DEKRA Automobil GmbH

EUROPEAN ROAD SAFETY REPORT 2014 URBAN MOBILITY

Strategies to prevent accidents on Europe's roads

DEKRA

Accidents:
To reduce the high risk of serious injuries on urban roads

The human factor:
More caution, respect and sense of responsibility

Infrastructure/vehicle engineering: To continue promoting the improvement of safety elements

Safe travel on urban roads

Road safety has been constantly improving on European roads for years. This positive trend also continued in 2012: approximately 28,000 road users lost their lives in road accidents in EU member states, this means a reduction by nine percent compared to the previous year. In fact with 3,600 road traffic fatalities in Germany in 2012 ten percent less people than the year before were killed in road traffic. Based on provisional figures the Federal Statistics Office is assuming another decrease by ten percent for 2013.

Nevertheless, there is still a lot to do. This is particularly evident from the road traffic figures for urban areas, which is still where most accidents happen. In Germany, accidents in cities made up just under three quarters of all accidents with 72.9 percent in 2012. Although considerably fewer people lose their lives in accidents in built-up areas compared to on rural roads this is where most serious and minor injuries happen though. There is a similar picture in various other EU states. The high risk potential is no accident. The causes are on the one hand high density of traffic, plus the fact that nowhere else can you find so many different road users moving in such a small space where the “strongest” (trucks and cars) meet the “weakest” (pedestrians and cyclists). Added to this, maximum attention is specifically required from motorised road users due to the mass of road signs and sensory overload, for example from billboard lighting.

It should also not be forgotten that another source of damage has been added by almost silent electric vehicles at slow speeds. Although the number of electrically powered cars and commercial vehicles on the roads is still at a very low level, this could change considerably in future. In particular, the number of various types of e-bikes will probably rise rapidly in urban traffic of the future. This is also highlighted by a DEKRA survey, which was carried out at our branches nationwide in November/December 2013. According to this, roughly one in three car drivers surveyed is toying with the idea of buying an e-bike, after all one in ten car drivers already rides a bike with electric pedal-assist technology (pedelec). Interest in an electric bike increases with age. Two out of three people surveyed like that pedelecs are also very suitable for less sporty and older people too.

Therefore there will be even more happening on the roads in future than there is today – particularly as major cities and surrounding conurbations specifically are going to experience a significant increase in population over the next few decades and a further increase in passenger and goods transport is anticipated. The facts and figures mentioned are reason enough for DEKRA to dedicate the 2014 Road Safety Report to urban traffic and road accidents, in other words Urban Mobility.

We have already been committed to greater road safety, especially for the “weakest” road users, i.e. pedestrians and cyclists, in a whole variety of ways for many years. A new test facility for the development and inspection of pioneering systems for pedestrian protection was just commissioned in the summer of 2013 at the DEKRA Automobile Test Center (DATC) in Klettwitz, Brandenburg.

Clemens Klinke, Member of the Executive Board at DEKRA SE and Chair of the Management Board at DEKRA Automobil GmbH

As with the DEKRA Road Safety Reports of previous years, this publication is primarily to provide impetus and guidance. This report is to provide food for thought for politicians, transport experts, manufacturers, academic institutions and associations. It should also be a guidebook for all road users in order to actually achieve the target set by the EU Commission in July 2010 of halving the number of fatalities on Europe’s roads every year again by 2020.

IMPRINT
DEKRA Road Safety Report 2014 Urban Mobility

Publisher:
DEKRA Automobil GmbH
Handwerkstraße 15
70565 Stuttgart
Phone: +49.7 11.78 61-0
Fax +49.7 11.78 61-22 40
www.dekra.com
April 2014

Responsible on behalf of the publisher: Stephan Heigl
Concept/coordination/editorial: Wolfgang Sigloch
Editorial: Matthias Gaul

Layout: Florence Frieser
Realisation:
ETMservices, ein Geschäftsbereich der EuroTransportMedia Verlags- und Veranstaltungs-GmbH
Handwerkstraße 15
70565 Stuttgart
www.etmservices.de
Head of Business Division:
Thomas Göttl
Managing Director: Werner Bicker
Project Manager: Alexander Fischer

Translation: Macfarlane International Business Services
Picture credits: K.-H. Augustin: Page 15; T. Bastiaans: 46; A. Berg:10, 53; R. Borgström: 27; N. Böwing: 13; Atelier Busche: 40; F. Cépas/DSCR: 25; Citroën: 15; Copenhagen Museum: 9; Daimler: 47; DEKRA: 1, 16, 20, 22, 24, 32, 33, 34, 35; EyeWire: 13; A. Fischer: 3, 5, 6, 18, 36, 38, 43, 44, 45, 50, 55, 56; Fotolia: 13 (O. Boehmer/bluedesign), 14 (H. Schmitt), 14 (Kara); 15 (J. Hartmann); F. v. Glasner: 30; U. Halene: 47; R. Höhne: 54; Imago: 1 (suedraumfoto), 5 (PEMAX), 6 (teutopress), 7 (Chromorange), 8 (Becker&Bredel), 12 (A. Hettrich); M. Kappeler/dpa: 14; Karlsruhe Police Force: 33; T. Küppers: 3, 11, 53, 54 (3), 57; OECD/ITF 2012/Marco Urban: 13; J. Pauls: 12; Philips: 49; Picasa: 51; Stuttgart fire protection authorities: 52; P. Rigaud: 42; H. Schacht/berlinpressphoto.de: 5. SSB: 51; V. Wiciok: 31.

Further developing road safety in all areas and all regions

Mobility is a key prerequisite for our modern society to work and for growth and wealth in our country. This is especially true for an industrial country like Germany. However, more traffic also means a huge challenge for road safety. The forecast additional increase in traffic must be associated with as little stress for people and the environment as possible. Above all though it must be designed to be safe. As safety is and will always be the most important element of a mobility policy to serve people. The safety of road users must take top priority in all the decisions we make.

Based on estimates by the World Health Organisation (WHO) roughly one million people die from the consequences of road accidents worldwide every year. In Germany the number of victims has dropped since the sad record high of road traffic deaths with almost 20,000 victims in 1970 to an all time low of approximately 3,200 last year and that is despite a massive increase in volume of traffic. Technical developments, the good condition of the infrastructure, good driving instruction for young drivers and road traffic legislation aimed at safety – they all contribute to this. The important concern for me is that we further develop road safety in all areas and all regions. DEKRA is an important partner to us in the process.

The DEKRA Road Safety Report mainly deals this year with safety within the context of urban mobility. Even though urban road safety primarily comes under the responsibility of local authorities there are numerous state measures that have a direct impact on road safety in our cities and municipalities. By analysing accident data it is possible, for example, to identify and analyse local and regional accident black spots and defuse the danger locally.

In addition, the Federal Ministry of Transport and Digital Infrastructure has had a school route planner developed as part of a research project, which is a practical guidebook that communities use to plan even safer routes to school. The various bicycle campaigns that have been carried out on behalf of the state by the Deutsche Verkehrswacht road safety organisation also make an important contribution to road and mobility education, for adults too by the way. This is of great importance in cities in particular in light of the welcome growing use of the bicycle. Cities also naturally benefit in terms of road safety if we constantly further develop the technical body of standards for transport.

Alexander Dobrindt (MdB),
Federal Minister of Transport and Digital Infrastructure

The challenges of urban mobility

Whenever sustainable transport planning is talked about in relevant publications, the media, at congresses or in cities, the topics usually revolve around ideal traffic flow and reducing noise and harmful emissions. However, road safety should not be neglected. As most accidents across Europe happen in fact in urban areas. The rapid rise in population that some cities will experience over the next few decades, as well as demographic change and changing mobility behaviour make it essential to tackle safety-related challenges and develop solutions to reduce the number of fatalities and injuries in road accidents in built-up areas. For safe urban mobility – today and in future.

More than 50 percent of the global population already live in cities today. Estimates from the United Nations anticipate a further increase to 75 percent by 2050. This poses massive challenges in several respects for the cities affected by this rapid growth, for example, in terms of transport. More people in a city ultimately also means more road traffic, be it business or private. However, cities that are growing at a slower rate or not at all have also undergone a structural change. The public transport system and bicycle, with or without electric pedal-assist technology, are undoubtedly rapidly gaining importance as means of transport in cities. Nevertheless, motorised private transport and not least goods transport remain essential components of urban mobility combined with all the resulting "side-effects", for example congestion, noise, air pollution and accidents. Demographic change also results in specific challenges for road safety.

One feature of urban space is that there is not only a larger number of people that remain here temporarily but also in the main more permanently and recurrently, who cover distances by foot or using vehicles for a whole variety of different

1839: Commissioning of the first tram in Europe on the Montbrison-Montrond route in France (horse-drawn).

1863: Opening of the first underground in the world in London.

1868: Installation of the first traffic light system in the world in London. It was operated by gaslight and exploded after just a short time.

1881: The world's first electric tram travels through Berlin (built by Siemens).

1830 | 1840 | 1850 | 1860 | 1870

Milestones in urban mobility and road safety purposes. The size and growth of population figures in a city are not an insignificant aspect in understanding historical developments and the current demands on urban mobility and associated road safety.

Although urban mobility mainly focuses on the cities' key areas, the associated movements of people by vehicles also have their destination or origin in neighbouring cities or cities that are further away though. This results in intensive interaction between locally distributed urban mobility and sprawling interurban mobility in conurbations on major traffic routes and often also on secondary roads.

URBAN STRUCTURES ARE NOT JUST A QUESTION OF SIZE

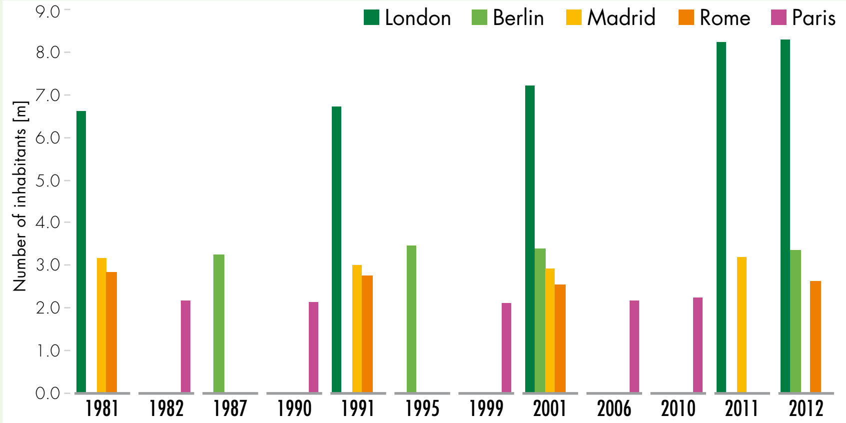
Figure 1 shows the number of inhabitants and different population growths of five cities in the European Union which have more than two million inhabitants based on current statistics. The largest city by far in the EU is London, where the population has increased considerably from 6.7 million (1991) to 8.3 million (2011). Berlin follows in second place with 3.4 million inhabitants (2012). Madrid has roughly the same amount of inhabitants with 3.2 million (2011). Rome follows in fourth place, which with 2.6 million (2012) has slightly more inhabitants than Paris (2.2 million in 2010).

Figure 2 shows the number of inhabitants and population growth of the ten cities in Germany with the highest population according to official statistics. Out of these cities, Berlin, Hamburg, Munich and Cologne have more than one million inhabitants. Berlin has the most inhabitants by far with 3.4 million. Frankfurt am Main, Stuttgart, Düsseldorf, Essen, Bremen and Dortmund follow in rankings five to ten. Essen, Düsseldorf and Dortmund belong to the Ruhr region. With roughly 5.1 million inhabitants this largest conurbation in Germany is in turn significantly larger than Berlin. This demonstrates that the population of an individual city cannot be considered in isolation.

As the example of Paris shows, the number of inhabitants in the suburban, densely built-up outskirts, in this case Île-de-France, have to be considered in conjunction with the official population of a city. The Île-de-France is a conurbation of Paris and France's most densely populated region. 11.6 million inhabitants (2009) live here, 19 percent of the French population in total. The number of inhabitants mentioned of currently 2.2 million refers to the city centre with its 20 districts, whose borders have not changed since 1860. Significantly more inhabitants than today were registered here from 1910 to 1960 with just under three million. Dur-

1

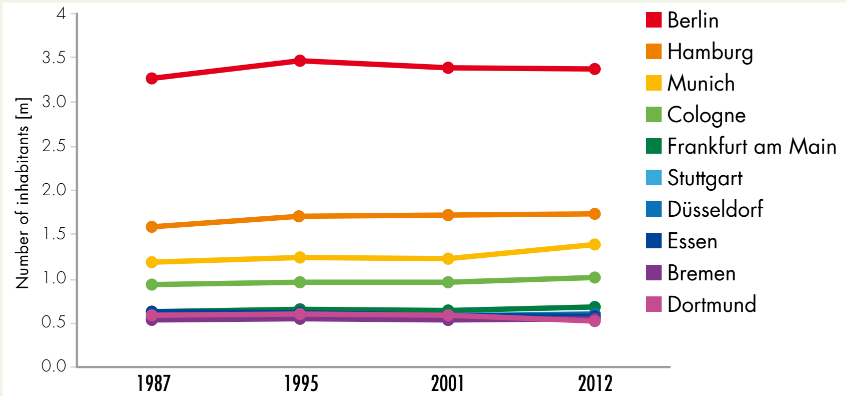
Population of cities in the European Union with more than two million inhabitants from 1981 to 2012.



Data source: www.citypopulation.de

2

Population of the ten largest cities in Germany from 1987 to 2012



Data source: www.citypopulation.de

1882: Commissioning of the first electric street lighting in Germany in Nuremberg.

1895: First scheduled petrol-driven bus service in Germany between Siegen and Netphen.

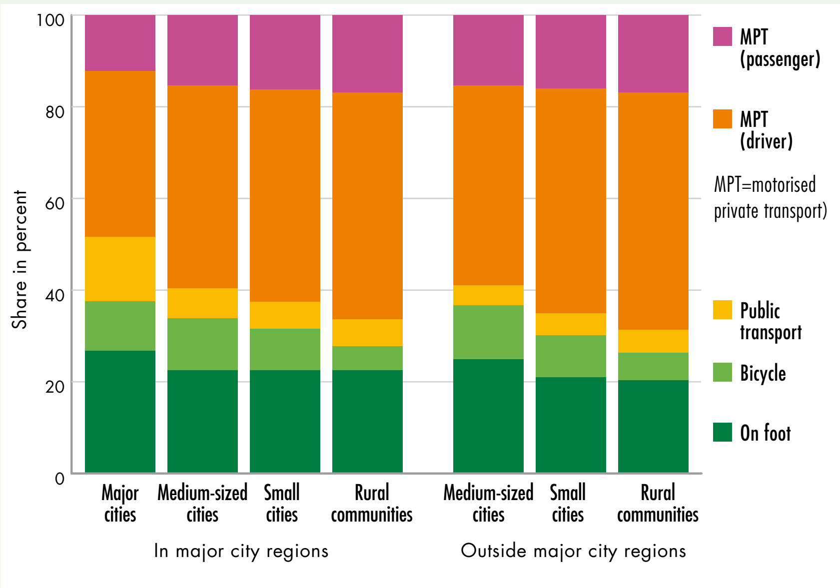
1900: Opening of the Paris Metro on the occasion of the World Exhibition.

1880 1890 1900 1910

Together with its suburbs and surrounding metropolitan area Paris has grown into a European mega city.

3

Percentage of main modes of transport on all routes



Data source: Report on results of "Mobility in Germany 2008", infas DLR

ing this time the number of inhabitants in the surrounding areas had already risen more rapidly than in the centre. Although the city centre's number of inhabitants decreased considerably in the 1960s and 1970s the metropolitan region of Paris grew into a kind of mega city.

Mega cities, strictly speaking by definition those that have more than ten million inhabitants, do not currently exist in the EU according to official population statistics. However, besides Paris London is the second European metropolitan region on the scale of a mega city. 14 million inhabitants were already recorded for the metropolitan region of London in 2001.

The urban mobility described in this report therefore expressly does not deal with road safety in mega cities but in current European cities. At the end of the day, urban life does not just start in cities of over a million inhabitants. Cities with less than 50,000 inhabitants can also have urban structures, while some cities with

1907: Commissioning of the first cycle path in Germany in Offenbach (with separate cycle traffic control systems).

1914: Installation of the world's first regular traffic lights in Cleveland.

1920: Installation of the world's first three-coloured traffic light systems in Detroit and New York.

1900 1905 1910 1905 1920

over 100,000 inhabitants are of quite a rural nature.

TRAFFIC DENSITY AND THE NUMBER OF VEHICLES ON OUR ROADS CONTINUE TO INCREASE, PARTICULARLY WITH GOODS TRANSPORT

As far as the trend in personal mobility is concerned (Figure 3), walking and cycling have more and more become a mode of local transport for routes of up to five kilometres and further increases are still expected. As shown in the "Mobility in Germany 2008" study published by the Federal Ministry of Transport, Building and Urban Affairs in February 2010. The study conducted by the Bonn ifas Institut für angewandte Sozialforschung GmbH in cooperation with the Institut für Verkehrsforschung des Deutschen Zentrums für Luft- und Raumfahrt e.V. in Berlin also states that shopping, errands and recreational activities make up two thirds of all the distances covered. Footpaths and cycle paths take up a high percentage with trips for leisure, shopping, education and private errands. By contrast, the car is still the dominant means of transport for getting to work and for urban business traffic, not just in German but in many European cities (Figure 4).

Besides motorised private transport (MPT), goods transport has also played an increasing role in the urban sector for years. Trucks do not just travel between the logistics sector's major distribution centres on roads outside towns but they are a normal sight on working day in inner cities. They deliver the required goods directly to recipients based here, such as major department stores, medium-sized and smaller shops, restaurants as well as construction sites and businesses.

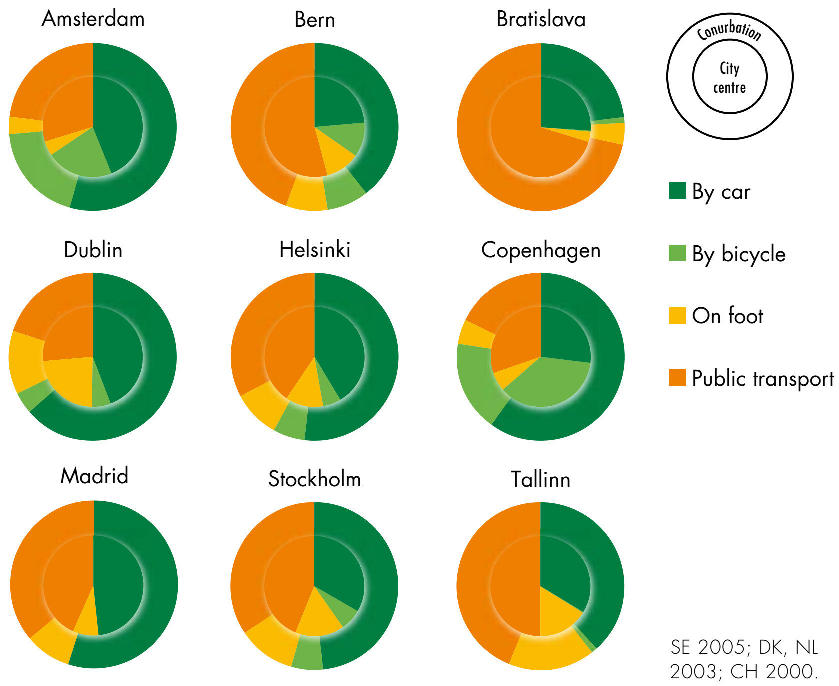
The amount of traffic that this causes can be shown using the example of mineral water alone. Its average consumption per head in Germany is just under 136 litres annually. With a crate of twelve bottles each with 0.7 litres (= 8.4 litres per crate) that makes roughly 16 crates a head. For a city with 500,000 inhabitants that means an unbelievable eight million crates of mineral water per year. Assuming 48 crates fit on a euro pallet and 34 euro pallets fit in an articulated lorry, one articulated lorry can therefore transport 1,632 crates of mineral water. So roughly 4,900 articulated lorries are required to transport eight million crates. If the articulated lorries travel on six days over 52 weeks this equals 312 transport days. This means just under 16 articulated lorries are required every day just to transport the mineral water needs of a city with 500,000 inhabitants. If we add to this other drinks like soft drinks, fruit juices, milk and alcoholic drinks we come to 60 articulated lorries per day in a city of this size with an average consumption per head of just under 510 litres, just for drinks deliveries. This figure is in fact even higher as vehicles may also be on the roads with partial loads.

