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EUROPEAN CONFERENCE OF MINISTERS OF TRANSPORT

TRANSPORT RESEARCH CENTRE

SPEED MANAGEMENT

Summary Document

JOINT TRANSPORT RESEARCH CENTRE

In January 2004, the Organisation for Economic Co-operation and Development (OECD) and European Conference of Ministers of Transport (ECMT) brought together their transport research capabilities in setting up the **Joint Transport Research Centre**.

The Centre has 50 full members from Asia-Pacific, Europe and North America, including all members of the OECD and ECMT.

The Centre's mandate is to promote economic development and contribute to structural improvements of OECD and ECMT economies through co-operative transport research programmes addressing all modes of inland transport and their intermodal linkages in a wider economic, social, environmental and institutional context.

Speed Management is the product of one of three road safety projects conducted concurrently by the Centre, along with *Achieving Ambitious Road Safety Targets* and *Young Drivers: the Road to Safety*.

For more information regarding the Joint OECD/ECMT Transport Research Centre, including its full programme of research activities and other recent publications, please consult www.cemt.org/JTRC/index.htm.

For more information regarding the Centre's project on Speed management, please consult http://www.cemt.org/JTRC/WorkingGroups/SpeedManagement/index.htm.

KEY FINDINGS

The following is a synopsis of the key findings of the Joint OECD/ECMT Transport Research Centre's report, *Speed Management.*

- Speeding -- i.e. excessive and inappropriate speed -- is a widespread social problem as, typically, at any time 50 % of drivers are above the speed limits. It is the number one road safety problem in many countries, often contributing to as much as one third of fatal accidents and speed is an aggravating factor in the severity of all accidents.

- Higher vehicle speeds also contribute to increased greenhouse gas emissions, fuel consumption and noise and to adverse impacts on quality of life, especially for people living in urban areas.

- Research indicates that co-ordinated actions taken by the responsible authorities can bring about an immediate and durable response to the problem of speeding. Indeed, reducing speeding can reduce rapidly the number of fatalities and injuries and is a guaranteed way to make real progress towards the ambitious road safety targets set by OECD/ECMT countries, as well as to reduce environmental pollution and energy consumption.

- Speed management -- which should be a central element of any road safety strategy -- can help achieve appropriate speeds, taking into account mobility and economic needs as well as safety and environmental requirements. A coherent consistent policy will produce better results than a series of isolated measures. The speed management package should encompass the following elements:

  – Targeted education and information to the public and policy makers.

  – Assessments of appropriate speed for all types of roads and a review of existing speed limits in relation to accident risk based on road function, presence of vulnerable road users, traffic composition, and road design and roadside characteristics. In urban areas, the speed limit should not exceed 50 km/h and 30 km/h zones are recommended in areas where vulnerable road users are particularly at risk, as they have proven very effective in reducing accident risk and severity and protecting vulnerable road users.

  – Infrastructure improvements which are aimed at achieving safe, "self explaining" roads; these should guide drivers in choosing the appropriate speed.

  – Sufficient levels of traditional police enforcement and automatic speed control, encompassing all road users (including foreign drivers), and the development of section control (control of average speeds over sections of a road). More effective enforcement can be achieved through measures like minimum tolerances above speed limits and use of mobile cameras.

- Development of vehicle engineering, such as collision avoidance systems and speed limiters. In countries where this is not the case, consideration should be given to mandatory speed limiters for trucks and coaches.

- Given the great potential benefits that new technologies can bring, their progressive implementation is encouraged. Appropriate actions could include:

  - All new cars equipped with manually adjustable speed limiters, and as soon as practicable with voluntary informative or supportive Intelligent Speed Adaptation (ISA) systems.

  - To help secure the potential benefits of the ISA technologies, governments are also encouraged, in co-operation with relevant partners, to develop interoperable digital speed limit databases.

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EXECUTIVE SUMMARY

This document summarises the report entitled *Speed Management*, published by the Joint Transport Research Centre of the Organisation for Economic Co-operation and Development (OECD) and the European Conference of Ministers of Transport (ECMT). This report is the result of two years of collective effort by a group of experts in the field of speed management from throughout OECD and ECMT member countries.

Over the past five decades, society and individuals have benefited greatly from rapidly improving road systems. During the same period, industry has manufactured and sold motor vehicles able to travel at increasingly high speeds. Higher speed vehicle transport has contributed to the economic development of OECD/ECMT countries, and has contributed to improvements in the general quality of life. On the other hand, these higher vehicle speeds have had major adverse impacts, principally in terms of road accidents - and consequent death, injury, and material damage but also in environmental terms including noise and exhaust emissions and in terms of the liveability of residential and urban areas.

Recently, there has been increasing demand, particularly in urban areas, for strategies that reduce such adverse impacts. A growing portion of the population has sought to improve road safety, reduce adverse environmental impacts and improve the general quality of life. In urban areas in particular, residents are increasingly in favour of lowering vehicle speeds in order to protect the environment, provide a better level of amenity for the general resident population, better protect those living near roads, and in particular ensure the safety of pedestrians, bicyclists, children and people with reduced mobility.

