-led development, standardisation and deployment of in-vehicle telematics including "Event data recorders" to record collisions and other driver behaviours such as speeding and harsh acceleration.
- Support and encourage the implementation of well researched and evaluated pilot studies of new in vehicle technologies in organisations.
- Within the context of a strategic plan, regularly monitor developments of vehicle and in vehicle technology to update standard setting followed by market penetration or eventual legislation for their deployment.
- Encourage employers managing fleets (also those of EU institutions) to purchase vehicles with in vehicle technologies with high life saving potential.

Recommendations to Member States

- Include safety criteria (including in-vehicle technology tackling speed) for purchase of vehicles in public procurement requirements and for government authorised contractors and sub-contractors.
- Support employers to fulfil their legal requirements to undertake a risk assessment. As part of this provide information and training to fleet managers to inform them about the need to consider in-vehicle safety technologies in the new vehicle purchase and lease process and in how to conduct a fleet risk assessment, with supporting examples and case studies.
- Highlight the need for a wider use of in-vehicle technologies tackling speed with a high life saving potential especially in fleets.
- Promote vehicle safety information, such as EuroNCAP results (especially the safety equipment rating) more widely and effectively so that they play a more prominent role in new vehicle choices and fleet purchasing policies.
- Give incentives (such as tax breaks) to employers investing in effective and proven vehicle safety technologies.
- Encourage insurers to support the successful deployment of in vehicle technologies and review their cost/benefit against future insurance premiums.
- Encourage insurers to identify customers with above-average risk profiles, and recommend risk and cost mitigation solutions.
- Encourage insurers to work closely with system suppliers to develop solutions to increase safety.
- When implementing procedures to manage fleets include effective monitoring processes that take account of the whole supply chain.

Recommendations to Employers

- Include safety criteria when purchasing vehicles, including 5 star Euro NCAP cars and vehicles using in-vehicle safety technologies.
- Communicate vehicle safety technologies purpose (i.e.: this is for your own good and we value you and are concerned for your wellbeing!) to employees and train them to use equipment properly.
- Develop a contractual and binding system of close working, risk engineering, incentives and sanctions to generate and maintain the necessary level of cooperation between the insurance company and the fleet operator.
- Set speed limiters in their HGV fleets at a level which is lower than the legally required compliance limit, which can benefit fuel utilization as well as safety.
- Use the available technology and systems to analyse the driving behavior of employees, contractors and subcontractors.
- Implement a data warehouse (See Figures 12 and 13) based on the data from licence checks, collisions, risk assessment and vehicle systems, to identify good drivers, and those requiring further coaching and development.
- Work closely with suppliers, equipment manufacturers, insurers and customers to develop appropriate safety solutions.

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