TRUCKS ARE AND REMAIN THE MOST IMPORTANT INLAND MODE OF TRANSPORT

In Germany a total of 3.8 billion tons of goods were transported using three inland modes of transport, namely by inland waterway vessels, rail and trucks (over 3.5 tons) in 2012. With 3.2 billion tons roughly 85 percent of this was accounted for by road freight traffic, including approximately 2.9 billion tons by German and approximately 330 million tons by foreign trucks. More than half (56 percent) of the goods on German trucks were transported locally (up to 50 kilometres). 22 percent of the transported goods were accounted for each by regional transport (51 to 150

4

Distribution of travel to work traffic in European cities



Source: Eurostat

1922: Installation of Europe's first three-coloured traffic light systems in Paris.

1922: Installation of Germany's first three-coloured traffic light system in Hamburg.

1933: Installation of Europe's first pedestrian lights in Copenhagen.

1937: Installation of Germany's first pedestrian lights in Berlin.

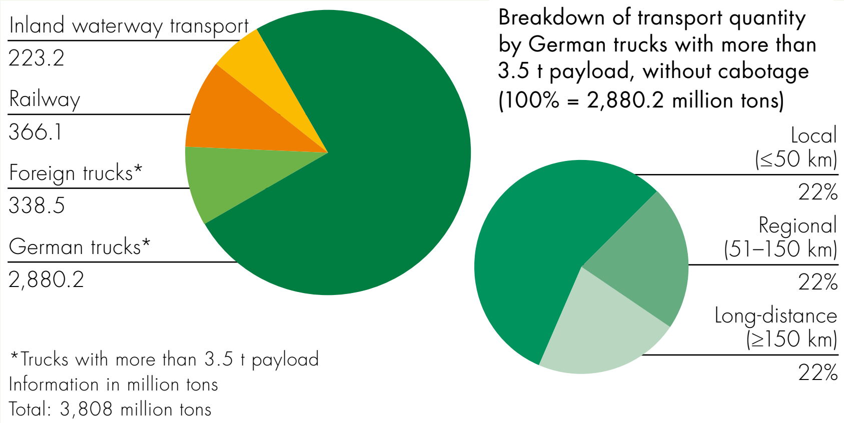
1925 1930 1935 1940

kilometres) and long-distance transport (over 150 kilometres) (Figure 5).

Light delivery vans and trucks (up to 3.5 tons) also should not be forgotten, their use has dramatically increased mainly for courier, express and parcel delivery services (CEP). Distance selling via the Internet is one of the specific drivers of growth. In 2012 alone, sales in this segment called e-commerce increased by 27.2 percent compared to the previous year to EUR 27.6 billion according to information from the Bundesverbandes Internationaler Express- und Kurierdienste (BIEK – Federal Association of International Express and Courier Services). According to the BIEK the CEP market has grown almost twice the speed of the overall economy since 2002. The volume on the whole German CEP market developed from 1.69 to 2.56 consignments from 2000 to 2012. That is a growth of almost 52 percent (Figure 6). Corresponding increases in the volume of traffic due to the vehicles used for this can mainly be felt in the already highly overburdened urban centres and conurbations. At the same time though, the number of cars used in private transport to transport goods for private consumption is decreasing as a result.

5

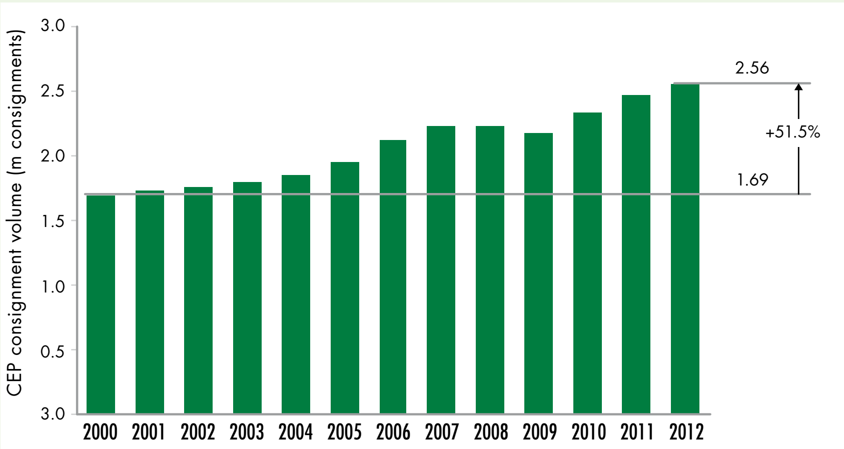
Distribution of goods transported in Germany in 2012 by rail, inland waterway vessel and trucks as well as German trucks over distance ranges



Data sources: Federal Office for Goods Transport, Federal Statistics Office

6

Consignment volume on German CEP market from 2000 to 2012



Data source: BIEK, CEP study 2012

POSITIVE OVERALL TREND IN THE EU

The merging of a whole range of different road user groups and the variety of transport situations leads to the fact that across Europe more accidents have been happening in built-up areas, i.e. urban areas, than anywhere else for years now. If we initially just look at the total number of fatalities it is clear to see that the reduction in the number of road deaths overall continued in 2012, both in and outside built-up areas. According to official figures from the CARE database (EU road accident database) 28,136 road users died on roads in all 28 EU member states in 2012 (Figure 7). According to the current target in the "Guidelines for road safety policy 2011-2020" this figure should drop to 15,752 by 2020 in order to be able to achieve a common European area of road safety. This is the equivalent to halving the number of 31,484 fatalities in 2010. This target is a clear indicator of the European Commission's commitment to road safety.

According to the "White Paper for targeted action on urban road safety" presented by the EU Commission in December 2013 just under 40 percent of road users killed on EU roads in 2012 lost their

1948: First road markings with broken white lines in London.

1949: The pedestrian crossing or zebra crossing appears internationally for the first time in the Geneva Protocol on road traffic signs.

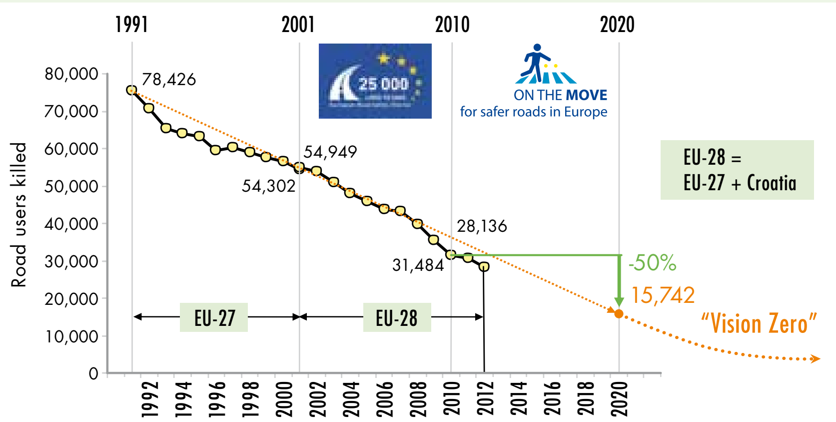
1952: The first zebra crossings are marked in Germany.

1940 1945 1950

Trucks are a normal sight on working days in urban centres too and are important modes of transport for delivering the required goods directly to recipients here.

lives in urban areas. Roughly half of the 11,000 road users killed in accidents in built-up areas are pedestrians and cyclists. According to information from the EU Commission four causes are responsible for 70 percent of all fatal road accidents both in and outside built-up areas: Driving under the influence of alcohol or drugs, failure to stop at a red light, not wearing a seat belt and excessive speed. The Commission sees road user behaviour and a safe infrastructure and safe vehicles as being important areas for action for the future.

7 Number of road users killed on roads in the European Union from 1991 to 2012 and targets for 2020.



Data source: CARE, as of: October 2013

The topic of speed is also the subject of a model presented by Letty Aarts and Ingrid van Schagen from the SWOV Institute for Road Safety Research in Leiden, The Netherlands, in 2006 ("Power Model"). Based on this there would be roughly 2,200 less deaths caused by road accidents, half of them on urban roads, simply by reducing the average speed by just one kilometre per hour on European roads.

URBAN ROAD SAFETY PROGRAMMES ARE BOOMING

How the importance of road safety is measured by the communities themselves, specifically in urban areas, can also be seen in the rising number of road safety programmes organised over the last few years, in Germany and in many other European countries. One example from Germany includes the updated "Road Safety Programme Berlin 2010" presented in 2005 and 2007 with the vision that no more road accidents with serious personal injuries will happen in Berlin's urban area and the aim to get as close to this ideal vision as possible. The sponsors of the Berlin

1953: In Germany legislation introduces the pedestrian crossing nationally for the first time in Section 26 of the road traffic regulations.

1957: Introduction of a 50 km/h speed limit in built-up areas in Germany.

1964: Pedestrians are given priority on zebra crossings in Germany.

1968: The international convention on road traffic and road traffic signs is signed in Vienna.

1955 | 1960 | 1965 | 1970

road safety work, which also includes DEKRA, have at the same time agreed on a joint charter ("Berlin charter for road safety") and taken on commitments specific to the institutions with activities which they hope will contribute to the success of the road safety programme.

The listed activities include
- Sharing technical and statistical information to enable a better understanding of the causes of accidents, injuries caused by accidents and the effectiveness of preventive and palliative measures,
- Mobility education for children and young people,
- Initial and further training for road users,
- Improvement in vehicle safety standards also in terms of other road users,
- Roads and other transport infrastructure designed for safety to minimise road accidents and to encourage a safe driving style,
- To develop and realise technologies to minimize the consequences of accidents,
- To contribute to better knowledge of the causes, circumstances and impacts of accidents in order to derive and implement measures to prevent accidents and lessen their impact.

One example from Italy is the "Piano Sicurezza Stradale 2012/2020" published in 2012 for the city of Rome. This programme's declared objective is to reduce the number of deaths by road accidents on the Italian capital's roads by 50 percent by 2020. In doing so, Rome sees itself confronted with an exceptional challenge. As can be read in the road safety programme the city has a significantly higher degree of motorisation compared to other major European cities. There are 1,022 motorised vehicles to every 1,000 inhabitants in Rome. By comparison: the degree of motorisation is 602 vehicles to every 1,000 inhabitants in Barcelona, 380 vehicles to every 1,000 inhabitants in Paris and just under 400 vehicles to every 1,000 inhabitants in London. At the same time Rome has the most motorised two-wheelers out of the cities mentioned. With 715,000 motorised two-wheelers the figure is six times higher in Rome than in London (116,000). As far as the number of deaths caused by road accidents is concerned too, Rome is the sad leader by far out of the four cities mentioned.

Austria's capital Vienna published its own road safety programme in 2005 ("Vienna's Road Safety Programme 2005 to 2020"). The long-term objective is to achieve "Vision Zero", i.e. no fatalities and no serious injuries in road traffic. The "Human factor", "Infrastructure", "Vehicle" and "Basic conditions" are seen as the main areas of action. Greater road safety is also to be achieved by a range of measures including lower speeds and compliance with speed limits, traffic calming measures, improving traffic flow, using traffic telematics, maintaining very high quality standards in periodical vehicle monitoring and less private traffic due to increased use of alternative modes of transport.

These examples show: The need to work on a sustainable improvement in road safety at all levels has been recognised. It is now time to pick up on various possible solutions and implement them locally in the best way possible and just as sustainably. This report highlights what accidents look like in detail, what action can be taken to efficiently counteract them and where there is a need for remedial action regarding this.

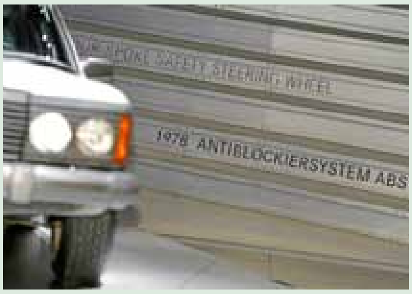
Important milestones on the way to "Vision Zero"

Dr Walter Eichendorf
President of the German Road Safety Council (DVR)

One can scarcely imagine that over 21,000 people lost their lives and over half a million were injured in road traffic in Germany in 1970. The efforts to make transport safer were worth it and continue to be. Besides road users being better educated, safer infrastructure and progress in rescue, the many technical changes in vehicles have also contributed to successes. We have managed to protect people in their vehicles better, for example with the aid of seat belts, airbags and strong passenger compartments. We are now in the process of making vehicles more intelligent and preventing accidents entirely as far as possible.

Electronic driver assistant systems have both the task of warning against dangers and even intervening in the driving process itself in an emergency. They use sensors and cameras to observe their surroundings and can assist the driver at that crucial moment. The emergency braking assistant is particularly helpful in urban traffic with lots of pedestrians and cyclists. It is very pleasing that the automatic braking assistant is offered in many vehicles, even down to the smallest vehicle category. There should not be any question about whether assistant systems for monitoring the blind spot, keeping in lane, lighting up the road better or automatic emergency braking are part of the standard equipment of any new vehicle. These systems have huge potential to prevent accidents at roughly 50 percent. We are also promising a great deal under the motto "Smart cars arrive safer", from successive further development to automated driving. Their use already contributes to achieving the milestones on the way to "Vision Zero" with zero deaths caused by road accidents and serious injuries.

1975: The world's first city toll charge in Singapore.



1979: First electronic ABS (Mercedes Benz S-Class and 7 Series BMW).

1980: Introduction of traffic-calmed areas into German road traffic regulations.

1983: Testing of 30 km/h speed limit zones in pilot projects in Germany.

1970

1975

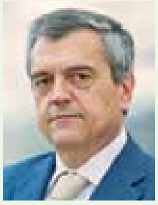
1980

8 Comparison of accidents in cities

	Rome	London	Paris	Barcelona
Number of inhabitants	2.76 Millions	7.56 Millions	2.2 Millions	1.63 Millions
Number of motorised vehicles	2.82 Millions	3.01 Millions	835,050	981,580
Road traffic accidents with personal injury	18,496	24,105	7,164	9,052
Fatalities	182	126	43	39
People injured	24,467	28,763	9,871	10,792
Road traffic accidents with personal injury to every 100,000 vehicles	655	801	858	922
Deaths caused by road accidents to every 100,000 inhabitants	6.6	1.7	2	2.4
Injuries to every 100,000 inhabitants	886	380,6	448,4	662
Social costs (in EUR)	2.05 Billions	2.29 Billions	786 Billions	849 Billions
Social costs per inhabitant (in EUR)	744	317.2	357.2	629.3

Data source: Piano Sicurezza Stradale 2012/2020 – Roma si muove sicura (2012), figures from the year 2010

Improving road safety in urban areas



José Viégas

Secretary General of the OECD International Transport Forum

Improving road safety in urban areas is a major challenge in cities in OECD countries, particularly in emerging markets. Due to an ageing population and increasing urbanisation the pressure is on to solve this problem over the next few years.

In OECD countries 40 percent of fatal accidents and 60 percent of accidents with injuries happen in urban areas. The most vulnerable road users, i.e. pedestrians, cyclists and motorcyclists are particularly affected.

In cities, roughly 50 percent of the people killed are pedestrians, mainly children and older people. The situation for drivers of mopeds, motorcycles and bicycles with auxiliary motor also give reason for concern. In cities like Paris, Rome and Barcelona more than a third of casualties are accounted for by this group of people and the share is increasing. The share of people who are killed is generally lower for two-wheeler drivers. The increasing popularity of this environmentally-friendly mode of transport, which is also due to the widespread use of bicycle hire, has led to the share of cyclists killed in some cities having increased drastically.

Whilst the scope of the problem, measured by the number of people killed, is relatively well known, there is less information about injuries in non-fatal accidents involving pedestrians or cyclists as these are reported on less frequently or incorrectly. This is a particularly serious problem as injuries often mean that they may lead to long-term serious health consequences and invalidity and therefore to significant financial difficulties. It is therefore essential to expand our knowledge about accidents resulting in injuries, in particular in terms of the number and nature of the injuries suffered.

The development of sustainable cities is closely related to improving road safety. Speed regulations are an important component and the general introduction of 30 km/h speed limits in city centres and residential areas is undoubtedly progress. Regrettably, speeds over 50 km/h are still permitted in inner city areas in some cities which means that the most vulnerable road users are most at risk. Improving road safety is also secondary to the aim of achieving a better quality of life for city dwellers and therefore designing public areas to be more pleasant for all citizens and creating "cities worth living in". This requires innovative thinking from city planners and the creation of more space for non-motorised road users and local public transport.

1985: Bergen (Norway) is the first city to introduce a charge to drive into the city centre.

1987: After several more or less unsuccessful attempts in various European cities, the car-sharing model has its première in Zurich. Since then this kind of car use has been introduced into many cities, not just in Europe.

1990: Introduction of a 50 km/h speed limit in built-up areas and 30 km/h speed zones in France.

1985

1990

Visions – urban mobility in 2050

Climate-neutral mobility is in the meantime less of a vision and more of an ambitious goal of the German car industry. When it is a question of urban mobility of the future, it is always a question of electromobility. The origins of this technology can already be found in the mid-19th century. However, at that time it was only able to be accomplished on rails and not on roads. Back then cars did not have enough space to store the electricity. In the meantime however nobody can afford to ignore electromobility as a solution. The basis for combustion engines are predominantly fossil fuels today but there is not an unlimited supply of these. The demand for natural oil and precious metals is continuously rising due to growth in the global population and increasing industrialisation of the emerging markets and their constantly improving living standards.

Over 7.1 billion people currently live on earth and this figure increases every day. At the same time the number of inhabitants in rural regions is constantly decreasing whilst the population density in conurbations is increasing. In the major emerging markets with their huge economic growth in particular, experts are expecting high increases in goods transport and even higher rises in private passenger transport. In addition, there are global efforts to reduce CO2 emissions caused by burning fossil fuels and to curb climate change as a result. A car that does completely without any emissions is what our engineers are working on intensively. The electric car is one possible way to achieve this.

Electromobility is no longer a vision: e-cars are a reality today. German manufacturers alone are launching 16 series models of electric vehicles on the roads by the end of 2014. Anyone who wants to drive an electric car can get started now. At the end of the day, if the energy required for electric vehicles can be generated from regenerative sources such as wind, sun, water and biomass they will make the miracle of mobility without any harmful emissions possible. Sustaining mobility as a driver for economic growth and at the same time protecting resources and the climate, that is the challenge of urban mobility. The transport concepts of the future must pick up on the developments of a changing world.

Matthias Wissmann

President of the German Association of the Automotive Industry (VDA)

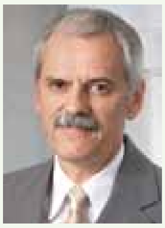
What we see is an older gentleman, who happens to be Professor Dr Albert E., leaving his apartment in Stuttgart in the morning. In the stairwell he checks again that he has his Mobility Card with him as this ensures that he will be mobile all day long. Today he is heading for his institute first and to his seminar where students who are superbly prepared via an Internet platform are expecting him. In the afternoon he has a Board of Trustees meeting at the ministry and in the evening he is also invited to a talk in Frankfurt.

He uses the suburban railway to travel to his institute. He inserts his Mobility Card into the ticket machine and knows that EUR 1.50 is now being deducted from his mobility account. He covers the short distance from his institute to the seminar room by e-bike. This costs 50 cents. He gains access to it using his Mobility Card. For his trip to the Board of Trustees meeting he holds his Mobility Card up against the windscreen of a hire car. He has logged in and his trip can start. His account is charged with EUR 12.80. For his trip to Frankfurt he has reserved a seat on the Intercity train using his smartphone app. This trip is also paid for using the Mobility Card (EUR 46.50). After he returns from Frankfurt he treats himself to a walk from the train station to his apartment nearby, in his opinion the most wonderful and cheapest form of mobility.

At the end of the month he receives his mobility account statement. He has never had his own car. The idea of owning one seems absurd to him, the scientist: "I don't buy a hotel when I need to stay somewhere overnight", is his simple logic. As a result, the professor moves through the urban world of his little major city using his Mobility Card. The only reminders of traffic jams and smog in Stuttgart are photos of his parents proudly posing in front of their own car.