Speed management policies which can deliver these outcomes have become a high priority in many countries.

The effects of speed

Speed has many positive impacts, the most obvious being that it allows a reduction in journey time and therefore enhances mobility. Advances over the past century in roads, motor vehicles and road transport have decreased travel times significantly – and have also contributed to the development of national economies, facilitated access to employment, goods and services and facilities such as hospitals, entertainment and shopping centres, and in turn widened opportunities for housing, jobs, etc. These advances have clearly contributed to improvements in the general quality of life.

Speed also has some strong negative consequences (e.g. on road safety and the environment) and can contribute to significant adverse impacts on the liveability of residential and urban areas.

The problem of speed

Excessive and inappropriate speed is the number one road safety problem in many countries, often contributing to as much as one third of fatal accidents and an aggravating factor in all accidents.

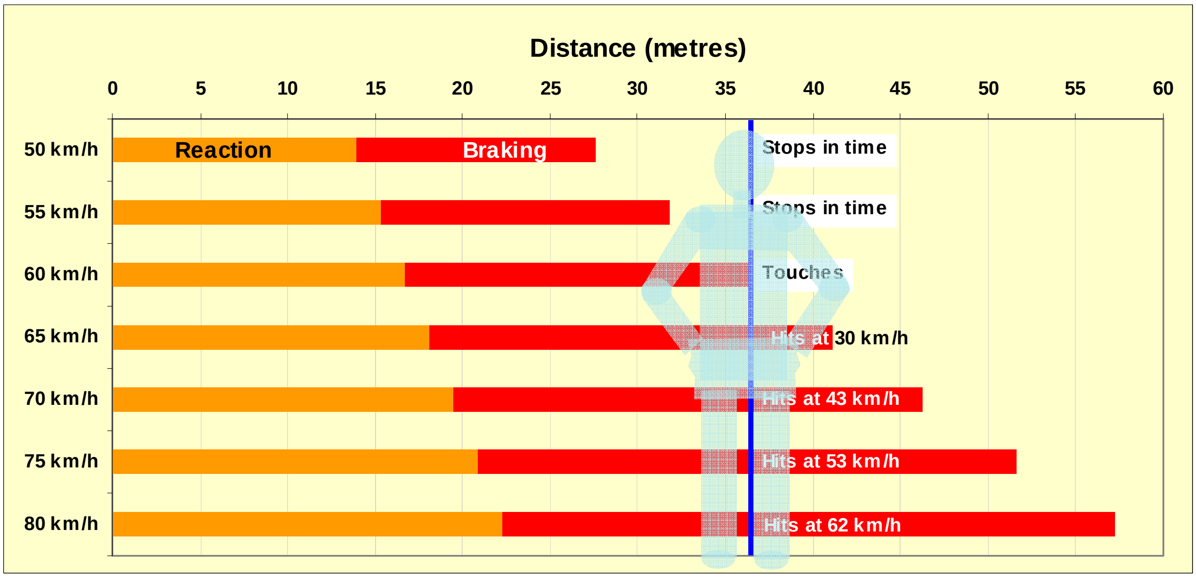
Speeding - which encompasses *excessive speed* (*i.e.* driving above the speed limits) or *inappropriate speed* (driving too fast for the prevailing conditions, but within the limits) - is dangerous. As well as being a causation factor in around one third of fatal accidents, speed is an aggravating factor in the severity of all accidents.

As the impact speed increases, the forces that vehicle occupants must absorb in a crash increase dramatically, in accordance with kinetic energy principles. Occupant protection systems are very effective at low and moderate speeds. However, they cannot adequately protect vehicle occupants from these kinetic forces at high impact speeds.

Vulnerable road users are particularly exposed to vehicle impacts - especially in urban areas - at speeds which are above the limits of human tolerance.

The possibility of avoiding collisions reduces as speed increases. As an example, as shown in Figure 1, with a speed of 80 km/h on a dry road, it takes around 22 metres (the distance travelled during a reaction time of approximately 1 second) to react to an event, and a total of 57 meters to come to a standstill. If a child runs onto the road 36 meters ahead, the driver would most likely kill the child if driving at 70 km/h or more, hurt the child if driving at 60 km/h and avoid hitting the child if driving at 50 km/h. However, if the child runs out on to the road 15 metres ahead of the driver, the probability is that the child would be fatally injured at 50 km/h and all higher speeds.

Figure 1. **Stopping distance at different speeds (including reaction time of around 1 second)**

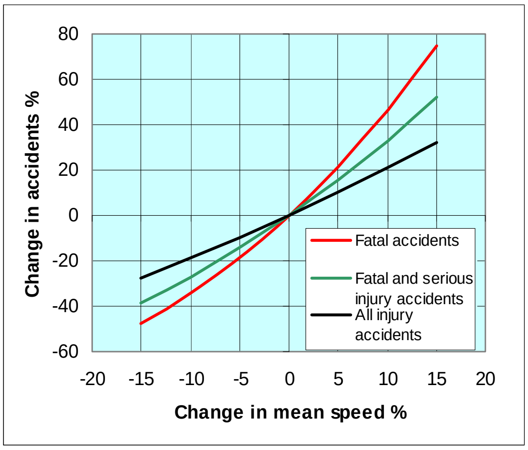


Source: Adapted from ATSB.

Excessive speed is a widespread social problem, which affects the entire road network (motorways, main highways, rural roads, urban roads). Typically, at any time, 50% of drivers are above the speed limits. Often, drivers exceed speed limits by less than 20 km/h, but a proportion of drivers travel at speeds more than 20 km/h above the limit. Speeding concerns all types of motor vehicles and all groups of road users. However, young drivers are the group the most involved in speeding behaviour.

The significant adverse road safety impacts of higher vehicle speeds have been confirmed by extensive research. The relationship between serious injury accidents, fatal accidents and speed has been modelled by many researchers. Nilsson's "Power Model"[1] (see Figure 2) which is well known leads to the broad relationships illustrated in the chart and the following estimates of the effects of changes in mean speed on fatal accidents, fatal and serious injury accidents and all injury accidents:

Figure 2. **The Power Model: relationship between change in mean speed and accidents**



Source: Nilsson (2004).

- A 5% increase in average speed leads to approximately a 10% increase in all injury accidents and a 20% increase in fatal accidents.

The same research indicates the positive impacts of reducing vehicle speeds:

- A 5% decrease in average speed leads to approximately a 10% decrease in injury accidents and a 20% decrease in fatal accidents.

As the model indicates, reducing speed by a few km/h can greatly reduce the risks of accidents as well as mitigating the consequences of an accident.

Recognising the broad concerns about speeding, the Secretary-General of the United Nations, in his report[2] to the General Assembly on *Improving global road safety*, has invited member States to "take action on inappropriate and excessive speed".

Higher vehicle speeds also contribute to increased greenhouse gas emissions, fuel consumption and noise and to adverse impacts on quality of life especially for people living in urban areas.

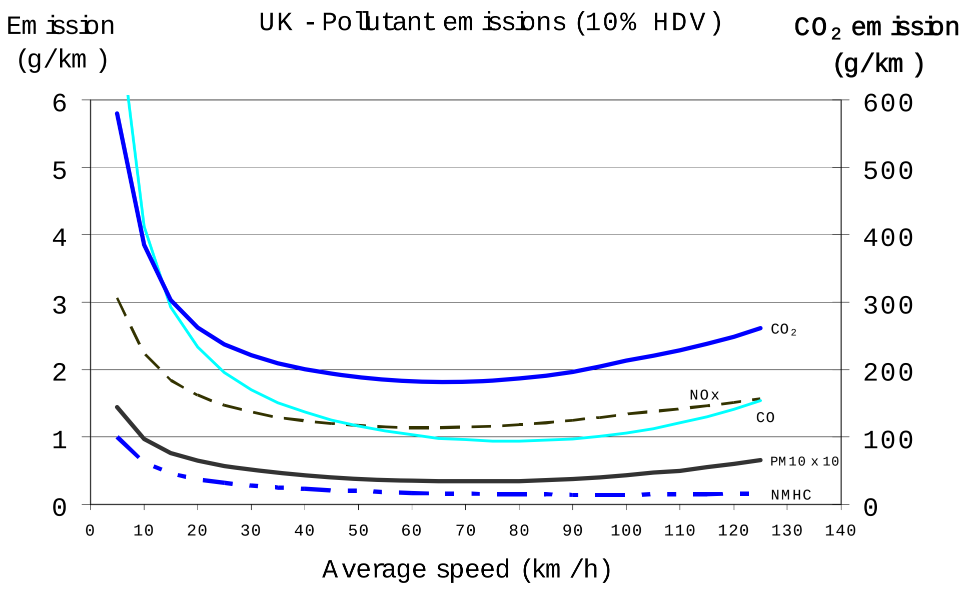
Speed has important impacts on the environment as it is strongly related to the emissions of greenhouse gases (mainly CO_2) and of local pollutants (CO, NOx, HC, particulates), as well as to

1. Any model is a simplified representation of reality. The Nilsson model of the relationship between vehicle speed and fatalities and injuries, while founded on a sound scientific base, can not take into account all the characteristics of the road environment. The actual effects depend on the exact road traffic and characteristics. For example, the effect is considerably larger on urban roads as compared to motorways.

2. United Nations General Assembly, Document A/60/121 dated 1 August 2005.

increasing fuel consumption. As shown in Figure 3, the optimum speed, *i.e.* the speed at which emissions are minimised, varies according to the type of emission. Typically, pollutant emissions are optimised for constant speeds of 40-90 km/h. Ozone - which comes from chemical reactions involving hydrocarbons, oxides of nitrogen, and sunlight - is also affected by vehicle emissions and therefore by vehicle speeds.