Prof. Dr Willi Diez

Director of the Institut für Automobilwirtschaft (IFA), Hochschule Nürtingen-Geislingen



1995: First series ESP from Bosch (Mercedes Benz S-Class).

1995: Launch of the world's first public bicycle hire system in Copenhagen.

2003: Introduction of the city congestion charge in London.

2005: A European Directive on the design of the front of vehicles to protect pedestrians and other vulnerable road users comes into force (2003/102/EC).

2008: Introduction of environmental zones (emission stickers) in Germany, first of all in Berlin, Cologne, Hannover.

1990

1995

2000

Dr Sigrid Evelyn Nikutta
Chair and Member of the Betrieb der Berliner Verkehrsbetriebe (BVG)

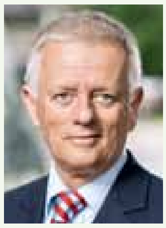
Mobility is a little bit of quality of life. This also and mainly applies in cities whose attraction not least depends on the public transport on offer. The city centre network and links to the surrounding area are location factors that rank right at the top of people's list of priorities. Berlin with an area of almost 900 square kilometres and the adjacent municipalities in the affluent areas are served today by a range of transport that can compete with the best across Europe.

However the challenges facing transport companies over the next few decades are already foreseeable. The population trend in Berlin and surrounding areas is, like in other conurbations, characterised by two components: there are likely to be more people and the share of people over 65 years old will have almost doubled. On the whole, it is to be expected that besides the working population, senior citizens will complement young people as an important customer group.

Transport companies have to take this trend into account and set the right agenda for the next five to ten years. But one thing is already obvious now: the public transport on offer must be more geared towards and tailored to this group of people than before. This basically means modern, comfortable and environmentally-friendly vehicles, the further development of the route network with a high density of stops, as well as easy to understand and simple to use transport.

This initially sounds easy but it will be difficult enough against the backdrop of the cities and municipalities' budget situation if travel prices are to remain affordable, that is to say socially acceptable. Only once convincing answers have been found to the challenges mentioned will public transport continue to have a future and also be the backbone of urban mobility in 2050.

Fritz Kuhn
Lord Mayor of the regional capital of Stuttgart



There is too much noise and pollution, too many traffic jams and stress in almost all metropolises on earth. Any vision of the urban mobility of tomorrow or even the day after tomorrow has to deal with the knowledge of today and provide answers that are balanced in term of ecological, social and economic aspects. I am convinced that we still do not even know about many aspects of future urban mobility today. We would therefore do well to confront dynamic developments in this field with great curiosity and openness.

In my vision, cities are available to citizens far more as an attractive living space with a high quality of life. In my vision, people from children to senior citizens move safely in public spaces. In my vision, urban mobility protects the environment in a city of short distances and it is reliable and affordable.

The mobility of the future will be more varied. Vehicles, be they for private or business transport, will be on the roads with new technologies and drives, for example electric, bio fuels, gas and hybrid. Local public transport will be highly developed and networked. By modernising public space and developing appropriate infrastructures the vision of equality for all road users will be largely realised if not fully achieved.

The tailored mix of mobility services will have accomplished a strong market position based on simple and reliable information, booking and payment systems. Car manufacturers will have undertaken ecological challenges in economic business models and have led them to success by 2050. This kind of vision can become a reality. However, on the way to achieving this we must give up the passed down design principles of car-friendly cities for mobility-friendly cities. If we let ourselves be inspired by new ideas, reflect together, discuss and act with concerted efforts, if we do not overplay individual requirements and wishes and all take responsibility together for the whole thing then we can design the urban mobility of the future to be both compatible with people and urban living and even create new jobs in doing so.

2011: All new vehicle models launched on the market in Europe must be fitted with ESP as standard since 1st November. Mandatory ESP then applies to all new cars from November 2014.

2012: Citroën launches the first car-sharing programme that exclusively uses electric vehicles in Germany with "Multicity" in Berlin.

2013: The Master's course "Urban Mobility – Traffic Engineering" is launched for the first time at a German university in Nuremberg in the summer semester.

2005

2010

2015

High risk of serious injuries

Although the number of roads users killed throughout Europe is highest on rural roads, most accidents by far happen in built-up areas. At the same time, most serious and minor injuries are also reported here. This is firstly because the majority of car traffic is in built-up areas and secondly, nowhere else can you find so many different road users in such a small space. Often the "strongest" (trucks and cars) meet the "weakest" (pedestrians and cyclists) here, combined with a correspondingly high potential risk.

Whenever city planners and transport providers talk about change in urban mobility, topics like networking modes of transport, improving traffic flow or reducing harmful emissions are frequently top of the agenda. However, one very important aspect should therefore not get left behind: road safety. As many accident risks are posed in urban areas in particular. Car drivers and motorcyclists on the way to or from work, heavy goods vehicles that are delivering goods and being loaded and unloaded on the edge of the road, stop and go traffic, children on the way to school, pedestrians suddenly crossing the road, plus buses and trams, an accumulation of traffic signs, poor visibility, poorly lit roads, sensory overload due to billboard lighting and much more: an extraordinary level of attention is required of all road users in built-up areas especially. This applies even more because another potential source of danger has recently appeared in urban traffic with almost silent electric vehicles and e-bikes travelling at low speeds.

The figures speak clearly for themselves: accidents are most common within built-up areas. For example, out of the 2.4 million accidents recorded by the police in Germany in 2012 roughly three quarters (72.9 percent) happened in built-up areas, 20.8 percent on rural roads and the remaining 6.3 percent on motorways. As Figure 9 shows, in a total of 299,637 accidents with personal injury 3,600 people lost their lives, the figure for serious injuries was 66,279 and minor injuries stood at 318,099. 1,062 people, i.e. just under a third, lost their lives in built-up areas. By comparison: the number of fatalities on rural roads was roughly twice as high with 2,151. By contrast, significantly higher numbers were recorded in built-up areas than on rural roads or motorways with 35,350 for serious injuries and 214,959 for minor injuries.

There was a similar trend in France in 2012. Here 1,027 people were killed in road accidents in built-up areas (28.1 percent of 3,653) and roughly 65.3 percent on rural roads with 2,385 people. By contrast, the most serious injuries were recorded by far in built-up areas with 52.9 percent (14,358 of 27,142). This ratio was also not any different in Austria. 151 people lost their lives in road accidents in built-up areas here in 2012, 380 on rural roads and motorways. 31,003 people were injured in built-up areas, 19,892 on rural roads and motorways. In Italy the number of fatalities in built-up areas and rural roads was at least more proportional than in Germany, France and Austria. In Italy 1,562 people died in road accidents in built-up areas in 2012 (42.8 percent of 3,653 and 1,761 on rural roads (48.2 percent).

9 Accidents with personal injury in 2012 in Germany by location

	Total	Percentage	Fatalities	Percentage	Serious injuries	Percentage	Minor injuries	Percentage
Total	299,637	100%	3,600	100%	66,279	100%	318,099	100%
Built-up areas	206,696	69.0%	1,062	29.5%	35,350	53.3%	214,959	67.6%
Rural roads	75,094	25.0%	2,151	59.8%	25,766	38.9%	80,355	25.3%
Motorways	17,847	6.0%	387	10.7%	5,163	7.8%	22,785	7.1%

Data source: Federal Statistics Office

ACCIDENTS IN THE EU

The CARE database (EU Road Accident Database) provides detailed figures for the individual member states (EU-28 without Lithuania) for a look at accidents in the whole of the EU. The most current figures from the individual states come from the years 2009 to 2012. Out of the 29,698 deaths in total, 18,358 were drivers of vehicles (motorised vehicles and bicycles), 5,260 were passengers in vehicles and 6,080 were pedestrians. Whilst with drivers and passengers the majority of people killed in accidents lost their lives outside built-up areas, roughly two thirds of the pedestrians died in accidents in built-up areas (Figure 10).

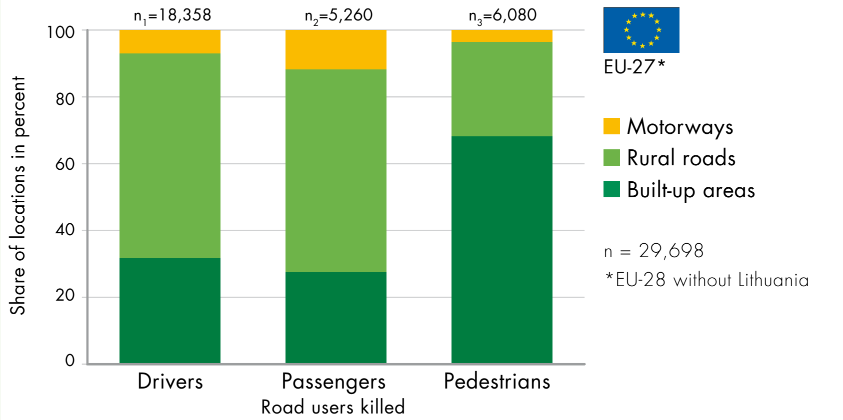
The figures of people killed in accidents in built-up areas can be taken from CARE for 15 EU member states for the period from 1991 to 2010 based on type of road use (Figure 11). This shows that the numbers of pedestrians and car passengers killed mainly dominated in the 1990s. However, it was also these two types of road use that particularly profited from the beneficial development of vehicle and road safety so that the absolute figures of pedestrians and car passengers killed is in the meantime far more approximate to other road users, In the 15 EU states looked at 2,212 pedestrians, 1,780 car occupants, 1,424 people on motorcycles (including motorcycles and mopeds), 682 people on bicycles, 439 people on mopeds, 122 occupants of goods vehicles (small delivery vans and trucks, heavy goods vehicles and articulated lorries) as well as 17 occupants of buses died in accidents in built-up areas in 2010.

ACCIDENTS IN BUILT-UP AREAS IN GERMANY

Similar trends for accidents in built-up areas can be established in Germany as in the whole of the EU. Using the figures published annually by the Federal Statistics Office, a trend can be followed up to and including 2012, where the number of pedestrians killed is always greater than the number of car occupants killed (Figure 12). Since roughly 2005, the number of car occupants killed has largely become approximate to the number of people on bicycles, although in 2008, 2011 and 2012 more people on bicycles were killed than car occupants. In 2012, 388 pedestrians, 248 people on bicycles, 217 car occupants, 135 people on motorcycles, 25 people on mopeds, 12 occupants of goods vehicles and two occupants of buses lost their lives in Germany in accidents in built-up areas.

10

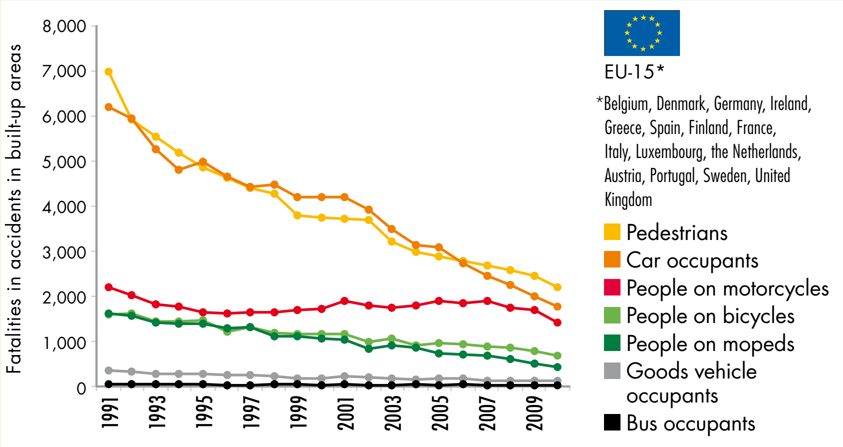
Percentages of locations of vehicle drivers and passengers in vehicles as well as pedestrians killed in road accidents on roads in the EU



Data source: CARE, as of: 26th November 2013, always the most current years for individual EU-27 states for the period from 2009 to 2012

11

Fatalities in accidents in built-up areas by type of road use in 15 EU states from 1991 to 2010



Data source: CARE, as of: 26th November 2013

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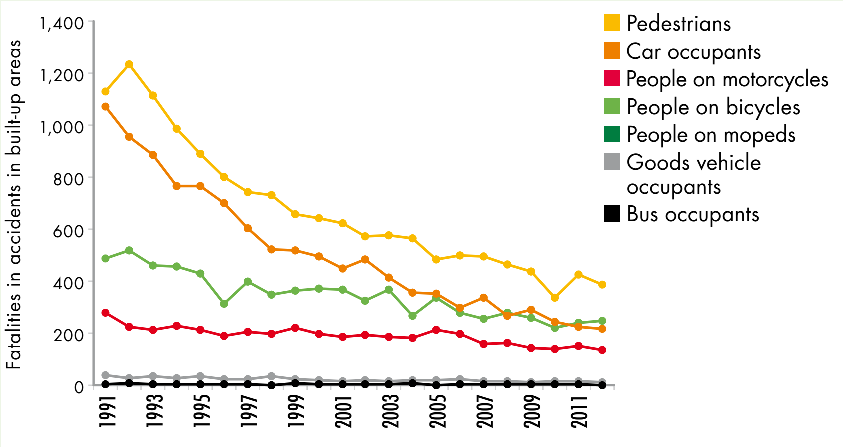
Trend for numbers of fatalities in accidents in built-up areas by road use in Germany 1991 to 2012



Data source: Federal Statistics Office

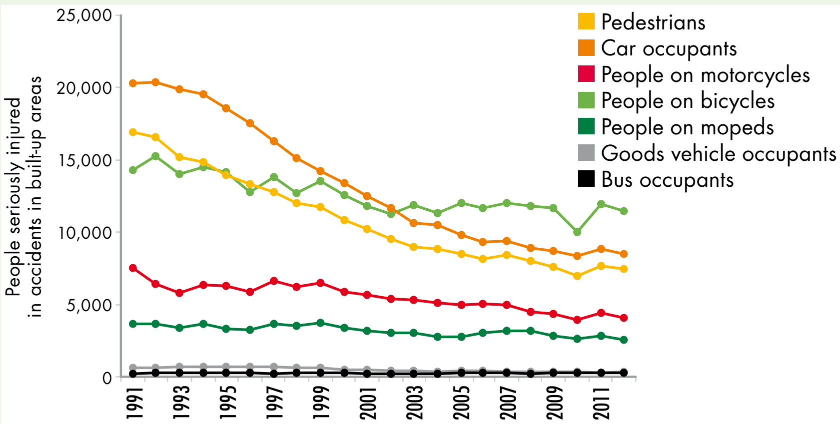
The emergency services are called out more than 30,000 times a day in Germany.

13 Fatalities in built-up areas by road use in accidents with personal injury for 2012 in Germany

	Total	Fatalities	Serious injuries	Minor injuries
Accident victims in built-up areas	251,371	1,062	35,350	214,959
Of these				
Pedestrians	30,209	388	7,450	22,371
People on bicycles	67,598	248	11,499	55,851
Car occupants	111,345	217	8,566	102,555
People on motorised two-wheelers	30,987	181	6,683	24,119
Goods vehicle occupants	3,388	12	359	3,017
Bus occupants	4,845	2	318	4,525
Agricultural machinery occupants	186	3	44	139
Occupants of other vehicles	794	4	137	653

Data source: Federal Statistics Office

14 Trend for numbers of seriously injured people in accidents in built-up areas by road use in Germany 1991 to 2012



Data source: Federal Statistics Office

The Federal Statistics Office also provides figures for serious injuries in road traffic (Figure 14). Whilst the numbers of seriously injured car occupants still dominated in the 1990s, more people on bicycles than car occupants have been seriously injured in accidents in built-up areas since 2003. 11,499 people on bicycles, 8,566 car occupants, 7,450 pedestrians, 4,130 people on motorcycles, 2,553 people on mopeds, 359 occupants of goods vehicles and 318 occupants of buses were registered here as seriously injured in 2012.

SERIOUS ACCIDENTS INVOLVING COLLISIONS BETWEEN VEHICLES AND PEDESTRIANS

The detailed analysis of accidents also provides a very telling picture (Figure 15). As far as the accident types are concerned, turning in/crossing accidents dominated in 2012 at 26 percent, followed by accidents involving longitudinal traffic at just under 21 percent. 258 road users in total lost their lives in these two types of accidents. Pedestrian accidents on the other hand had far more serious impacts. These are accidents caused by a conflict between a pedestrian crossing the road and a vehicle. Although this type of accident only makes up 7.8 percent of all accidents, most road users lost their lives as a result with 275 fatalities.

The most frequent type of accidents were turning in/crossing accidents (33.1 percent) where the most serious and minor injuries were also recorded with this type of accident. Most deaths were accounted for by collisions between vehicles

15 Nature of accidents with personal injury in built-up areas for 2012 in Germany

	Total	Percent-age (%)	Fatalities	Percent-age (%)	Serious injuries	Percent-age (%)	Minor injuries	Percent-age (%)
Total accidents with fatalities/injuries in built-up areas	206,696	100	1,062	100	35.350	100	214,959	100
Type of accident (conflict situation that led to the accident)								
Driver-related accident	23,024	11.1	238	22.4	6,707	19.0	20,051	9.3
Left or right turn accident	33,696	16.3	113	10.6	5,288	15.0	36,263	16.9
Turning in/crossing accident	54,718	26.5	152	14.3	8,077	22.8	58,836	27.4
Pedestrian accident	16,136	7.8	275	25.9	4,930	13.9	12,720	5.9
Accident due to stationary traffic	9,181	4.4	23	2.2	1,196	3.4	8,920	4.1
Accident involving longitudinal traffic	43,073	20.8	106	10.0	4,029	11.4	53,541	24.9
Other accidents	26,868	13.0	155	14.6	5,123	14.5	24,628	11.5
Type of accident (type of collision)								
Driving into stationary vehicle	16,824	8.1	23	2.2	1,880	5.3	18,238	8.5
Driving into moving vehicle	30,183	14.6	23	2.2	1,831	5.2	39,434	18.3
Side collision in same direction	9,320	4.5	35	3.3	1,217	3.4	9,640	4.5
Oncoming traffic	12,406	6.0	77	7.3	2,778	7.9	14,798	6.9
Turning in/crossing	68,458	33.1	218	20.5	10,330	29.2	73,748	34.3
Vehicle and pedestrian	27,855	13.5	378	35.6	7,321	20.7	22,824	10.6
Driving into an obstacle	1,078	0.5	8	0.8	255	0.7	880	0.4
Lane departure to the right	7,028	3.4	84	7.9	2,116	6.0	6,214	2.9
Lane departure to the left	4,391	2.1	97	9.1	1,425	4.0	3,876	1.8
Other type of accident	29,153	14.1	119	11.2	6,197	17.5	25,307	11.8
Nature of accident site								
Junction	49,675	24.0	188	17.7	7,589	21.5	56,213	26.2
Intersection	49,658	24.0	191	18.0	7,942	22.5	51,680	24.0
Entry or exit	20,357	9.8	57	5.4	2,990	8.5	20,403	9.5
Climbs	4,431	2.1	39	3.7	999	2.8	4,590	2.1
Downhill stretch	9,597	4.6	97	9.1	2,654	7.5	8,897	4.1
Bend	11,553	5.6	152	14.3	3,210	9.1	11,504	5.4
Features of accident site								
Level crossing	724	0.4	34	3.2	207	0.6	730	0.3
Pedestrian crossing (zebra crossing)	4,663	2.3	22	2.1	897	2.5	4,287	2.0
Pedestrian lane	6,688	3.2	71	6.7	1,570	4.4	5,904	2.7
Bus stop	3,522	1.7	45	4.2	832	2.4	3,376	1.6
Road works	1,697	0.8	8	0.8	302	0.9	1,704	0.8
Traffic-calmed area	1,493	0.7	1	0.1	219	0.6	1,390	0.6
Impact with obstacle								
Tree	3,006	1.5	67	6.3	1,054	3.0	2,867	1.3
Pylon	2,633	1.3	53	5.0	724	2.0	2,893	1.3
Abutment	110	0.1	0	0.0	27	0.1	115	0.1
Guard rail	816	0.4	14	1.3	219	0.6	847	0.4
Other obstacle	9,358	4.5	110	10.4	2,627	7.4	9,491	4.4
No impact with object	190,773	92.3	818	77.0	30,699	86.8	198,746	92.5
Road conditions								
Dry	153,510	74.3	764	71.9	26,565	75.1	158,385	73.7
Wet/damp/slippery (oil, leave etc.)	48,701	23.6	278	26.2	8,022	22.7	51,911	24.1
Icy	4,485	2.2	20	1.9	763	2.2	4,663	2.2
Light conditions								
Daylight	158,581	76.7	661	62.2	25,636	72.5	164,650	76.6
Dusk	9,777	4.7	40	3.8	1,624	4.6	9,974	4.6
Darkness	38,338	18.5	361	34.0	8,090	22.9	40,335	18.8

Data source: Federal Statistics Office

Excessive speed was the cause of this accident in a built-up area where a pedestrian lost her life.

and pedestrians. With 24 percent most accidents happened near a junction or intersection and most fatalities as well as serious and minor injuries happened in built-up areas. In contrast to rural roads, impact with an obstacle hardly played a part at all in built-up areas and most accidents happened in dry road conditions during the day.