Figure 3. **Gaseous emissions as a function of speed**
United Kingdom (2005)



Source: UK Department for Transport.

Speed also has a considerable impact on the exterior noise that a vehicle emits and therefore on overall levels of traffic noise, which are another major concern, particularly in urban areas and at night time.

Travel speed, actual and perceived, can also affect - both positively and negatively - people's assessments of their level of amenity.

Greater mobility, faster travel, and better access to facilities and services improve general assessments of the quality of life, while the significant adverse impacts such as on the environment detract from such quality of life. Some impacts such as injury or noise can be measured; others are more difficult to assess. Disruption to local communities, or fear of fast moving vehicles, which may discourage individuals from walking or cycling, or restrict their ability to reach destinations easily, are not readily quantifiable but can still have a considerable impact on the people concerned. In these cases, the social costs of speed are borne mainly by those outside moving vehicles.

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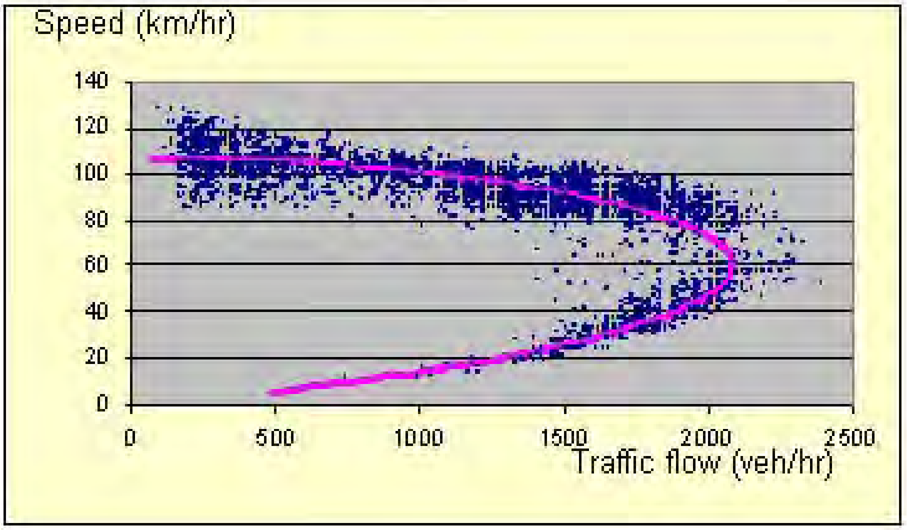
Speed management is not incompatible with mobility and economic needs

Mathematically, higher speed leads to reduced travel time. However, the effects of speed in reducing travel time are generally overestimated by road users and, at least in urban areas, the time savings are often small or negligible because of intersections and delays at traffic lights.

In terms of infrastructure use, reducing the average speed of the flow does not necessarily reduce the throughput capacity of the road. For example, the maximum capacity of an urban motorway is typically obtained at a speed of about 60-70 km/h as illustrated in Figure 4 which shows the relationship between traffic flow and speed for a 2x2-lane urban motorway. It shows that speeds reduce as traffic increases until traffic reaches levels where traffic flows become unstable.

Figure 4. **Traffic flow per lane as a function of travel speed for an urban motorway (2x2 lanes)**



Source: NSC (France).

How to address the problem of speeding

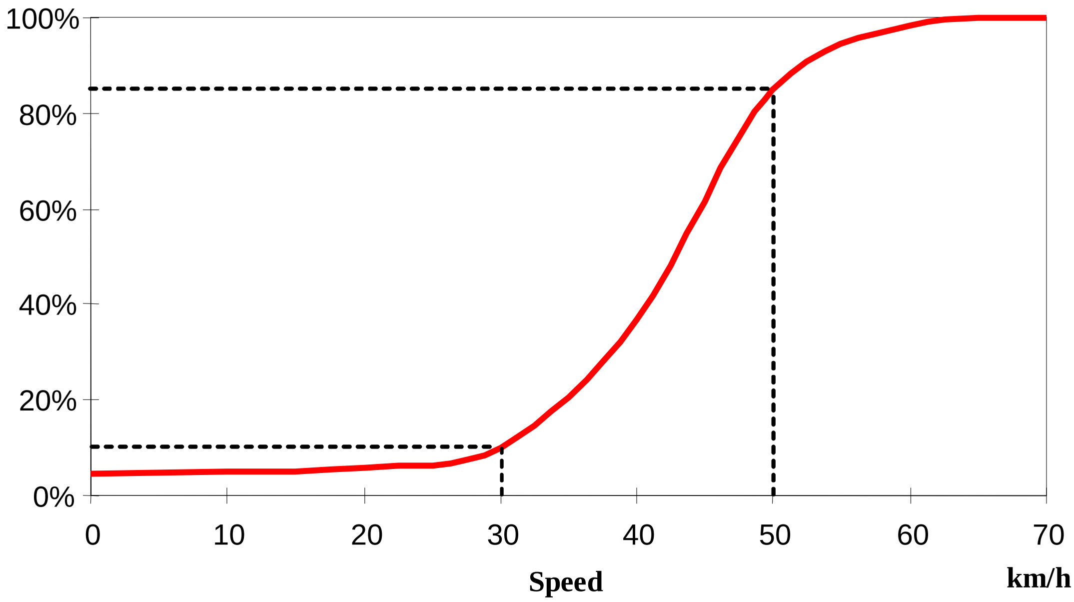
Most governments have recognised the need for action to address speeding. *Speed management*, which should be a central element of any road safety strategy, aims to achieve appropriate speeds on all parts of the road network.