Car drivers were involved in the accidents most often, followed by cyclists, pedestrians and drivers of motorised two-wheelers (Figure 16). In just under 80 percent of cases, accidents involved two parties (Figure 17), eleven percent of fatalities in built-up areas lost their lives in accidents involving the influence of alcohol or drugs (Figure 18).

16 Parties involved in road accidents with personal injury by type of vehicle or road use for 2012 in Germany

	Total	Fatalities	Serious injuries	Minor injuries
Accident victims in built-up areas	251,371	1,062	35,350	214,959
Road users				
Car drivers	206,220	681	25,256	180,283
Cyclists	72,129	256	12,038	59,835
Pedestrians	34,409	395	7,905	26,109
People on motorised two-wheelers	33,637	192	7,055	26,390
Goods vehicle drivers	20,748	185	2,790	17,773
Bus drivers	7,420	27	737	6,656
Agricultural machinery drivers	719	11	178	530
Data source: Federal Statistics Office				

17 Accident victims in road accidents with personal injury in built-up areas by road use for 2012 in Germany

	Total	Fatalities	Serious injuries	Minor injuries
Total accidents with fatalities/injuries in built-up areas	206,696	1,062	35,350	214,959
Road users				
Single vehicle accidents	25,339	240	7,476	20,132
Accidents with 2 parties involved	163,981	711	25,230	169,729
Accidents with 3 parties involved	14,727	77	2,112	20,635
Accidents with 4 parties involved	2,117	18	381	3,542
Accidents with 5 or more parties involved	532	16	151	921
Data source: Federal Statistics Office				

RISK STATISTICS FOR FATALITIES AND SERIOUS INJURIES IN ACCIDENTS IN BUILT-UP AREAS IN GERMANY

Different road users have different risks of being seriously injured or even killed in accidents with personal injury. Besides the absolute figures of accident victims it is in the main these kind of risk statistics that can be used to track and evaluate progress in the vehicle and road safety trend over time. An appropriate ratio for all road users results from the relation of the absolute figures of fatalities or serious injuries to every 1,000 people involved in accidents with personal injury in the individual road user groups. This is predominantly a ratio to evaluate passive safety (minimizing the consequence of accidents). From a wider perspective, integrated safety measures can also have an impact here.

As the ratios show, vulnerable road users like pedestrians and two-wheeler drivers have a significantly greater risk of being seriously injured or killed than occupants of cars, goods vehicles or buses (Figures 19 and 20). 46,444 pedestrians were involved in road accidents with personal injury in built-up areas in Germany in 1991, 1,331 of these were killed. This equals a risk ratio of 29 pedestrians killed to every 1,000 pedestrians involved in accidents with personal injury (Figure 19). This risk had more than halved to 12 pedestrians killed to every 1,000 pedestrians involved by 2012. Nevertheless, pedestrians are still the road user group most at risk.

Followed in second place by people on two-wheelers, of which eight fatalities were registered to every 1,000 people involved in accidents with personal in built-up areas in 2012. Only minor changes have taken place here from 1991 to 2012 so that an almost constant fatality risk can be assumed for people on motorcycles. There is a decreasing risk of fatality over the course of time for bicycle users and people on mopeds and scooters. In 1991 seven bicycle users or people on mopeds were killed to every 1,000 people from this group involved in accidents with personal injury in built-up areas. In 2012, there were three fatalities to every 1,000 people involved meaning that the fatality risk has also more than halved for these two groups of road users.

The already low fatality risk for occupants of cars has continued to develop favourably. In 1991, 38 of 26,267 car drivers and passengers involved in accidents with personal injury in built-up areas were killed which equals a risk ratio of 1.45 fatalities to every 1,000 occupants. For 2012, 12 occupants killed out of 21,164 people involved in accidents with personal injury in built-up areas results in a statistic of 0.57 fatalities to every 1,000 occupants, corresponding to a decrease by 61 percent. As a result, the risk for car occupants is at the same level today as for occupants of goods vehicles, which are generally considerably larger and heavier than cars.

The fatality risk of bus occupants is even lower. In 1991, six fatalities were registered with a total of 77,258 bus drivers and passengers involved in accidents with personal injury in built-up areas. This equals a statistic of 0.08 fatalities to every 1,000 occupants involved. In 2011 there was a corresponding statistic of 0.08 (5 fatalities out of 65,305 occupants involved) and 0.03 (2 fatalities out of 62,573 occupants) in 2012. As a result the fatality risk for bus occupants has remained at a roughly constantly low level from 1991 to 2012.

The risk of being seriously injured in accidents in built-up areas is currently roughly the same for people on motorcycles as for pedestrians (Figure 20). In 2012, 234 people on motorcycles and 230 pedestrians were seriously injured to every 1,000 road users in the respective group involved in accidents with personal injury. A favourable trend is also shown over time for pedestrians, whilst there is currently in fact an increasing risk ratio for people on motorcycles.

The risks of being seriously injured for people on mopeds and bicycles have also become more approximated although the risk trend for people on mopeds was slightly more favourable. In 2012, 163 people on mopeds were seriously injured to every 1,000 people involved in accidents with personal injury. For people on bicycles there were 155 people seriously injured to every 1,000 people on a bicycle involved in accidents with personal injury.

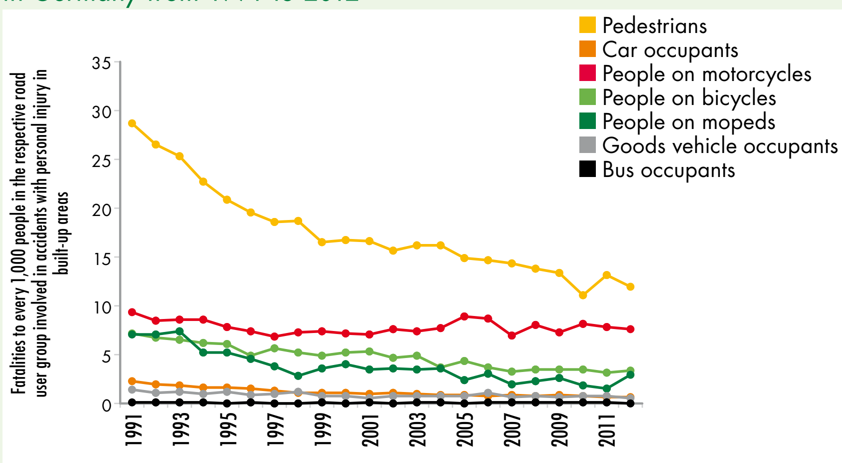
At a significant distance behind follows a considerably lower risk ratio for seriously injured occupants of cars, goods vehicles and buses. In 2012, 25 car occupants, 17 occupants

18 Accidents with personal injury caused by alcohol or drugs by location for 2012 in Germany

	Total accidents	Percentage	Fatalities	Percentage	Serious injuries	Percentage	Minor injuries	Percentage
Total	15,130	100%	338	100%	5,393	100%	13,590	100%
Built-up areas	10,020	66.2%	118	34.9%	2,975	55.2%	9,082	66.8%
Rural roads	4,476	29.6%	194	57.4%	2,172	40.3%	3,786	27.9%
Motorways	634	4.2%	26	7.7%	246	4.6%	722	5.3%

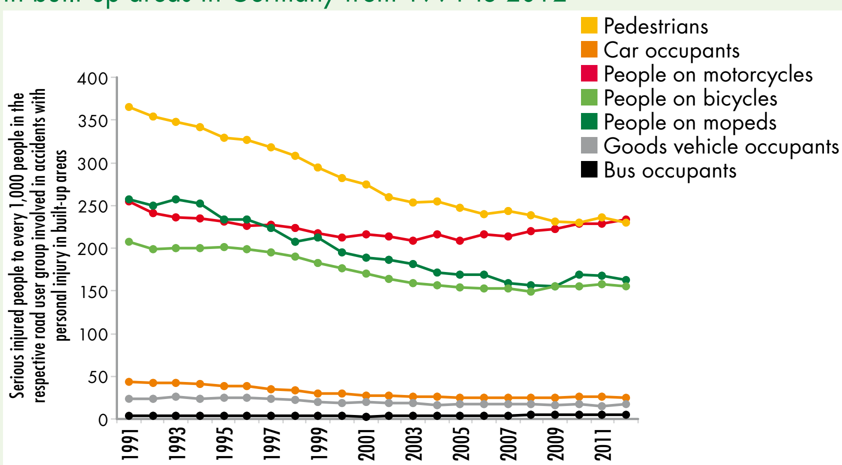
Source: Federal Statistics Office

19 Fatality risk in relation to every 1,000 pedestrians, people on two-wheelers or car occupants involved in accidents with personal injury in built-up areas in Germany from 1991 to 2012



Data source: Federal Statistics Office

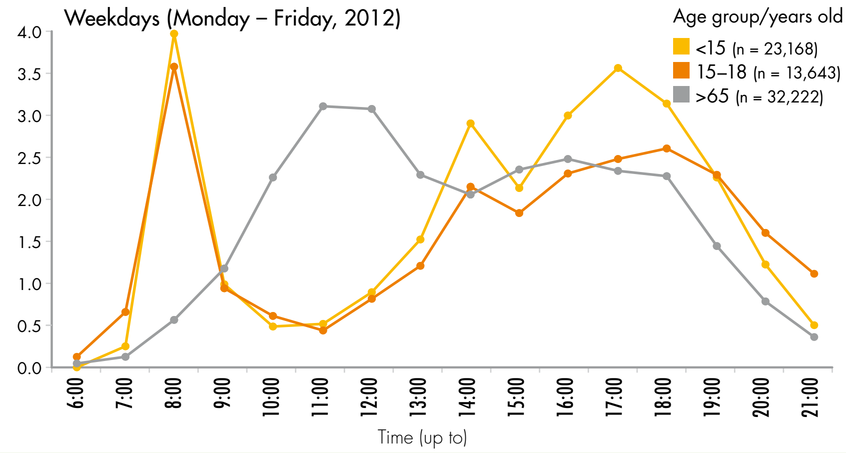
20 Risk of serious injury in relation to every 1,000 pedestrians, people on two-wheelers or car occupants involved in accidents with personal injury in built-up areas in Germany from 1991 to 2012



Data source: Federal Statistics Office

21

Comparative values* for slightly, seriously and fatally injured road users in built-up areas on weekdays (norm referenced to all people injured in an age group)

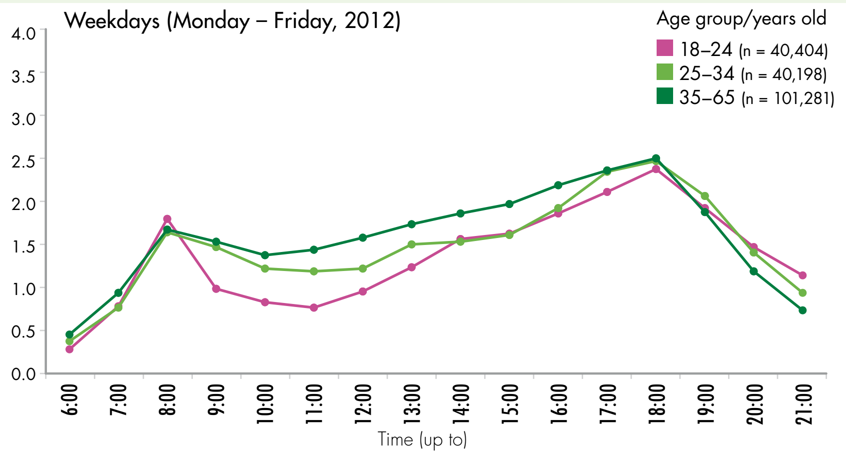


*Comparative value = accident number related to average value per hour. Data source: Federal Statistics Office

Note: If all injured people in an age group were evenly distributed over all hours of all weekdays (7 days each 24 hours) this would result in a comparative value of 1. A higher number than 1 indicates a greater accumulation of this age group for these hours of the week. The relevant peak times for accidents in terms of age can be seen in Figures 21, 22 and 23.

22

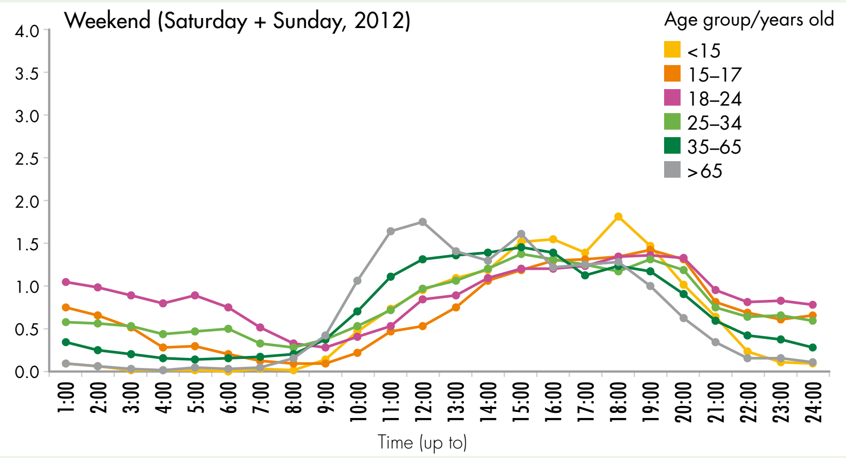
Comparative values* for slightly, seriously and fatally injured road users in built-up areas on weekdays (norm referenced to all people injured in an age group)



*Comparative value = accident number related to average value per hour. Data source: Federal Statistics Office

23

Comparative values* for slightly, seriously and fatally injured road users in built-up areas on weekends (norm referenced to all people injured in an age group)



*Comparative value = accident number related to average value per hour. Data source: Federal Statistics Office

Two pedestrians were hit by this car and killed or seriously injured when crossing a wide road with separate carriageways and traffic lights at a junction in a built-up area.

of goods vehicles and five occupants of buses were seriously injured to every 1,000 people in the respective road user group involved in accidents with personal injury.

AGE-SPECIFIC FREQUENCIES OF INJURED ROAD USERS

If we consider the accident figures in built-up areas from the aspect of the age of injured road users, two groups stand out in particular: children under 15 years old and senior citizens aged 65 or older. For example, 23,168 children under 15 years old were slightly, seriously or fatally injured in built-up areas in Germany in 2012. During the week there is an accumulation of children injured between 7 and 8 a.m. (on the way to school) and between 3 and 6 p.m. (on the way home from school and during recreational time). Almost the same distribution is evident for people injured in the 15 to 18 year old age group. In addition, 32,222 people aged 65 or older were slightly, seriously or fatally injured in built-up areas in 2012. The peak figures are recorded between 10 a.m. and midday, hardly any injuries occur in this age group after 7 p.m. (Figure 21). The other age groups (from 18 to 65 years old) show a significantly weaker peak between 7 and 8 a.m., a drop after 8 a.m. and a continuous rise afterwards until 6 p.m. (Figure 22).

What is noticeable at the weekend is the higher percentage of age groups between 15 and 35 years old during the evening and at night, whilst senior citizens are also injured more often than other age groups between 10 a.m. and midday at the weekend. Senior citizens show identical

times for the rise, peak and drop during the week and at the weekend. The absolute figures are higher during the week than at the weekend (Figure 23).

CHILDREN KILLED IN ROAD ACCIDENTS IN BUILT-UP AREAS

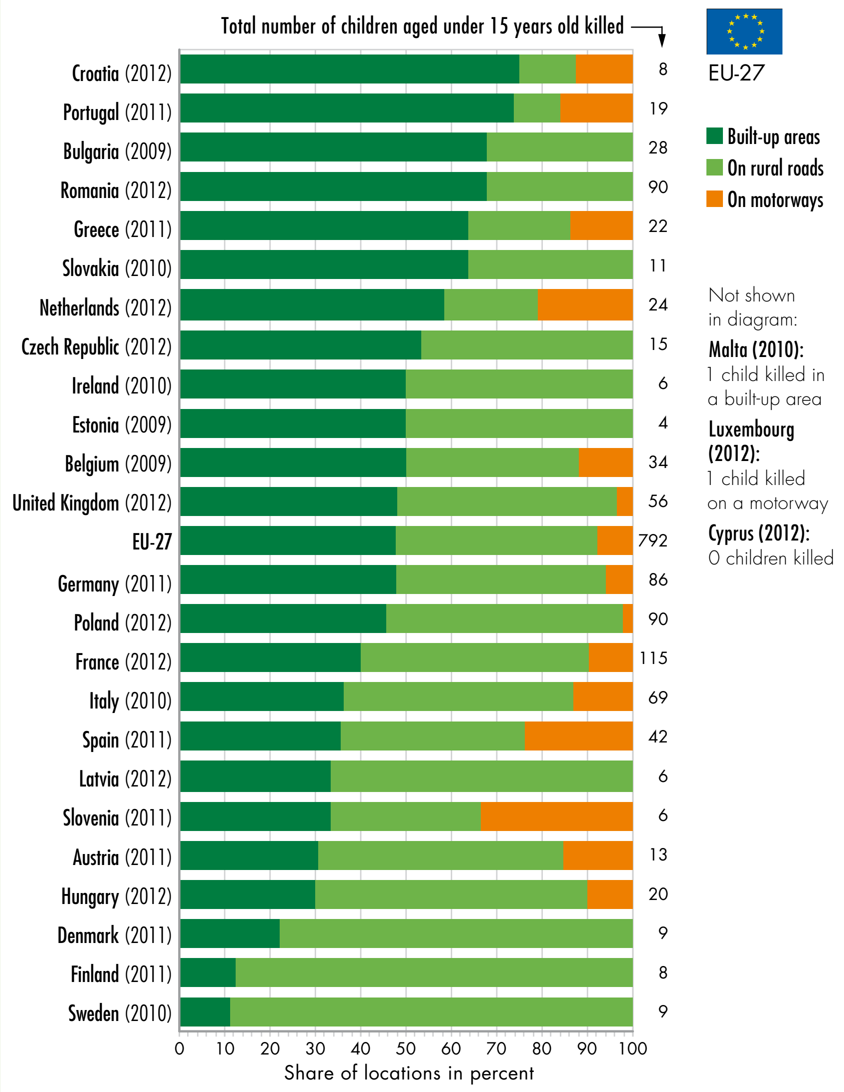
Road accidents involving children are still a sad everyday occurrence. According to the CARE database, 793 children aged under 15 died in the EU (EU-28 including Croatia but not including Lithuania, latest available figures from the member states from the period 2009 to 2012). 379 of these children (48 percent) died due to accidents in built-up areas. However, the percentages of children killed by accidents in built-up areas are very different in individual states and range from 11 percent in Sweden and 13 percent in Finland to 74 percent in Portugal and 75 percent in Croatia (Figure 24).

As shown in CARE, a total of 86 children were killed in road accidents in Germany in 2011, 41 of these children (48 percent) in accidents in built-up areas. According to the latest data from the Federal Statistics Office these figures have decreased in 2012. 73 children in total lost their lives in road traffic, 28 of these (38 percent) in accidents in built-up areas. Two of these children were killed as car occupants, eight children on bicycles and 18 children as pedestrians.

Looking at this from a long-term perspective the trend is pleasingly positive. From 1991 to 2012 the number of children under 15 years old killed in built-up areas in Germany has reduced from 251 to 28.

24

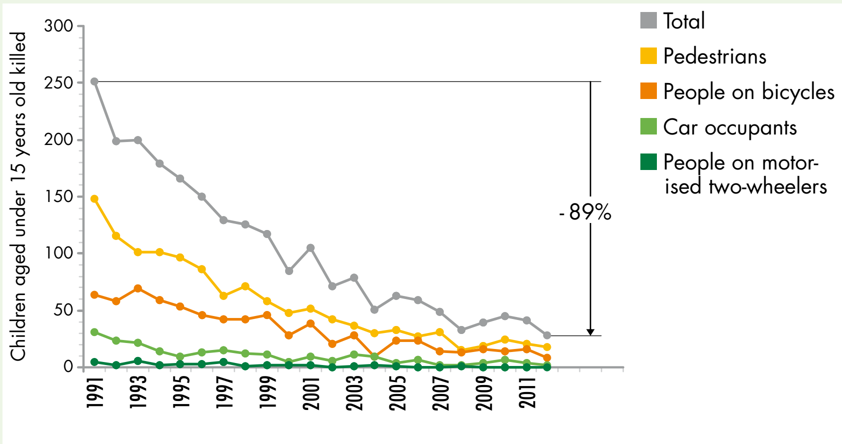
Number of children currently killed in road traffic accidents every year in EU states broken down by locations



Sources: CARE, years 2009 to 2012

25

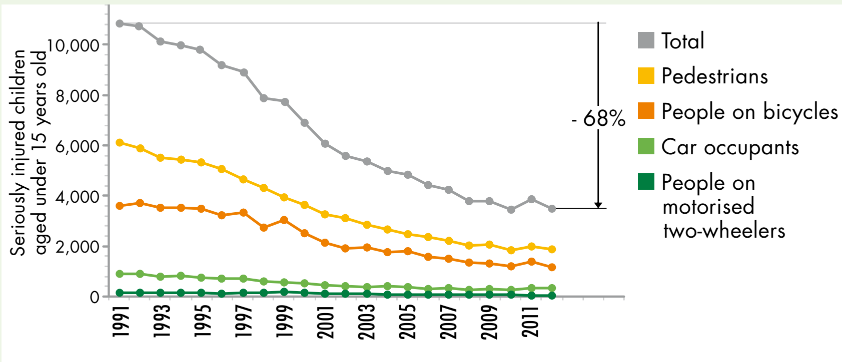
Trend for number of children aged under 15 killed in road traffic accidents in built-up areas in Germany from 1991 to 2012 by road use



Data source: Federal Statistics Office

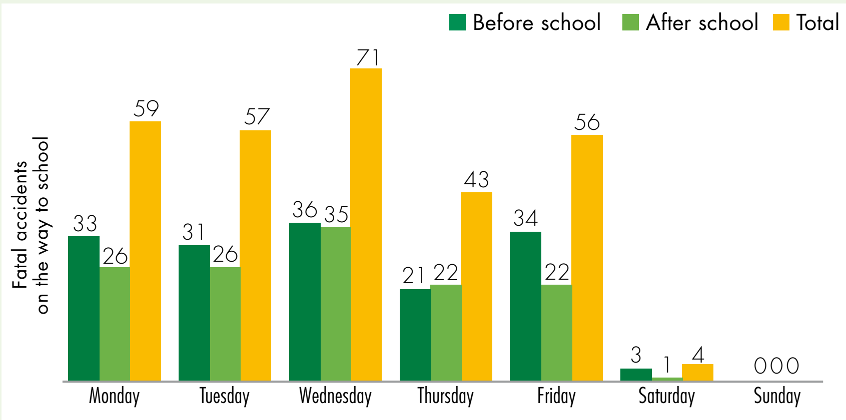
The red caps distributed to children every year by DEKRA at the start of the school year as part of the "Safety requires brains" campaign help to increase the safety of the youngest road users on the way to school due to greater visibility.

26
Trend for number of children aged under 15 seriously injured in road traffic accidents in built-up areas in Germany from 1991 to 2012 by road use



Data source: Federal Statistics Office

27
Fatal accidents on the way to school in Germany from 2007 to 2011 broken down by weekdays and with reference to the start and end of school



Data source: German Social Accident Insurance

That is a decrease of 89 percent (Figure 25). A significant drop in the absolute figures of children seriously injured in built-up areas can also be observed from 1991 to 2012, of in fact 68 percent (Figure 26).

Numerous reasons have contributed to this permanently positive trend. For exam-

Safety requires brains

Children are particularly at risk in road traffic in winter when they are overlooked in the dark in the mornings. DEKRA is involved in nationwide safety campaigns at the start of the school year with the "Safety requires brains" promotion.

More than 1.5 million bright red child caps have been distributed to schools since 2004 as part of this promotion. The cap is comfortable to wear and impossible for other road users to overlook thanks to the striking colour and reflective strips all around.

Typical traffic risks are addressed and advice is given about how to avoid them in an accompanying brochure for the promotion. Here parents can find helpful tips like how to plan a suitable route to school and practise it later. "Safety requires brains" is one of many contributions that DEKRA makes to the European Charter for Road Safety.

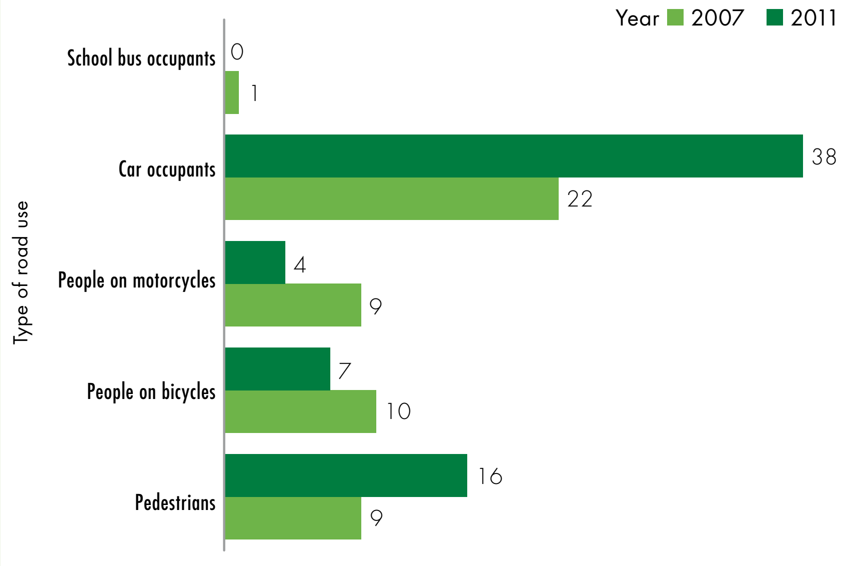
ple, education about the dangers and correct behaviour in road traffic that starts in the home and at kindergarten and is continued in schools. Bicycle helmets, which are still largely consistently worn in this age group, have undoubtedly also contributed to the drop in casualty statistics for children riding bicycles. Local targeted infrastructure measures must also be mentioned, which were carried out locally by experts, attentive parents and responsible bodies after inspecting the routes to school in order to identify any unnecessary risks and remove them as far as possible.

ACCIDENTS ON THE WAY TO SCHOOL IN GERMANY

Some of the children fatally injured in built-up areas and also above all adolescents and young adults lose their lives in accidents on the way to school. According to information from the German Statutory Accident Insurance, a total of 158 fatal accidents on the way to school were recorded in Germany between 2007 and 2011. This equals an average of 32 fatal accidents on the way to school per year. As expected, these accidents largely happen on weekdays from Monday to Friday. Naturally, there are increases before school starts between 7 and 8 a.m. as well as at lunchtime when school ends between 1 and 2 p.m. (Figure 27).

28

Accidents on the way to school as fatal road traffic accidents in the years 2007 and 2011, broken down by type of road use



Data source: German Social Accident Insurance

Children in day care facilities, schoolchildren in compulsory education and at college and students are affected. It was mainly adolescents and young adults aged 15 and older that were involved in fatal road accidents on the way to school in 2011 with a share of 82 percent. The corresponding share in 2007 was 74.5 percent. The number of students killed in road accidents on the way to school as car occupants increased by 72 percent from 22 in 2007 to 38 in 2011 (Figure 28). They make up the largest group of fatalities in road traffic accidents on the way to school. Older students at vocational colleges domi-

Protect particularly vulnerable road users even better

Henri Prévost

Deputy Interministerial Delegate for Road Safety, France

The number of deaths caused by accidents in traffic in built-up areas has been halved in France over the last ten years, from 2,284 fatalities in 2000 to 1,026 in 2012. At the same time the urban population has grown continuously. Nevertheless, it should be noted that the car, which still took top priority in the 1990s, is increasingly sharing urban space with very different road users, such as bicycles and motorcycles, as well as pedestrians.

The generally established reduction in speeds on French roads has also been introduced to conurbations thanks to the use of radar devices and specifically radar systems for monitoring red lights ("red light speed cameras"). These were predominantly installed near schools and hospitals. As a result, a significant improvement has been established in road user compliance at traffic lights and therefore also with speed limits since 2009, when the first red light radar was installed in the metropolitan area of Paris.

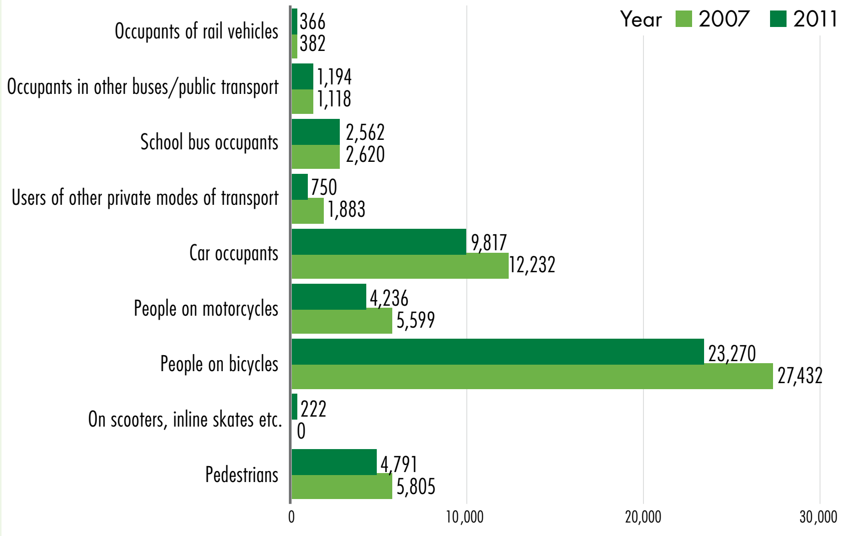
On the other hand, zones were set up with improved protection for particularly vulnerable road users in cities, for example 30 km/h zones and the "Zones de recontre" (pedestrian priority zones) where the speed limit is 20 km/h.

In cities our main concern lies in securing safety for road users at greater risk, primarily pedestrians and cyclists. They are urgently advised to ensure good visibility at all times, particularly during fading daylight, to improve their safety. We recommend that they wear bright clothing with reflective strips so that they can be seen by other road users. In winter 2012/2013 the death rate for pedestrians between November and January was 36 percent (174 people).

Although safety has improved for pedestrians and cyclists over the last ten years there is still a great deal to do. Out of the 1,026 people who lost their lives in an accident in a conurbation in 2012, 69 percent belonged to the group of road users at greater risk and 28.3 were pedestrians and 5.6 percent were cyclists.

The question now is: How can the accident rate be reduced even further in urban centres? The increase in "multi-modal mobility", i.e. one and the same person is alternately a pedestrian, cyclists, motorcyclist, car driver, promises positive effects. A car driver who is also a cyclist and motorcyclist is more aware of different road users: they see motorcyclists better and anticipate their behaviour more accurately. Nonetheless, no road user can ignore the road traffic regulations and, for example, cross roads wherever they like, ignore red lights, cycle on the pavement, obstruct vision due to bad parking. Everyone must pay good attention to their own safety and that of others. The successful coexistence of all road users is a guarantee for safety in public urban areas.

29
Reportable accidents on the way to school by road use in Germany



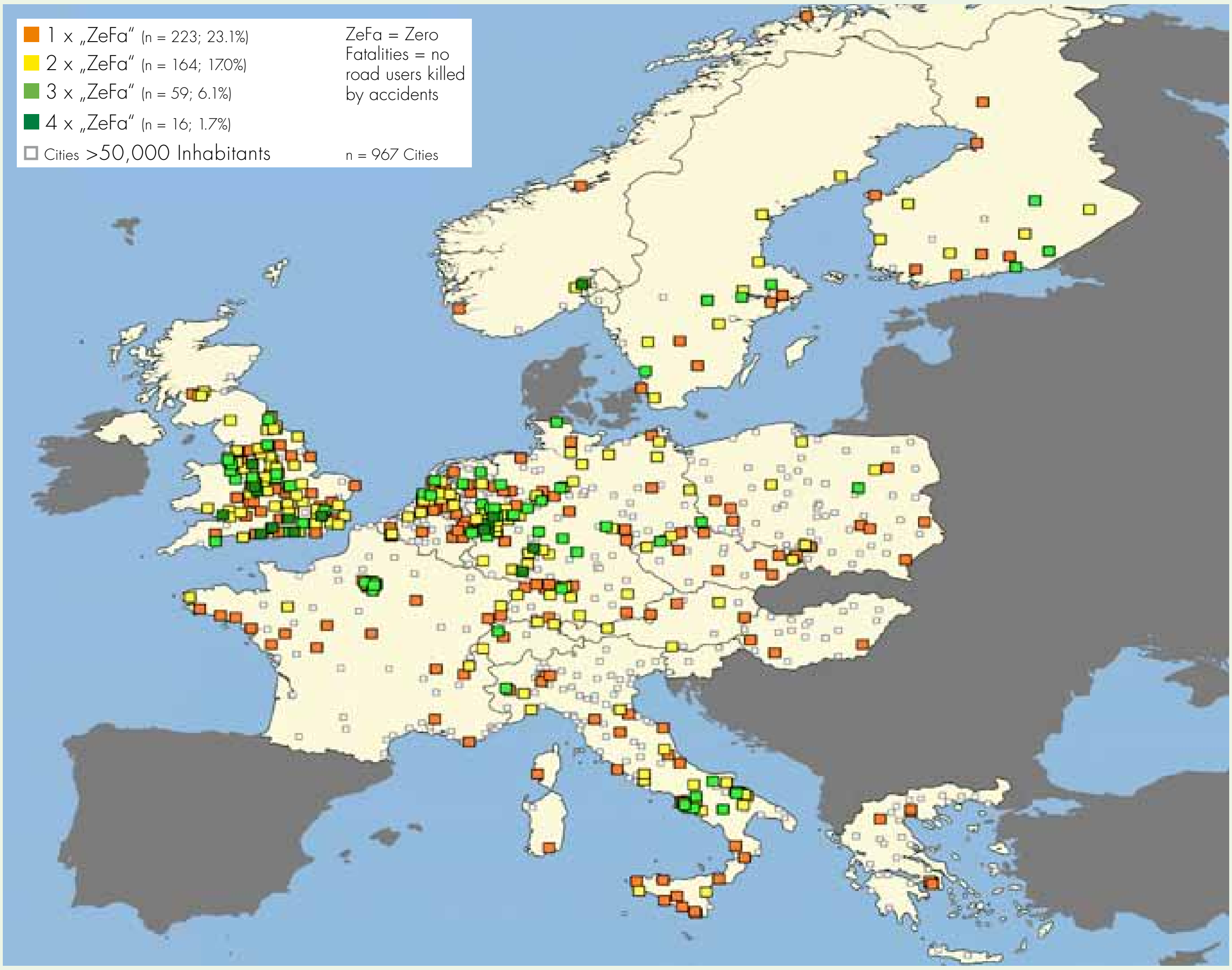
Data source: German Social Accident Insurance

nate here. The number of schoolchildren killed as pedestrians has also increased considerably from 9 fatalities in 2007 to 16 in 2011 (+78 percent).

If we consider all the reportable road traffic accidents documented in schoolchildren's accident insurance then those involving people on bicycles are most frequent, followed by car occupants and pedestrians (Figure 29). The figures for fatalities in public transport are at a relatively low level, although school bus accidents happen more frequently than accidents involving rail vehicles.

Overall the modes of transport used vary greatly in both road traffic accidents involving children in built-up areas as well as accidents on the way to school. This is typical for urban areas in major cities, where the selection of public transport is significantly larger than in small towns and rural areas.

30
Diagram of cities in selected European states (>50,000 inhabitants), which have achieved zero deaths by road accidents in at least one year from 2009 to 2012



Data source: Analysis by DEKRA based on separate analyses by the Federal Statistics Office and IRTAD members

"Vision Zero", the interplay between the human factor, vehicle, traffic and infrastructure

The "Vision Zero" road safety initiative was first presented over 15 years ago and adopted by the Swedish Parliament in October 1997. Politics were signifying a change with this: away from the strived for balance between mobility and safety towards safety as the top priority. Mobility can only continue to further develop in the long-term under the objective that nobody is injured or killed in road traffic accidents any more.

In the meantime, the initiative has been adopted almost worldwide. The EU Commission has set 2050 as the year to aim for "almost nobody" dying on European roads any more. There is an ISO standard for organisations, which aims to end deaths and serious injuries caused by road accidents. And Volvo has set itself the target of nobody being killed or seriously injured in a new Volvo any more from 2020. Looking at things realistically we only have a chance to be able to guarantee safety in road traffic if we see safety as a system in which the interplay between the human factor, vehicles, traffic and infrastructure offers safety and not just the individual components themselves. This applies to both urban mobility and safety. In an urban environment, the greatest challenge lies in having various different road users together in a limited space at the same time where the vulnerable road user is the smallest common denominator.

Therefore the traffic infrastructure must be designed right from the start so that even if human error occurs the most vulnerable still have the chance of not sustaining any serious injuries. The actual speed must be based on this and the possibility of autonomous braking must be used for this to be able to offer the greatest possible safety for pedestrians.

A cyclist must be able to fall without sustaining any serious injuries. A child must be able to walk to school without the fear of being run over by a car. It is only possible for cities to become safer with the help of "Vision Zero" with a meticulous concept and taking into account that more and more new types of vehicles, such as pedelecs, are becoming more widespread in urban areas.

Prof. Dr med. Sc. Claes Tingvall

Director of Traffic Safety at the Swedish Transport Administration

"VISION ZERO" – SCIENCE FICTION OR REALITY ONE DAY?

The term "Vision Zero" is soon mentioned whenever road safety is described in terms of quality. This vision was first presented by Claes Tingvall in Sweden in 1997. Its objectives: no road users killed or seriously injured by accidents. However, this admirable objective for humanitarian reasons alone is often still seen as being impossible today. Is this objective therefore merely science fiction?

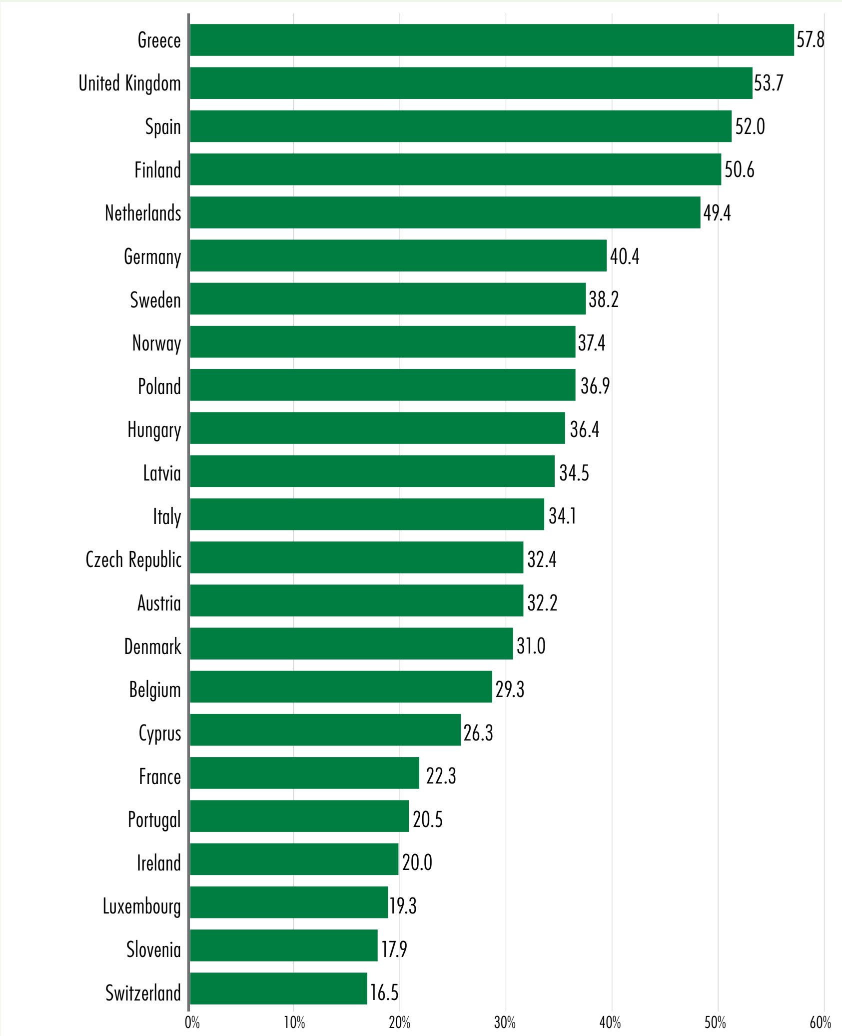
Admittedly: we are still a long way off the vision of not having to report any fatalities or serious injuries after accidents in cities and towns as well as on rural roads and motorways. The figures presented in this report have made that clear. However, every major project starts out small. Therefore why shouldn't we first of all focus on our immediate living space, i.e. cities and towns, with "Vision Zero" and set our first interim target here as no deaths caused by road accidents? At the end of the day this has already been achieved in individual years in numerous European cities (Figure 30).