Speed management strategies and policies are often consistent with policy goals in other areas (*e.g.* protecting the environment) and may be embedded in wider transport strategies. These goals need to be made more prominent in order to encourage greater collaboration and cooperation and to increase public acceptance and political readiness to take action.

With appropriate political support, speed management strategies can make a real contribution to achieving the triple goals of improved road safety, reducing environmental impacts and moderating energy consumption.

A very important and relatively recent development in addressing the problem of speeding has been to recognise and act on the thresholds of physical resistance of the human body to the energy released during a crash (which is related to the impact speed). These thresholds need to become a critical input to the development of laws, regulations and infrastructure. For example, according to the World Health Organisation, pedestrians incur a risk of around 80% of being killed at an impact speed of 50 km/h, while this risk is reduced to 10% at 30 km/h (see also Figure 5). For car occupants, wearing seat-belts in well designed cars can provide protection to a maximum of 70 km/h in frontal impacts and 50 km/h in side impacts.

Figure 5. **Probability of fatal injury for a pedestrian colliding with a vehicle**



Source: Interdisciplinary Working Group for Accident Mechanics (1986); Walz *et al.* (1983) and Swedish Ministry of Transport (2002).

Co-ordinated actions should be taken by the responsible authorities to bring about an immediate and durable response to the problem of speeding

Reduced speeding will immediately reduce the number of fatalities and injuries on the roads and is one guaranteed way to make real progress towards the ambitious road safety targets set by some OECD/ECMT countries (*e.g.* the -50% fatalities target adopted by ECMT Ministers in 2002 for the period 2000 to 2012 and other similar targets set at national level).

Recently, there have been a number of very successful examples of responsible authorities taking decisive and coordinated action to reduce speeding. Two of these are:

- ***France.*** On 14th July 2002 – the national holiday in France – the French President announced that the "fight against road unsafety" would be one of the government's three main objectives for the following five years. A year later, a road safety action plan – which involved several ministries – was adopted which included a strong focus on speed enforcement, with the introduction of automatic enforcement. Over three years from 2002, the average speed on French roads decreased by 5 km/h and fatalities decreased by over 30% in France – an unprecedented result.

- ***Australia.*** In 2002, the State of Victoria launched their *Arrive Alive!* Strategy, which also had a strong focus on lowering vehicle speeds. Stronger enforcement and a reduced tolerance margin for speed limit excedence led to noticeable decreases in the average speed, especially in 60, 70 and 80 km/h zones. During the first four years of the strategy (2002-2005), there was a reduction of around 16% in fatalities. The 43% reduction in fatalities in metropolitan Melbourne from 2001 to 2003 was spread across all road user categories. Even though it is difficult to conclude that the reduction in road trauma was solely due to improved compliance with speed limits, patterns of the injury and fatality reduction suggested that this was a major contributor to the trauma reduction.

As well as achieving rapid improvements in road safety, addressing speeding problems in these ways will make a significant contribution to the objective of reducing greenhouse gas emissions.

Reduced speeding will also reduce other adverse impacts which affect people's perceptions of their amenity and quality of life – including vehicle noise, disruption to local communities, and less visible impacts such as the extent to which fast moving vehicles discourage individuals from walking or cycling, or restrict their ability to reach their destinations easily.

Development of a speed management package that achieves the right balance between the individual speed management measures

The speed management package will need to consider the following elements: infrastructure improvement, speed limits, appropriate signing and marking, vehicle engineering, education, training and incentives, enforcement and driving assistance technologies. In addition, a key element of the success of speed management policy is the measurement of speed. All countries are encouraged to monitor speed on their road network regularly, as this is a major performance indicator with respect to both safety and environmental objectives.

Education and information to the public and policy makers about the problem of speeding

This is a prerequisite for the successful implementation of speed management actions. The most successful education and information programmes encompass the logical basis of the speed limit system, and the reasons for speed management measures, highlighting the positive safety outcomes of these measures, as well as the environmental benefits (air pollution and noise) of moderated speeds.

Education, training and information programmes are matters of concern to the entire population. However, different actions are required where children, teenagers, young drivers or drivers in general are concerned. Education and training of learner drivers needs to focus on the risks and other disadvantages of speeding so that these become an explicit issue in driver training. It is important that the driving instructors themselves are educated on the issue of speed and its effects.

Drivers who are already licensed form the largest group of interest, but they are also very difficult to reach. Countries generally rely on information campaigns, *e.g.* by billboards alongside the road or messages on television. Information campaigns are indispensable when used to support other measures but will have little effect if they are applied as a stand-alone measure.

The production and dissemination of information should be a continuous activity.

At the same time, advertisements for cars should not glamorize speed, as is currently often the case. The depiction of speed in advertising of cars, motorcycles and even sport utility vehicles (SUVs), both in print and television media, is widespread but should be actively discouraged. Rapid progress could be made through voluntary agreements on new advertising standards. Governments need to encourage manufacturers to replace the emphasis on speed with positive messages about the benefits of vehicle features and technologies that can improve safety while reducing journey times and the stress of driving. NCAP crash test programmes are examples of structured information schemes that governments could use to encourage manufacturers to offer safety-related speed management systems on new vehicles and to inform the public of their potential benefits.

Appropriate speeds for all types of roads in the network and review of existing speed limits

Appropriate speeds for different types of roads should reflect the fundamental importance of protecting human life and preventing injury on the roads. The assessments need to be related to human tolerance to impact speeds in different potential crash circumstances and the risks of such crashes. Assessments of appropriate speed also require a trade off between other goals such as sustainable mobility, environmental protection and improved quality of life. Appropriate speeds need to be determined for all types of roads in the network. Existing speed limits then need to be reviewed to assess whether they reflect the appropriate speed in relation to accident risks and a the range of other relevant factors including road function, traffic composition, presence of vulnerable road users, and road design and roadside characteristics.

Speed limits are one way to achieve appropriate speeds. The speed limits chosen must be credible in the light of the road and road environment characteristics and public authorities have the responsibility of ensuring this credibility. There should be a clear differentiation between speed limits on motorways and other roads in order to maintain the attractiveness of the motorway which is the safest road category.

In urban areas, speed limits should not exceed 50 km/h[3] with 30 km/h zones promoted in areas where vulnerable road users (including children) are particularly at risk. Research shows that these lower limits, when accompanied by traffic calming measures, are very effective at reducing accidents and injuries, with reductions of up to two thirds having been demonstrated. In the last decade, a number of countries have lowered their speed limits in urban areas, with significant results in terms of reductions in fatalities. As an example:

- **Hungary.** The speed limit in force inside built up areas was reduced from 60 km/h to 50 km/h in 1993 and resulted in a reduction of 18.2% in accident fatalities in the following year.

Harmonised speed limits across regions (*e.g.* Europe, North America) can contribute to their improved credibility and promote an increasing level of acceptance among the general public.

The use of variable speed limits in appropriate circumstances may help to improve levels of safety performance and also improve public acceptance.

3. In 1996, ECMT Ministers recommended considering a maximum speed limit of 50 km/h in urban areas, however this limit is still not implemented in some ECMT countries.

Drivers informed at all times on what the speed limit is

Drivers need to be informed at all times on what the speed limit is. A traditional and cost-effective way is to use consistent roadside signing and road markings and much progress can still be made in their application.

As well, there are emerging technology applications which could allow the speed limits to be confirmed in other ways. For example, variable signs can deliver messages suited to the current road conditions, and are therefore more credible than fixed signs. Speed limits can also be displayed in the vehicle, through infrastructure-vehicle communication or through GPS systems.

Infrastructure improvements which aim to achieve safe,"self-explaining" roads

Each road should have a clear function: access, distribution or flow. For each of these functions, there is a corresponding appropriate speed, which should derive logically from aspects of the infrastructure design, such as visibility distances, intersection spacing, and width of the right of way. This contributes to safe, "self explaining" roads, where drivers recognise the type of road and are guided to adapt their speed to the local conditions.

Infrastructure improvements are often easier and cheaper to implement in built-up areas, where immediate safety benefits can be made. Research has proven that measures such as speed humps and road narrowing are likely to be cost-effective in protecting vulnerable road users and the general environment, particularly in dwelling areas, near schools, at pedestrian crossings, etc. Constructions similar to medieval gates help indicate the change from one traffic environment to another (see Figure 6).

Figure 6. **Gate effect in a town in Germany**

Source: CDV.

On rural roads, infrastructure speed management measures are more difficult to implement because of the extent of the network and the costs involved. Improvements can be made by removing roadside obstacles with the aim of making the road safer and more 'forgiving'. While the ideal solution would be to separate traffic on rural roads (using median barriers for example), resource constraints generally prevent this being done widely. Alternative solutions, such as the possible use of new technologies, should therefore be pursued as well.

When the infrastructure cannot be upgraded, at reasonable costs, to the standard required for the existing speed limit, the appropriate action is to *lower the speed limit*.