For manageable and promising analysis it makes sense to set a lower limit in terms of population, for example at 50,000. There are 181 cities with at least 50,000 inhabitants in Germany. These include 80 cities with at least 100,000 inhabitants (= major cities). 31.9 percent of Germany's total population of just under 80.5 million live in these major cities (as of: end of 2011). Consideration of cities with more than 50,000 inhabitants includes 40.4 percent of the citizens living in Germany (Figure 31).

Separate analysis of accident statistics from 2009 to 2012 shows that some of these

31

Percentage of the population living in cities (>50,000 inhabitants)



Data sources: Survey of IRTAD members + Wikipedia (list of major and medium-sized cities in Germany, as of: end of 2011).

32 Distribution of cities (>100,000 inhabitants) without any road users killed across Europe's countries

Country	Total	ZeFa cities*
AT	5	2
BE	9	0
CH	6	3
CZ	6	2
DE	80	17
FR	39	5
FI	9	4
GB	72	34
GR	12	0
HU	9	0
IT	45	2
LU	1	0
NL	26	9
NO	6	3
PL	39	3
SE	7	4
SI	1	0
Total	**372**	**88**
		23.7%

*ZeFa = Zero Fatalities = no road users killed or seriously injured by accidents

Sources: Survey of IRTAD members + separate analysis by Federal Statistics Office

33 Percentage of residents living in cities (>50,000 inhabitants) without any deaths caused by road accidents from 17 European countries*

Inhabitants of cities 50,000+	Inhabitants of ZeFa cities							
	Absolute frequency				Relative frequency			
	2009	2010	2011	2012	2009	2010	2011	2012
153,380,424	13,453,310	16,158,029	16,763,454	13,760,078	8.8%	10.5%	10.9%	11.1%

*17 countries with 967 cities (2012 just 14 countries with 753 cities)
Sources: Survey of IRTAD members + separate analysis by Federal Statistics Office

34 European cities (>50,000 inhabitants) without any deaths caused by accidents from 2009 to 2012*

Country	City	Inhabitants
GB	Redditch	81,919
DE	Velbert	81,192
GB	Eastleigh	78,716
GB	Chatham	76,792
GB	Farnborough	65,034
DE	Kerpen	63,569
DE	Dormagen	62,312
GB	Halesowen	58,135
NO	Asker	57,418
GB	Macclesfield	56,581
GB	Littlehampton	55,706
DE	Hürth	55,581
GB	Barry	54,673
GB	Christchurch	54,210
DE	Neustadt a.d. Weinstraße	52,322
DE	Bad Homburg	51,625
		1,005,785

*Germany, Great Britain and Norway 4 years.
Sources: Survey of IRTAD members + separate analysis by Federal Statistics Office

35 Largest city in terms of the country with no deaths by road accidents in at least one year between 2009 and 2012

Country	City	Inhabitants
AT	Salzburg	145,871
BE	Ukkel	78,288
CH	Lausanne	127,821
CZ	Liberec	101,865
DE	Aachen	260,454
FR	Villeurbanne	144,751
FI	Espoo	259,380
GB	Nottingham	289,301
GR	Kalamaria	90,096
HU	Kaposvár	67,746
IT	Reggio di Calabria	185,577
LU	–	
NL	Almere	193,163
NO	Stavanger/Sandnes	199,237
PL	Zielona Góra	117,523
SE	Uppsala	140,454
SI	–	

Sources: Survey of IRTAD members and separate analysis by Federal Statistics Office

cities did not have any deaths caused by road accidents to record at the end of individual years in built-up areas, i.e. between the city limit signs. This ideal value appears more often than assumed and is generally known. Precisely 100 of the 181 cities in Germany have achieved the ideal value of "zero" at least once in the last few years: 34 cities once, 41 cities twice, 19 cities three times and six cities four times. The six cities with no deaths caused by road accidents in the four years considered are Velbert, Dormagen, Kerpen, Neustadt an der Weinstraße, Bad Homburg and Hürth. Out of the major cities with over 100,000 inhabitants 12 cities have already recorded zero deaths by road accidents once and another five cities twice (Jena, Trier, Bergisch Gladbach, Remscheid and Reutlingen). Among the major cities that had no deaths caused by road accidents once are three cities with more than 200,000 inhabitants, Aachen, Mönchengladbach and Oberhausen.

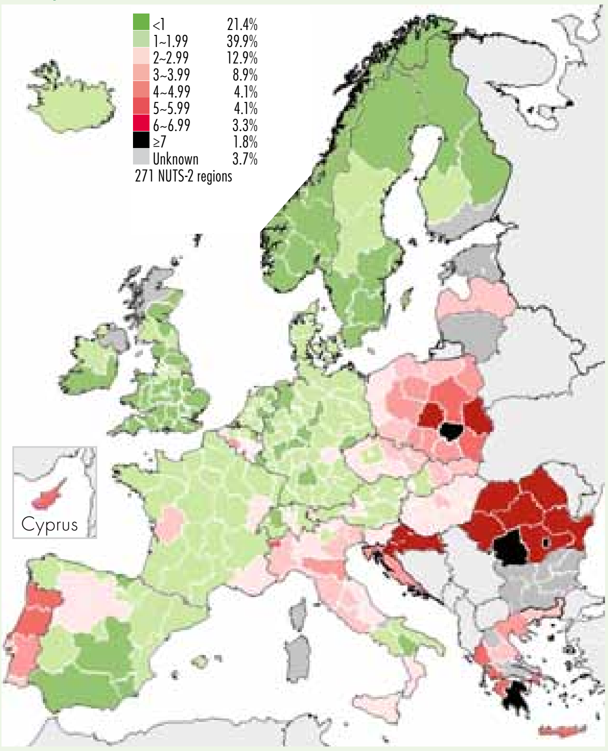
POSITIVE TRENDS AT EUROPEAN LEVEL TOO

A census in 17 European states (Germany, Switzerland, Austria, France, Belgium, the Netherlands, Luxembourg, Great Britain, Norway, Finland, Sweden, Poland, the Czech Republic, Slovenia, Italy, Hungary, Greece) resulted in 967 cities in total with more than 50,000 inhabitants including 372 cities with more than 100,000 inhabitants. Among the 967 cities there are 462 that had no fatalities in at least one year. Among the 373 major cities, 88 had achieved the ideal value of "zero" at least once. That means that more than 40 percent (47.6 percent) of cities (50,000+) have achieved zero at least once. It is even 23.7 percent with cities with more than 100,000 inhabitants (Figure 32). Considered on an annual basis roughly 200 cities (50,000+) in the 17 states have no deaths caused by road accidents.

This analysis includes 967 cities from 17 European states with more than 150 million inhabitants in total. More than 15,000,000 inhabitants live in cities with no deaths caused by road accidents in these states every year (Figure 33). There are even 16 cities (from Germany, Great Britain and Norway) that recorded no deaths caused by road accidents for the whole period from 2009 to 2012 in built-up areas (Figure 34). More than one million people in total live in these cities. In addition, no fatal accidents happened in six Italian cities with roughly 450,000 inhabitants from 2009 to 2011. The largest cities with zero in the respective states include quite well-known place names like Nottingham, Uppsala, Salzburg and Aachen (Figure 35).

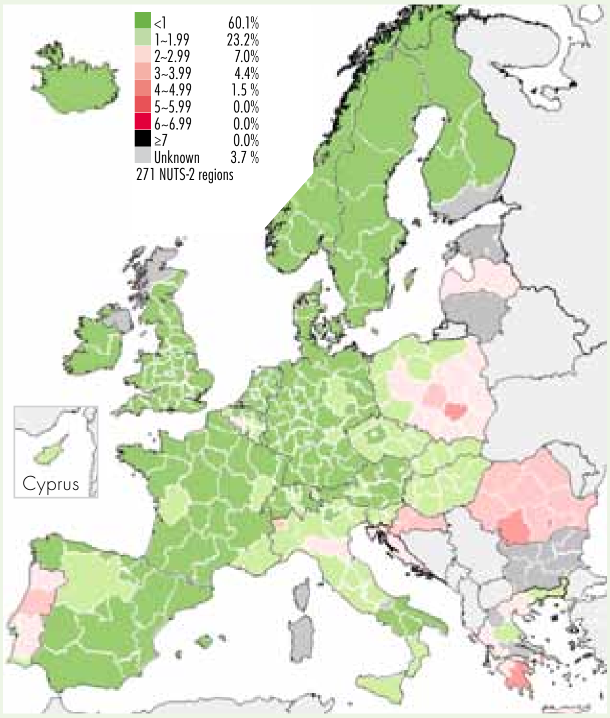
Conclusion: Although we are a long way from achieving "Vision Zero" in built-up areas there are more than 15 million Europeans living in a city (>50,000 inhabitants) without any deaths caused by road accidents every year. This actual state makes it clear that "Vision Zero" is achievable in urban areas in terms of the number of fatalities and is already a reality in some cities (Figures 36-39). Against this background, more regional and national measures and/or investments in road safety are essential so that the vision can become more and more of a reality for serious injuries too.

36
Diagram of road users killed in built-up areas in 2010 to every 100,000 inhabitants per NUTS-2* region in Europe



Data source: CARE

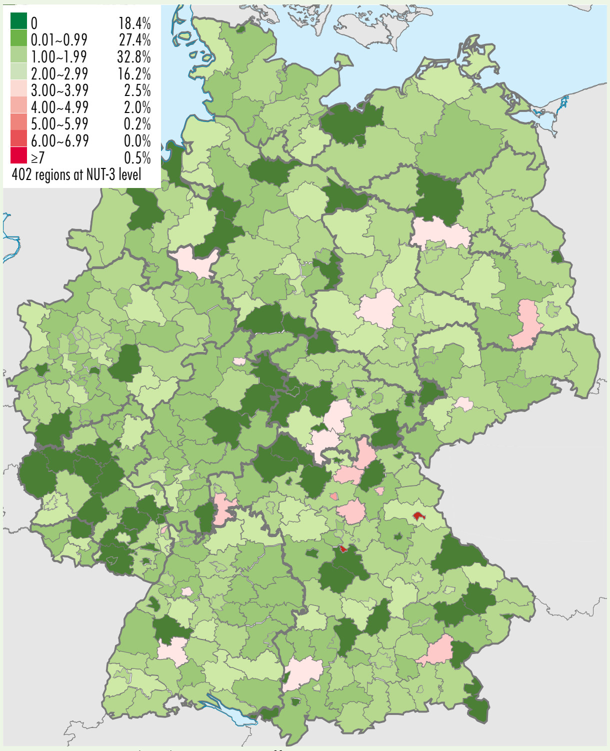
37
Projektion der je NUTS-2*-Region in Europa im Jahr 2020 innerorts verstorbenen Straßenverkehrsteilnehmer je 100.000 Einwohner bei Erreichen des europäischen Ziels zur Halbierung der Zahl der Verkehrstoten



Data source: CARE

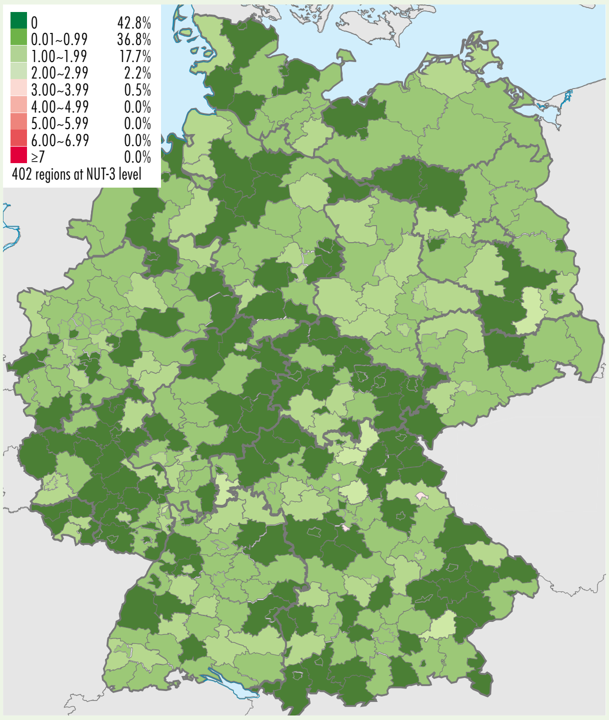
* NUTS (= "Nomenclature des unités territoriales statistiques") name for the regional units system for official statistics in the EU member states. It is closely modelled on the administrative structure of individual countries. Generally, one NUTS level corresponds to one administrative level or administrative units. NUTS-2 encompasses medium-sized regions/areas.

38
District-related diagram of people fatally injured in road traffic in built-up areas in Germany in 2010 to every 100,000 inhabitants



Data source: Federal Statistics Office

39
District-related projection of fatally injured people in built-up areas in 2020 to every 100,000 inhabitants in the event of achieving the European target of halving the number of deaths caused by road accidents



Data source: Federal Statistics Office

DEVELOPING A STRATEGY IN TERMS OF SERIOUS INJURIES IN ROAD ACCIDENTS

In its efforts to improve road safety, the EU Commission is not just concerned with reducing the number of deaths further but has also recently tended to focus more on road users seriously injured in accidents. Not without good reason. As according to estimates there are after all ten accidents with serious injuries and 40 accidents with more minor injuries to every fatal accident on Europe's roads. Whilst the number of fatalities in road traffic has dropped by 43 percent EU-wide in the last ten years, the number of people with serious injuries could only be reduced by 36 percent during this period. As we can see from the figures mentioned in this report, seriously injured road users in accidents with personal injury make up a large percentage particularly in built-up areas. For example in Germany: There were a total of 66,279 people with serious injuries in 299,637 accidents with personal injury in 2012, 53.3 percent of these were in built-up areas (for comparison see Figure 9 again).

The most common serious injuries in road accidents are head and brain injuries, followed by injuries to the legs and spine. Many of these injuries are associated with lifelong pain and permanent disabilities. Road users who are particularly at risk, for example pedestrians, cyclists, motorcyclists, senior citizens and children, are mainly affected by this. Quite apart from the human suffering that these injuries cause, the associated socio eco-

Recent accidents are pointed out by special information boards in many cities.

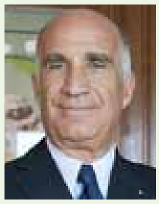
Designing mobility to be safer and more sustainable

Dealing with mobility as the Automobile Club d'Italia (Italian Automobile Association ACI) has been doing for more than 100 years undoubtedly means dealing with the issue of safety on roads seriously, the most important aspect of our daily reality.

During the last decade we have been able to drastically reduce the number of traffic accidents and monitor the consequences thanks to the combined efforts of all stakeholders in the mobility sector. The number of deaths on our roads almost halved between 2001 and 2012 (-48.5 percent). As a result, Italy has come very close to the ambitious target of 50 percent set by the EU for member states.

However, if we look at the ACI-Istat data (Istat = Italian Institute for Statistics) for 2012 we can immediately see that despite a drop of 10 percent in accidents and fatalities compared to the previous year, 75 percent of accidents still happen on urban roads with a fatality share of 42 percent and an injury share of 72 percent. 33 percent of these urban accidents alone happen in major cities like Rome, Milan, Genoa and Turin. An increase in fatalities among pedestrians (148 in 2012 compared to 136 in 2011) and accidents involving cyclists is also recorded, which has risen by 2.5 percent in urban centres.

All this still places safety at the heart of mobility work: awareness campaigns, expanding courses for safe driving, the innovative "Ready2Go" system for obtaining the driving licence, promoting international crash test programmes such as Euro NCAP are just a few of the initiatives that the ACI has implemented in the last few years and which it dedicates resources and energy to by offering itself as a protagonist in the battle for safety. However, the keyword is still synergy. Everyone has to be working in the same direction and pursuing the same goal: designing mobility, which is a permanent fixture in today's society, to be safer and more sustainable in every respect.



Ing. Angelo Sticchi Damiani

President of the ACI (Automobile Club d'Italia) nomic costs are estimated at roughly two percent of the EU's annual gross domestic product. According to estimates in the "World Report on Road Traffic Injury Prevention" by the World Health Organisation (WHO), this resulted in costs amounting to roughly EUR 250 billion in 2012.

One crucial factor for success in reducing the number of fatal accidents was the results-based approach of two consecutive ten year strategies for road safety, in the EU Commission's opinion. A great deal could be achieved using a comparable emphasis on measures to reduce serious but non-fatal injuries in road traffic. However, as there is a lack of common definitions and data reports are often flawed and incomplete, there is often only inadequate, inaccurate and patchy information about the nature and extent of serious injuries.

It therefore has to be assumed that the total number of people seriously injured in road traffic is in reality far higher than the number of reported cases. Added to this is the fact that the member states currently apply different, often non-medical definitions of serious injuries and different data collection methods. For example, some member states define people with serious injuries as anyone who had to be treated at hospital, whilst a person is only considered to be seriously injured in other member states if the stay in hospital lasts longer than 24 hours. Other member states base national definitions on the basis of medical diagnosis lists.

Reports of serious injuries are often flawed and incomplete at the moment. On the one hand this is due to the fact that the severity of injuries which are entered into databases for road safety is often only evaluated on site by the police using "ad-hoc" assessments, In many cases these assessments are not checked appropriately using hospital records later on. Also a significant share of non-fatal accidents are not reported at all, for example because the police are not always called to accidents. Some injuries are classified as serious injuries although this is not justified.

For this reason, the European Commission presented a document about serious injuries in road traffic in March 2013 in which the next steps for a comprehensive EU strategy for serious injuries in road traffic are outlined. These include the standardised definition of serious injuries in road traffic, guidelines for member states to improve data collection about serious accidents in road traffic and the setting of an EU-wide target to reduce road traffic accidents with serious injuries, for example for the period from 2015 to 2020.

First aid must be learnt and regular refresher courses make sense.

First aid saves people's lives

Despite success in reducing the number of fatalities and people injured in road traffic, everyone everywhere must always reckon on being the witness to an accident with injured parties or coming across this kind of accident site. The right response is then essential and has a crucial influence on the survival and recovery chances of the people involved in the accident.

According to a study by the University of Würzburg, the number of deaths caused by road accidents in Germany could be reduced by 10 percent if first aid were to be administered immediately after the accident. However, first aid is not just about preventing life-threatening situations. In most cases, alleviating pain, preventing long recovery periods and even providing important psychological support are the focus.

The willingness and ability to effectively administer first aid vary greatly in European countries. The Scandinavian region is deemed to be exemplary. First aid is already taught at school and the follow-up courses offered are also good.

One-off instruction in immediate lifesaving measures, as is required in some countries to obtain a car driving licence, certainly does not qualify you to administer adequate first aid, particularly as no repetition of any kind is required. A full first aid course of 16 hours, which is required for example in Germany to obtain a truck driving licence, provides a solid basis. However, as repetition is also not required here there is a lack of any routine and what is learnt is soon forgotten. In the United Kingdom first aid training is not required at all to obtain a driving licence.