Appropriate level of traditional police enforcement and automatic speed control

Both traditional police enforcement and automated speed control, including the use of mobile cameras - backed up by effective penalties - are needed to complement the other speed management measures in order to achieve their full effect. Speed enforcement activities are best repeated frequently, at irregular intervals and with different intensities. Higher intensities generally result in larger effects. However, as shown in Figure 7 the largest increase in effectiveness is found when doubling or tripling the enforcement intensity.

Figure 7. **The relationship between level of enforcement and change in injury accidents**

(1= current level; 2 = twice as high, *etc.*)

Source: Elvik, 2001.

Enforcement should encompass all road users (including foreign drivers) and all types of vehicles (*e.g.* motorcycles and trucks). In the case of automatic enforcement, experience has shown that better results are obtained when the vehicle owner, who is easier to identify than the driver, can be legally responsible for the violation[4].

4. In some countries (*e.g*. Germany), it is necessary to identify the drivers who committed the offence.

Section control (*i.e.* control of average speed on a section of road) has proven to be a cost-effective way to enforce speed limits, suggesting that further experience should be encouraged.

Tolerance levels for speed limit excedence should be set at a minimum (*e.g.* 5%), allowing for possible inaccuracies of the measurement device and speedometers. Setting higher tolerance levels above speed limits gives a misleading signal to the drivers and makes the speed limit system less credible.

Randomness of enforcement is a major determinant of a driver's subjective assessment of risk of apprehension. Therefore, an "anywhere anytime" enforcement programme could be expected to have more wide ranging effects, especially if linked to extensive publicity.

Experience with automatic control has shown that it is a cost effective approach which has a safety impact at a network level and not only at the location of the cameras[5]. However, a prerequisite to the successful large scale implementation of automatic speed cameras is provision of adequate information to the media, interest groups and the public. Re-investment of the revenues from fines in the enforcement effort (including speed camera operation) will reinforce that the purpose of automatic control by speed cameras is to improve road safety and raise public support.

Development of vehicle engineering

Maximum speeds of passenger cars, light trucks, sport utility vehicles and motorcycles have increased greatly over the past 30 years. Almost all passenger cars sold in 2006 can go beyond 150 km/h which is above the maximum regulatory speed limit in almost all countries. At some stage, limitations on the maximum speed of vehicles may need to be considered. However, even such limitations would not solve all the speed problems – especially in urban areas, where limitations on maximum vehicle speed would be of little assistance in ensuring compliance with speed limits of 50 and 30 km/h.

In countries with no such mandatory system, consideration should be given to mandatory speed limiters for trucks and coaches.

Conventional cruise control (CCC) and adaptive cruise control (ACC) can help drivers control vehicle speed. Adaptive cruise control – which allows the vehicle to follow a vehicle in front and maintain a pre-selected time gap or headway (distance) is a very promising technology that can help improve safety outcomes.

Electronic stability control (ESC or ESP) has proven very effective in reducing accident risk – particularly in the case of single vehicle accidents. The wider introduction of electronic stability control on passenger vehicles should be strongly encouraged.

Event data recorders (EDR) can deliver significant road safety benefits. EDRs can record data elements prior, during, and after an accident, including vehicle speed, acceleration, air bag deployment and some other occupant-based variables. More sophisticated EDR systems that transmit vehicle operational data including speed to fleet management centres are widely used in commercial vehicle fleets, particularly in North America. EDR's can be expected to promote a degree of "self enforcement". Their wider deployment also needs to be encouraged.

5. As an example, in France, the introduction of an automatic control sanction system in 2003 contributed to a reduction by 22% of national road fatalities in 2004.

Development and progressive implementation of driver assistance and vehicle speed control technologies

As *new technologies* become available progressively, new applications will provide a logical step forward in speed management. At present, Intelligent Speed Adaptation (ISA) applications are being actively researched and tested in many countries. With ISA technology, the vehicle "knows" the local speed limit and is capable of using that information to give feedback to the driver or limit the vehicle speed.

Two broad ISA categories are being assessed for possible wider deployment:

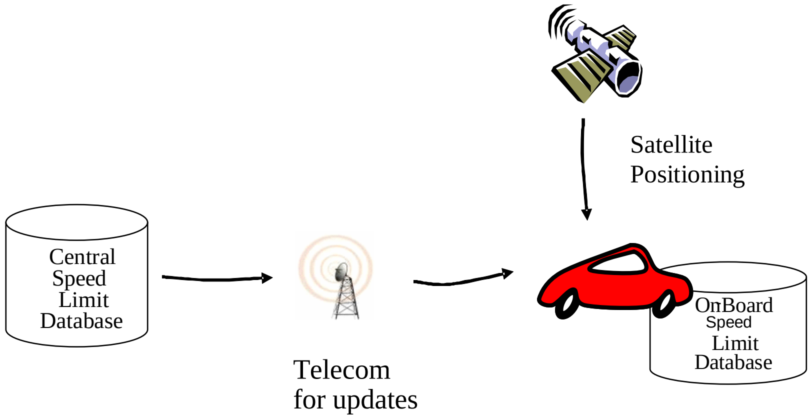
- *Informative (advisory)* ISA, which principally displays the speed limit and warns (via a sound or a visual element) the driver when above the speed limit; and

- *Supportive (intervening) ISA*, which provides advice to the driver but is also intervening in the sense that information on the speed limit is directly linked to the vehicle speed control system, with feedback to the driver.

Both systems can be set voluntarily (the driver chooses to activate it) or be made mandatory (the system is activated all the time). Whatever system is chosen, the driver can always override it in emergency situations.

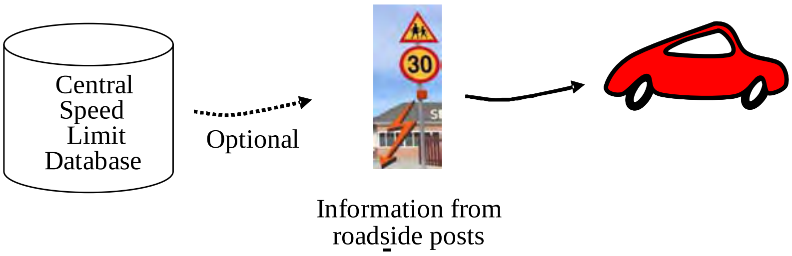
ISA can be based on autonomous navigation (see figure 8) or on roadside posts (see figure 9). Until now, *ISA based on autonomous navigation* has been considered as the best solution when covering large areas, such as national and international implementation, as it is less expensive for the road authorities.

Figure 8. **ISA based on autonomous navigation**



Source: Stefan Myhrberg, SWECO.

Figure 9. **ISA based on roadside posts**



Source: Stefan Myhrberg, SWECO.

Given the great potential benefits that such new technologies can bring, progressive implementation is encouraged on a cost-effectiveness basis. Appropriate actions could include:

- All new cars equipped with manually adjustable speed limiters (where the driver can choose the maximum speed)[6], and as soon as practicable with voluntary informative or supportive ISA, to assist drivers to adhere to speed limits (static and eventually variable).

- Reflecting the potential substantial safety benefits, mandatory ISA applications are given further consideration for the longer term, recognising and taking into account the changes in philosophies and liabilities that could be involved (for the supportive systems)[7].

- To help secure the potential benefits of the promising new ISA technologies, governments are encouraged to start developing, in co-operation with relevant partners, the necessary digital speed limit databases. These databases could well have other uses (e.g. for traffic management).

Other new technologies

The long-term vision is of an intelligent highway where communication between individual vehicles and roadside infrastructure assists drivers or even actively controls vehicles from the roadside - this may be of most benefit on strategic road networks. Other systems will be based on communication between the vehicles and satellites. For the longer term, there are a number of other technological advances that can be expected to provide real opportunities to greatly reduce the number of collisions, and ultimately the number and severity of casualties.

It is important that individual countries, and pan-European and world forums, continue to research these emerging opportunities so that informed decisions can be made. Appropriate research must be conducted to ensure that increased use of technology does not compromise safety and before full implementation, a number of issues need to be solved, including an in-depth assessment of potential adverse effects. Political and policy support will be important.

6. Adjustable speed limiters are increasingly available on new passenger cars in Europe and Asia. In other regions, notably North America, such devices are currently not well known.

7. For legal, liability and operational reasons, one country (Germany) has advised that it does not support the development and implementation of supportive ISA, whether voluntary or mandatory.

Situation in developing countries

Speeding is also a growing concern for developing countries. There is not enough data or research to clearly quantify the situation with respect to speeding in many countries at different stages of development, however, increasing levels of motorization without an adequate focus on speeding can be expected to have serious consequences for road safety. Although local circumstances differ (see figure 10), the experience of OECD/ECMT countries could be very useful, allowing developing countries access to the lessons learnt from years of experience with speed management policies. While Governments from industrialised countries can help with the transfer of the knowledge required developing countries will need to adapt the measures to the culture, level of development and level of road safety in each country.

Figure 10. **Vehicles are often overloaded**

Source: Nouvier.

Conclusions

Reduced speeding will immediately reduce the number of fatalities and injuries and is a guaranteed way to make real progress towards the ambitious road safety targets set by OECD/ECMT countries. Co-ordinated actions by the responsible authorities can bring about an immediate and durable response to the problem of speeding.

The best approach is to develop a comprehensive package of speed management measures. This package will vary from one country to another and will need to take into account the current levels of road safety performance in each country.

Most of the measures outlined in the study are likely to be applicable in all countries - and should be considered for both urban and rural areas.

However, it is suggested that countries without a long history of speed management begin by developing their strategies in urban areas where the greatest safety gains, especially to vulnerable road users, can be obtained quickly.

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