The further training required for drivers of commercial buses and trucks (implementation of directive 2003/9/EC) also may contain a first aid module, which can be highlighted as something positive. It is not just first aid training though that influences the willingness to administer first aid. The legal framework also has to be right. Germany takes a pioneering role in this. Besides a general obligation to administer aid the first aider is also comprehensively protected at the same time. They are insured by German Social Accident Insurance whilst administering first aid. They are also covered if any material damage results for them by administering first aid. However, it is very important that the first aider cannot be sued for any possible incorrect first aid as long as they did not act with gross negligence or even with intent.

Looking at the United Kingdom there is a major problem in precisely this respect. There is no official law that protects first aiders. Even standard common law here, i.e. a legislation system based on cases of precedence in the past, has its limitations due to a lack of suitable cases. Thus resulting in legal uncertainty for potential first aiders. The courageous aid that is definitely required is therefore not encouraged at any rate. There are similar problems in many European states. Remedial action is urgently required here.

Compelling examples of accidents in detail

1 Overview of the accident site

2 Accident site in the moped's travelling direction

3 Final position of the car and moped

4 Damage to the car and moped

5 Reconstructed position of impact

6 Damage to moped

Example 1

ACCIDENT AT JUNCTION WHEN TURNING IN

Accident circumstances:
An accident happened at a junction around midday on a workday when a car turning into the road collided into a moped that was travelling along the road with right of way.

Parties involved:
A car
A moped (vintage)

Consequences of the accident/injuries:
The motorcyclist was seriously injured in the accident.

The front left of the car involved was damaged. The front wheel, headlamps, front fork and other components were damaged on the moped.

Cause/problem:
There was a traffic jam before the lights some distance away on the priority road. Due to the traffic, a truck stopped in front of the road merging in from the right. The motorcycle driver was passing the truck just before the collision.

The car driver who wanted to turn left into the priority road used a gap in the traffic jam and saw the passing motorcyclist too late.

Prevention options/
approach for road safety measures:
There were signs to get into two lanes before the traffic lights from the junction on the priority road onwards. The moped driver was getting into lane to turn off left later on and was passing the truck that had stopped due to the traffic for this reason. As a result of this, the moped driver and his vehicle were temporarily not visible to the car driver. Also the car's left roof pillar concealed a certain area of visibility and made it more difficult to see the traffic with right of way.

The car driver could have prevented the accident by not turning in or exercising extreme caution and carefully edging forward while constantly ready to brake.

The motorcyclist could have at least reduced the risk by passing more slowly and carefully in the unclear traffic situation and at least have minimised the consequences of the accident at lower speed by braking immediately.

Example 2

PEDESTRIAN ACCIDENT DUE TO DRIVING ON DESPITE A RED LIGHT AND AT EXCESSIVE SPEED

Accident circumstances:
A car driver was turning into an intersection at excessive speed in daylight ignoring the red light. In doing so, she collided with an approaching car. Her car was deflected due to the collision and hit a group of pedestrians who were on the lane divider near a tram stop.

Parties involved:
Two cars
Several pedestrians

Consequences of the accident/injuries:
Two pedestrians were killed

Several people were seriously injured

Damage to property to the two cars involved and constructions in the area of the tram stop.

Cause/problem:
The car driver was approaching an intersection at a significantly excessive speed of at least 90 km/h. At the same time she ignored the „red“ light and drove into the intersection more than three seconds after the lights had switched to red. There was a collision with a car that was travelling straight ahead, whose visibility of the vehicle that caused the accident was blocked by the vehicle next to it on the left.

After the collision of the vehicles, the car that caused the accident still had a speed of at least 75 km/h and hit a group of pedestrians while it veered out of control. The car only finally came to a stop in a track bed far away from the tram stop.

Vermeidungsmöglichkeiten/
Ansatz für Verkehrssicherheitsmaßnahmen:
By complying with the maximum permissible speed limit which was reduced from 60 to 50 km/h due to roadworks and reacting to the traffic lights signals in good time the car driver would have been able to stop the vehicle safely before the intersection. There were no technical faults on the vehicle to cause the accident. The driver of the car with right of way did not have any chance of preventing the accident.

1 Direction of approach from the right at intersection
2 Final position of the vehicle that caused the accident
3 Final position of the other car involved
4 Collision site and marks towards the group of pedestrians
5 Overview photo of accident site

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1 Final position of the truck and bicycle

2 Road layout at the accident site

3 The child's run over bicycle

4 Reconstructed position of impact

5 Contact marks in front of the truck

Example 3

BICYCLE ACCIDENT INVOLVING MUNICIPAL VEHICLE

Accident circumstances:
A municipal vehicle was emptying refuse bins. A child riding a bicycle was hit by the truck on a narrow road in a built-up area near an incline section.

Parties involved:
A refuse collection vehicle.
A child riding a bicycle

Consequences of the accident/injuries:
The 6-year old child was fatally injured.

Cause/problem:
The child riding a bicycle passed the truck on the left as it was emptying the refuse bins. Once the child had reached the front end of the truck, they suddenly swerved to the right in front of the truck very close to the driver's cab. The refuse collection vehicle started up at this precise moment. The child on the bicycle was hit from behind and then ended up under the truck with their bicycle.

Prevention options/
approach for road safety measures:
The driver's seat is on the right of the truck as refuse bins on the edge of the road are loaded and emptied by the driver from the driver's seat from the right. They monitor this through the right-hand exterior mirror and a camera system.

The truck driver only has the possibility of monitoring the area all around the vehicle using the specially attached mirror and a camera system. A rear-view mirror with a wide-angle mirror and ramp mirror underneath it are attached on the left-hand side. At the front a wide-angle mirror is attached in the top left corner of the front windscreen's frame which shows the area directly in front of the vehicle, which cannot be seen from the driver's seat. During the loading process only the camera to monitor the emptying process at the rear is active, the other cameras are then switched off.

The cyclist passed the truck during the loading process, they could not be seen by the truck driver during this time due to him concentrating on his work. When the truck started the child was only shown distorted in the exterior mirrors in the furthest outer edges and vaguely visible at the boundaries.

The accident could only have been prevented by the truck driver by turning his attention and gaze to the left-hand exterior mirror during the overtaking process.

Example 4

PEDESTRIAN ACCIDENT INVOLVING TRAM

Accident circumstances:
A pedestrian was crossing a road and the tram track that runs alongside near a pedestrian crossing controlled by traffic lights in the tram's travelling direction from left to right. He was hit head-on near the tracks, propelled forwards and finally stopped right in front of the tram's final position.

Parties involved:
A pedestrian
A tram

Cause/problem:
The pedestrian was seriously injured in the accident.

Ursache/Problem:
The accident between the pedestrian and tram happened at the start of January in the dark, the accident site was lit. The pedestrian was crossing the tram's track bed near the pedestrian crossing although the traffic lights were signalling "red" for him. The tram driver recognised the danger and activated the emergency brake at the permissible speed when the pedestrian was near the opposite tracks. However, the collision with the pedestrian could no longer be prevented by this. The collision speed was still roughly 30 km/h. The exact location of the impact could not be identified from the marks but it is plausible that it was in the area of the crossing.

Vermeidungsmöglichkeiten/
Ansatz für Verkehrssicherheitsmaßnahmen:
The tram's history memory was analysed, which was able to prove the emergency braking was activated 18.5 metres before the tram's final position and roughly 6 to 10 metres before the assumed collision site. Statements by witnesses on the tram reveal that the tram driver only saw the pedestrian after turning their gaze, as their attention was previously directed at the blue light to the right of the junction.

The accident would have been avoidable for the pedestrian if they had waited or moved faster. It would have been possible for the tram driver to stop before the collision site with a roughly 10 km/h slower speed.


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1 Final position of the tram

2 Signs of impact on the tram's windscreen wipers

3 Crossing and the tram's final position

4 Grinding marks from the emergency braking in the track area

5 The tram's direction of approach before the junction and adjacent pedestrian lane


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More caution, respect and sense of responsibility

In built-up areas especially, motorised road users regularly come across "weaker" road users, for example pedelec cyclists or usual cyclists, pedestrians, people with disabilities, senior citizens and school children. As a result, dangerous conflict situations rapidly arise due to inattentiveness, carelessness and even recklessness. A high degree of attention, consideration and tolerance is required if there are to be no accidents. What is important is the basic willingness of putting yourself in the position of other road users to understand their behaviour.

Narrow roads, lots of cars, motorcycles, trucks, buses, trams, bicycles and pedestrians. Hustle and bustle and distraction everywhere. Urban traffic demands a great deal of its users. Whether an accident happens depends in most cases on the behaviour of individual road users. At the same time it must also be considered that many near-miss accidents are prevented by the extreme caution of other road users who compensate for road user errors. Not withstanding this, errors by drivers, cyclists and pedestrians are still the most common cause of accidents. This applies specifically to built-up areas, as the figures from Germany for 2012 show, among others (Figure 40). Driver errors when turning left or right and around, right of way errors, not observing a safe distance, incorrect road use and a lack of respect for pedestrians dominated in built-up areas in Germany in 2012 (Figure 41). Car drivers ranked highest by far in the list of errors, followed by cyclists in second place, even ahead of goods vehicle drivers.

The problem: In order to avoid accidents those involved must have a shared understanding of the regulations and standards. At the same time, road users must be able to predict others' actions, whether they be in a car, on a bicycle or as a pedestrian, and be able to put themselves in the position of other people.

This already starts with social conduct in road traffic. Who hasn't already thought that they conduct themselves better in traffic as a car driver than cyclists who the same rules apparently do not apply to? Or better than motorcyclists who weave through urban traffic constantly changing lanes? Or better than truck drivers who always drive so inconsiderately? And when you're on your bicycle yourself you curse car drivers instead.

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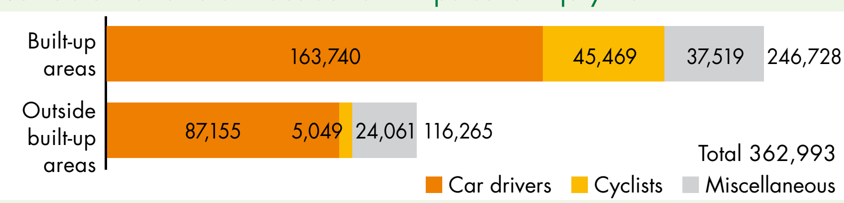
Vehicle driver errors in accidents with personal injury 2012



Data source: Federal Statistics Office

A LACK OF SEEING OTHERS' PERSPECTIVES

But where does this feeling that other groups of road users seemingly behave "worse" than our own group actually come from? Social psychologists talk about processes of discrimination in relation to the phenomenons described. This means unfair or derogatory behaviour towards a person just because this person belongs to a specific group (for example, the group of cyclists).

Researchers such as the social psychologist Henri Tajfel (1972) assume that all kinds of groups strive to set themselves apart from or be different to other groups in a positive sense. This may be achieved both by enhancing the status of one's own group ("Car drivers behave better in traffic") and by demoting other groups ("Truck drivers are inconsiderate in traffic"). The psychological reason for this is that every person, therefore every road user, has a positive self-image of themselves.

According to the theory of social identity developed by Henri Tajfel and John C. Turner (1979), a person always strives to achieve a positive self-image and high self-worth. This is also the case if the person sees themselves as part of a group, for example as a car driver. They then compare themselves to others at this group level. Within road user groups, for example car drivers, there is so-called "in-group solidarity". This means: The members of this group of car drivers assess each other more positively than "other" groups, for example cyclists. We could even talk about rivalry towards "out-groups", i.e. non-group members. If someone who usually drives a car is travelling by motorcycle, they consequently identify with the group of motorcyclists in the situation and will probably evaluate car drivers more negatively.

Sometimes though it is difficult to see the perspectives of various road users, among other things due to social processes. How could this be improved? Basically, it is possible to reduce these negative effects between various groups of road users. This would therefore mean that less stereotypes, prejudices and dislikes and more tolerance and openness would instead have to prevail between the groups. However, it is not difficult for anyone to imagine that it is not that simple to improve these kinds of group relationships. But perhaps you have already experienced yourself what it is like when you suddenly belong to another group. Perhaps a car driver remembers how they felt travelling by bicycle in the city and how threateningly close a car once passed them?

Prejudices towards other groups often result from a lack of experience or trust. This gap can at least be partially closed through having contact with one another. The "contact hypothesis" formulated by Gordon Willard Allport (1945) assumes that direct contact between groups under certain conditions (same status, common goal, established standards, frequent contact with members of other groups) can lead to a reduction in hostilities.

One question asked in relation to the use of modes of transport in urban areas is whether the choice of transport differs according to the occasion and distance. Significant differences have been established here when comparing cities of different sizes. Whilst a whole range of transport is used in major cities, the car dominates in smaller cities and rural areas as the first choice of transport (Figure 42).

This "multi-mobility", i.e. the choice of different modes of transport, must be considered more in traffic planning in urban areas on the one hand. On the other hand it can no longer be assumed that car drivers are always only car drivers and cyclists only ever ride bicycles. The fact that sole car drivers or sole cyclists see personal rivals in other road users might be explained by social psychology but it should not be tolerated. However, a number of road users switch between being car drivers, motorcyclists and cyclists. They are usually pedestrians on a regular basis too. In light of this, it would be desirable and beneficial for mutual respect, understanding, consideration and composure to be more marked especially in this "mixed group" of road users compared to other "group members". And this in turn includes the basic willingness to put yourself in the position of other road users to understand their behaviour.

TRAFFIC REGULATIONS, SOCIAL NORMS AND TRAFFIC MORALS

Many people are familiar with the term "norm". But what does it actually mean as

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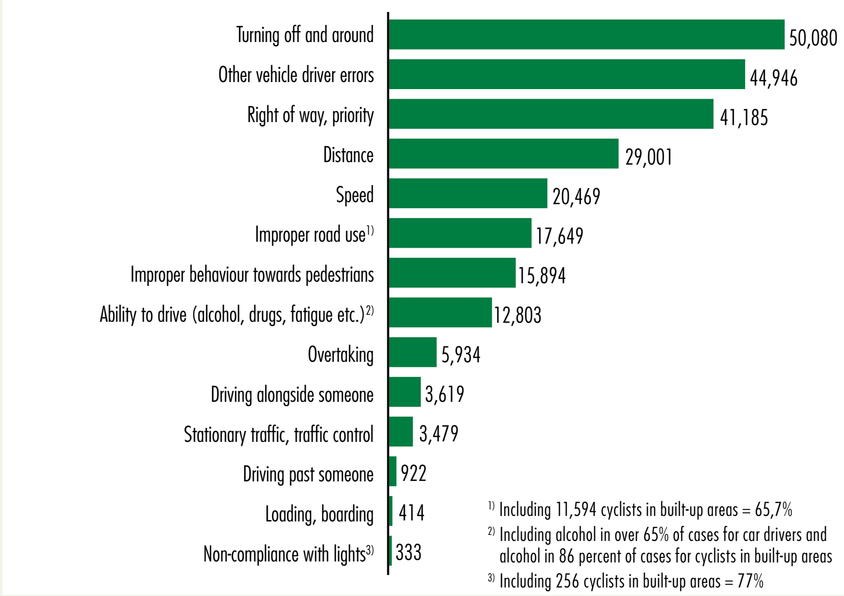
Vehicle driver errors in accidents with personal injury in built-up areas in Germany 2012in Deutschland innerorts



Source: Federal Statistics Office, 2012

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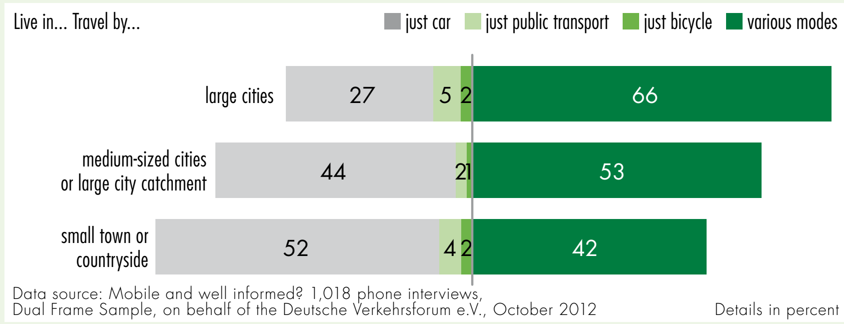
Transport use by city size



Source: Graphics from Follmer, R (2013)

A well developed public transport network leads to an increase in the use of public transport.

far as the conduct of various road users is concerned? All social actions are based on social norms. It has already been established that road use constitutes a social action. Social norms include rules and regulations, compliance with them is ensured through checks and sanctions, as necessary. They do not consequently include customs and habits, as non-compliance with these is not accompanied by sanctions and penalties.

Social norms are therefore so important to people as they regulate behaviour. In contrast to animals people rely on basing their behaviour on something. Norms help to maintain the regularity and uniformity of social actions. In traffic this means, for example, that a driver can be prepared for having right of way over crossing vehicles when the lights are green. With the help of social norms the person does not have to create new appropriate actions in every new situation. The driver knows that crossing traffic will not drive as long as the lights are green for them. Therefore they do not have to think again about which possible actions to take (braking, stopping, accelerating) every time they approach a junction with traffic lights.

Social norms are used to establish whether a person is behaving deviantly or in fact conforming. You could say they serve as the benchmark for proper and improper conduct. Compliance with traffic regulations or norms is really crucial as communication between various users is difficult. Therefore we have to be able to rely on the other person behaving correctly, i.e. according to our expected norm.

Traffic regulations rank among the social norms described. To what extent the individual complies with these regulations depends on various factors according to Günter Fred Müller and Maria Müller-Andritzky (1987), for example the degree of their internalisation or sanctions balance. Traffic regulations therefore tend to be accepted if they are obvious and purposeful.

INTERNALISATION OF TRAFFIC REGULATIONS

According to a study by Lars Rößger, Jens Schade, Bernhard Schlag and Tina Gehlert (2012) there are three important sources that lead to people complying with regulations: First of all they have internalised the norms, i.e. traffic regulations. This leads to them complying with the regulations out of conviction and also wanting this from other road users. “This internal method of observing regulations as a result of strong acceptance of the regulations is sustainable in the sense that it is also sought in unfavourable conditions and offers stronger, even if not complete, resistance against frustrations (e.g. when I see that others have advantages from transgressions)”. (Rößger et al., 2011, page 45). The internalisation of norms is influenced by the perception of social norms and the norms of one’s own reference groups. The expected consequences in one’s own group, in terms of informal sanctions, play a crucial part in this.

A distinction has to be made between the internalisation of regulations and the external method of obeying the rules. Rules may be obeyed externally in that the consequences of breaching the rules and therefore the likelihood that we can expect unpleasant consequences as well as the severity of punishments “force” us to comply with regulations. For example, drivers might avoid jumping red lights because they feared the consequences and not because they are convinced themselves about the regulation. Habits are formed if this kind of external obeying of rules is applied frequently. It is important to note that habits can result from regularly not obeying rules, for example in terms of exceeding speed limits, if this behaviour goes unpunished. The driver tends to experience positive consequences here because they have the impression of reaching their destination quicker without having to pay a fine. It is then difficult to change these habits.

A third option for traffic regulations being complied with is as a result of the situation the road user is in. Here the cues, for example due to the route or vehicle, which require a certain conduct play a part. Other road users may also be involved in the decision regarding conduct at the same time. “The speed selection during an independent trip is an example of this. It follows internal preferences (desired speed), which usually do not quite match the regulation requirements, it is controlled externally and rather weakly and usually results in a weighing up of preferences and perceived options based on the situation.” (ebd). If the perceived options based on the situation do not match your own preferences it results in a compromise between the two influences, which does not necessarily constitute a conscious decision but is often arrived at automatically and therefore unconsciously.

To summarise, traffic regulations tend to be obeyed once they have been internalised. Regulations that are rarely associated with punishments tend to not be obeyed. One example of this is driving at excessive speed. As a result of the relatively low probability of being flashed when driving fast, the person concerned has the subjective feeling of benefiting from driving fast and will therefore do so more often. One option for enforcing this regulation is to increase the density of checks. The severity of the punishment in the form of a fine or driving ban also undoubtedly has a certain effect on the obeying of rules. However, the severity of the punishment alone is not decisive for long-term and internalised behavioural change. It is clear though that any kind of overregulation does not contribute to increased acceptance of the rule. In fact every single road user should time and time again make themselves aware of which risks, sometimes fatal, may result from breaching regulations.

ATTENTION IN TRAFFIC

Everyone is sure to have a certain idea of what is meant by attention. At the end of the day children are taught at kindergarten that they must pay attention when crossing the road. But does that mean that one is attentive if you pay good attention to your surroundings? Or does attention mean that you are extremely focused on something? Before we can deal with to what extent attention plays a part in road traffic, particularly in cities, we must briefly broach what science understands by attention.

Historically speaking, attention research began with the assumption that attention is a unitary construct. One of the first comprehensive theories on attention originates from Donald Broadbent (1958), who in his theory assumes that two pieces of information presented at the same time or parallel stimuli (simultaneous) reach a sensory memory. However, only one of these two stimuli can pass a selective filter based on physical features while the other stimulus is prevented from doing so and is stored in a memory to possibly be accessed later on. This process is to prevent the processing system from becoming overloaded in its limited-capacity channel. Only information that runs through the content processing system can become conscious and therefore part of long-term memory. This process is shown in a simplified diagram in Figure 43. Although the filter theory has shaped attention research for more than a century it is considered to have been disproved in experiments today.

Over the course of time, researchers like Michael I. Posner and Stephen J. Boises (1971) moved over to the assumption that attention is not a unitary construct but consists of different components. These include alertness, for example. Vigilance components are understood to be something like sustained attention. Selectivity refers to the limited capacity of attention and the ability to integrate information for various modalities. According to Walter Sturm (2008) there are three dimensions of attention each with different attention components:

1. Intensity of attention
   - Processes of short-term and long-term activation
   - Components: Alertness, vigilance, sustained attention
2. Selectivity of attention
   - Components: selective, focused, divided attention
3. Spatial aspects of attention
   - Components: spatial focus of attention

ATTENTION SUFFERS WITH "DUAL TASKS"

But to what extent do these components play a part in road traffic? Various application scenarios can be found for this: You are travelling a long distance, for example on the motorway or a rural road, which is always straight and where the surroundings are very monotonous. Despite this you have to pay attention to the traffic and be attentive for a long period of time without carrying out any actions.

Vigilance or sustained attention is required at this moment. This means your body must be ready to work, i.e. respond

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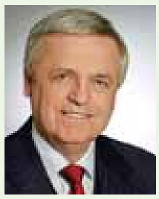
Diagram of the filter theory by Broadbent

Better networking of modes of transport is essential

Prof. Dr Wolfgang Schubert
President of the Deutsche Gesellschaft für Verkehrspsychologie e. V. (DGVP)



Analysis of demographic data makes it clear that among other things there is a migratory movement of people from rural to urban areas. To develop an effective infrastructure it will be necessary in future to develop an improved range of public transport as quickly as possible, in addition to the mode of transport predominantly chosen at the moment, the car.

The city of Shanghai, where there is an appropriate balance of options for use between motorised private transport, cycling, public transport and pedestrians, sets a great example for providing an effective traffic infrastructure. Here there is increasingly comprehensive networking between motorised private transport, the whole range of public transport (bus, underground, suburban railway, tram etc.) and non-motorised private transport. This networking in particular will gain importance as the use of cars declines in urban areas.

Analysis of the use of modes of transport shows that roughly 60 percent of road users prefer multi-modal traffic behaviour. This means that the proportion of use changes between various modes of transport as required. When the different modes of transport offered for use are appropriate road users also tend to decide on the best solution for their purpose. This will then also provide relief for the modes of transport that are currently overused.

A not insignificant number of young people no longer see obtaining a driving licence as their main goal, which provides a challenge to secure mobility for this group of people to participate in their social life using a modern traffic infrastructure. These kinds of findings should already be considered when planning future infrastructure work.

Being distracted by phone calls or the navigation system increases the risk of an accident.

to a vehicle that suddenly swerves out, without having to focus your attention on something specific.

A second aspect that is particularly important especially in urban traffic is attention selectivity. At the same time you have to imagine that a car driver, for example, is surrounded by a great deal of information or stimuli in urban traffic: other cars, traffic signs, cyclists, billboards, trams, traffic lights and much more.

However, in traffic flow they have to somehow filter out the information that is important for the situation at that moment. This is done using selective attention. Using this people guide their attention focus onto the relevant information, similarly to a torch's beam of light in the dark.

Road traffic is a complex challenge. Different aspects of attention are required to "solve" this challenge. One important aspect of attention, which particularly plays a crucial role in light of the technical equipment in many vehicles, is divided attention. With this aspect of attention we are able to observe and process several pieces of information simultaneously. As a result we can follow information on the radio parallel to paying attention to the traffic. However, it must be noted that carrying out "dual tasks", i.e. two different tasks presented at the same time, takes up a great deal of capacity. Therefore people achieve worse in one task whenever a second one is added.

USING MOBILE PHONES WHEN DRIVING MAKES IT MORE DIFFICULT TO RECOGNISE OBJECTS

If you remember the debate about mobile phones in road traffic it is clear why this aspect in particular is so important. The influence of talking on the phone was analysed in a study by David L. Strayer and William A. Johnston (2001). The test subjects carried out a simulated driving task in which they had to follow a moving target on a computer screen using a joystick. While doing this red or green lights appeared on the computer display. When the test subjects were shown a red light they had to push a button as quickly as possible to brake. In one test situation they had to hold a mobile phone conversation on a specific topic at the same time. In a second situation they listened to a radio station. When carrying out the single task the test subjects only had to follow the target, with the dual task they also had to hold a conversation or listen to the radio. The probability of them on the one hand not reacting to the red signal (braking with a red light) and on the other hand not reacting as quickly to this signal (reaction time) was analysed for each test situation. The results are shown in Figure 44.

Looking at the results it is clear that the probability of them overlooking a signal increases whenever they are involved in a conversation. The reaction time is also slower under these conditions. This means that the test subjects activated the "brake button" slower whenever they were making a phone call at the same time. This effect could not be significantly proved statistically for the group of radio listeners. What is particularly remarkable about this study is that the group of people making phone calls was originally broken down into those holding their mobile phone to their ear and some using a hands-free kit. Both these subgroups were included in the analyses because they did not differ in terms of their performance. This means that with regard to the higher error rate and slower reaction it is insignificant whether one is using the

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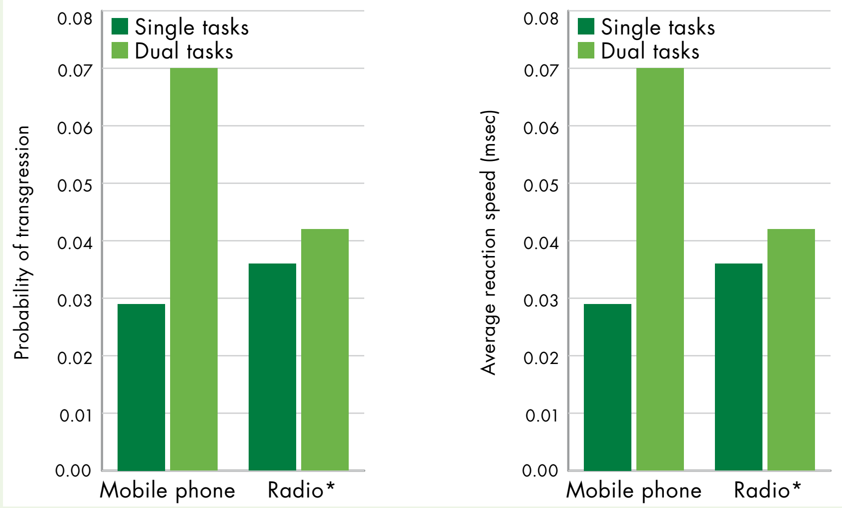
Results regarding dual and single tasks by Strayer and Johnston



Source: Graphics from Eyseneck & Keane, 2010, page 186 *(control group)

hands-free kit to make phone calls or not, the degree of inattentiveness is the same.

The authors were able to replicate these findings in another study in which the participants were to follow a vehicle in a driving simulator. Participants who were making phone calls ran into the vehicle in front when it braked more often than those who were not making calls as their reaction speed was slower. In another step the authors were able to prove that conversations using mobile phones make it more difficult to recognise objects when driving. Memory is impaired as a result due to dual tasks.

In an analysis of eye movements using an eye tracker it was demonstrated that this comes about due to reduced attention in the foveal vision range, i.e. in the centre of the field of vision. From this it was concluded that the impairment caused by making phone calls using a hands-free kit while driving is at least partly the result of reduced attention regarding visual stimuli. The driver no longer sees important information. In this context we talk about inattentional blindness. As the human brain's capacity is limited, certain information that attention is not focused on is also not processed. As a result we cannot actually consciously see it.

Traffic monitoring by DEKRA in 2013 revealed that roughly three percent of drivers were making phone calls with a mobile phone without a hands-free kit out of the more than 13,600 cars monitored in total. In absolute figures that is roughly 410 drivers who are massively putting themselves and others at risk during a comparatively short monitoring period of 17 days.

However, it is not just making phone calls while driving that leads to your attention not being on the traffic. Divided attention is required even when pedestrians are looking at their mobile phone display. This then also means that pedestrians do not absorb and process all the necessary information from their surroundings under these circumstances. For example, the researchers Hiltraut Paridon and Juliane Springer (2012) were able to prove in an experiment that reaction times are considerably slower when listening to music through headphones compared to the control condition of no music. This effect

Safety for road users through road safety education instead of prosecution

The Automobile Association (AA) has long been of the opinion that we should respond to minor traffic violations with education instead of prosecution and more restrictions for drivers. The physical ability to drive is one thing, having the necessary knowledge to develop a well-informed and deliberate attitude regarding road safety is quite another. At this point road safety education can play an important part in making urban road traffic safer.
At the AA we offer an innovative learning module for anyone who attends one of our driving schools. Last summer we introduced a training module for all students and teachers which was to raise one's awareness for cyclists so that participants are better prepared for driving safely alongside these vulnerable road users.

Action like this also has to be taken with car drivers and cyclists of course which is why we are supporting the Bikeability course as well, to teach children to cycle safely in road traffic. Cyclists are particularly at risk in city centres, for example in London, where there is a high concentration of trucks. Thanks to our range of fleet training we offer truck drivers courses where they have to get up onto the saddle to get to know the capital's roads from another perspective. Training like this which confirms the fact that cyclists and motorised vehicle drivers are not separate groups but often one and the same person actually lead to a change in behaviour.

The arguments in favour of education as a road safety measure go much further than that though. As far as I know the United Kingdom is the only country where there is a system in which minor traffic offences, for example minor speeding offences, can be tackled using education and not prosecution. For example, a driver who is caught driving 60 km/h in a 50 km/h zone can be offered the option of attending a speed awareness course at their own expense and not receiving any points in return. Similar courses are offered to drivers caught at the wheel using their mobile phone, skipping a red light or driving recklessly. In some cases, sentences and driving bans against drivers who were caught at the wheel under the influence of alcohol can be reduced by them attending courses. Research work at the University of Uppsala in Sweden through the Thames Valley Police project have shown that those people who attended a course only re-offend half as often after six months as those who chose points and a fine.

Road safety education can also be a more positive route for drivers than unnecessary laws. This has to already start at school by including road safety education in the National Curriculum. However, road safety education must also be continued afterwards for as long as the driver sits behind the wheel. Better prepared road users make life safer for everyone on our urban roads.

Edmund King
President of the Automobile Association (UK), Guest Professor for Transport, Newcastle University

Greater consideration in road traffic and new mobility solutions

Doris Bures

Federal Minister of Transport, Innovation and Technology, Austria

Urban mobility must focus on public transport because this is the key to maintaining people's mobility and being able to solve the major challenges of the future at the same time, for example environmental issues, problems related to space and noise. We presented a new overall transport plan for Austria in 2012 which formulates clear targets and guidelines for mobility of the future. The development of public transport and the intelligent networking of modes of transport are also the strategic guidelines for greater road safety in urban areas. We have set specific objectives for this in Austria:

- By developing local and regional transport we want to improve the attraction of public transport and motivate road users to switch to public transport which brings with it an improvement in road safety at the same time.
- Our bicycle packages have resulted in a significant improvement in road safety for children in particular. At the same time the BMVIT is promoting better safety for children on the way to school using various projects.
- One important step towards greater road safety in urban areas in particular was establishing the consideration requirement in Austrian road traffic regulations.
- Our "Children see the world differently" campaign sets a sensational signal for more consideration towards children in road traffic.
- Research, technology and innovation in new mobility solutions and transport systems in particular can contribute to a modern and safe urban transport and mobility system. My department is working particularly hard in this area and funding the development of new mobility solutions with more than EUR 80 million every year.

Traffic is constantly increasing in inner cities, where you also come across all kinds of road users.

even occurs with quiet music. It is sufficiently well-known that delayed reactions in road traffic increase the risk of an accident. For this reason, the authors recommend not wearing headphones when in road traffic, which also applies to cyclists and pedestrians. On the whole it has been established that any sideline activities in road traffic, be it when driving a car or as a pedestrian, lead to us not being able to devote our full attention to what is actually happening. Operating various technical equipment in cars also requires attention that is then no longer focused on the road traffic itself. This leads to important information not being able to be perceived or processed as a result of the brain's limited processing capacity. The accident potential resulting from these "distractions" is very high.

DEMOGRAPHICS AND CHOICE OF TRANSPORT

One question that will be particularly relevant in future is related to the choice of transport in particular in light of the ageing population, in urban areas too. In a study by the Technische Universität München and MAN (2013) 15 different cities all over the world were looked at with regards to the inhabitants' mobility behaviour. It was revealed that the quality of transport on offer influenced mobility behaviour. Cities with a low population density have a higher motorisation rate than cities with a high population density. By comparison: 5,935 inhabitants per square kilometre live in Copenhagen, although there are "just" 180 cars to every 1,000 inhabitants, in Melbourne there are 589 cars to every 1,000 inhabitants with just 530 inhabitants per square kilometre.

The conclusion is that large urban sprawl in a city leads to greater car use. However, with a high population density the public transport system is also extremely well developed. A well developed public bus and rail network leads to an increase in the use of public transport. A summary of the modal split, i.e. the distribution of transport use over various modes of transport is shown in Figure 45 for the different cities.

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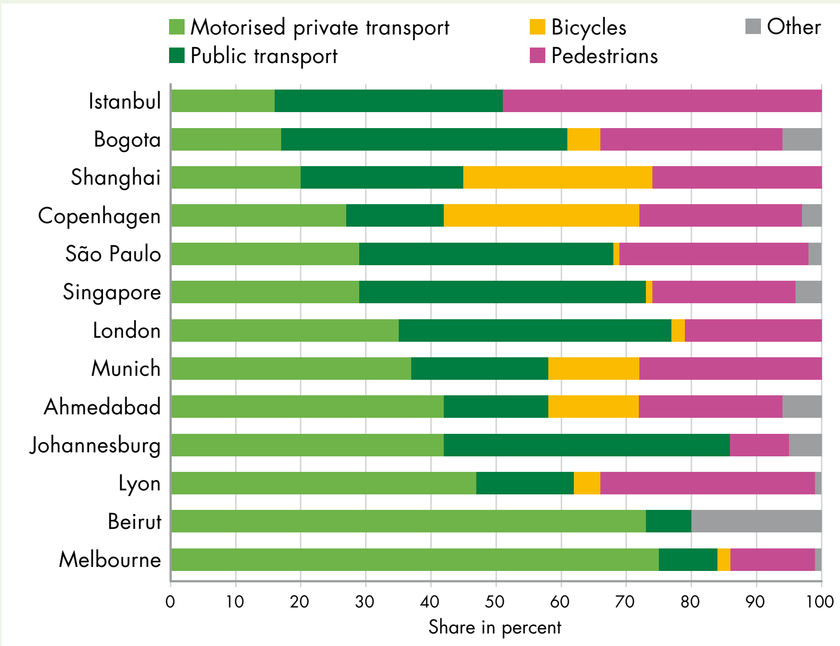
Choice of mode of transport in different cities



Source: based on MAN, 2013

A different picture results when referring to Germany (Figure 46). Here motorised private transport has the upper hand by far, which also still applies in forecasts. Modes of action for behaviour in traffic can be explained by this and other facts. The current situation of traffic in Germany mainly being defined by motorised private transport is associated with consequences for behaviour in traffic. A higher traffic density results leading to the overcrowding of transport routes and increased speeds due to the increase in the number of vehicles, transport service and road users along with the simultaneous stagnation of the development of the transport infrastructure. Road users respond to these environmental factors with behaviour that can be described by the following facts, among other things:

- Non-compliance with the safety distance,
- Inappropriate speed,
- Very erratic speeds (oscillation effect) and
- Aggressive driving style (tailgating, intimidation, driving too close).

These currently unfavourable environmental conditions in road traffic make it more difficult for road users to comply with traffic regulations and social norms. An improved infrastructure and balanced modal split always lead to behaviour compliant with regulations because people can decide for themselves which mode of transport they would like to use depending on the environmental situation and their needs. The necessity of an efficient traffic infrastructure for economic development, which also includes the aforementioned facts, is taken into account in a CDU, CSU and SPD coalition agreement for the 18th legislation period. How our mobility behaviour changes over our lifespan can be seen in Figure 47, which comes from a lecture by traffic researcher Robert Follmer (2013). For example, it is established here

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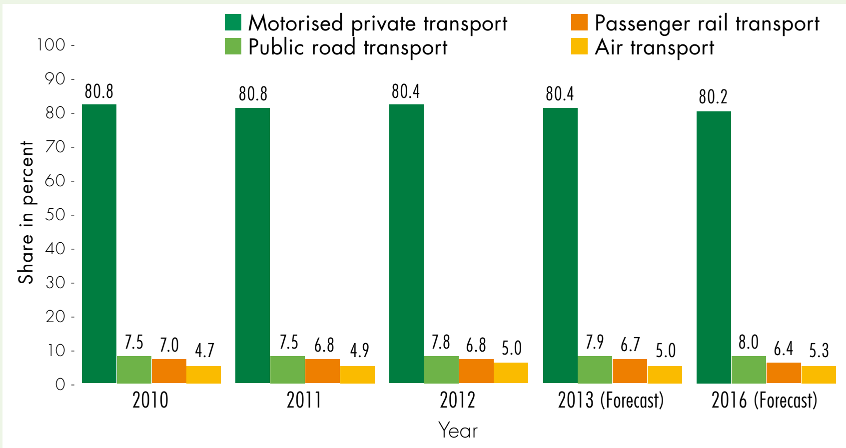
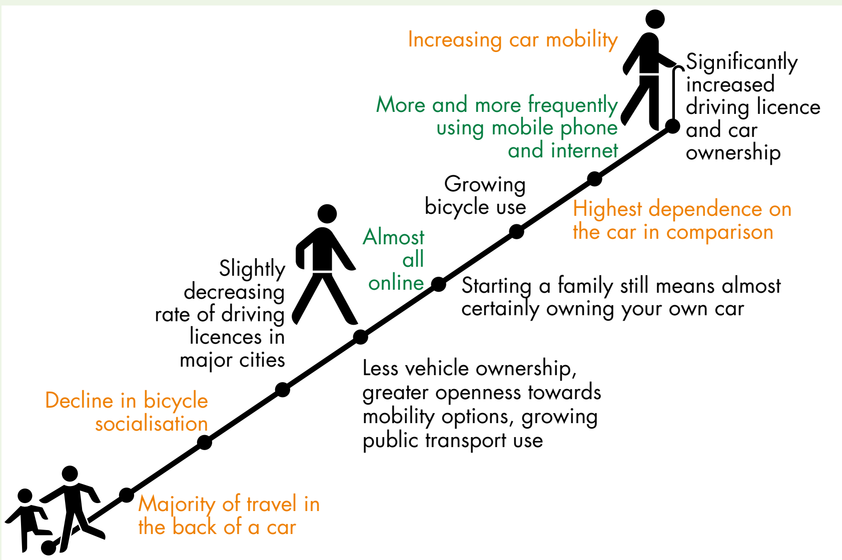
Modal split trend in passenger transport in Germany



Source: BAG (2013)

47

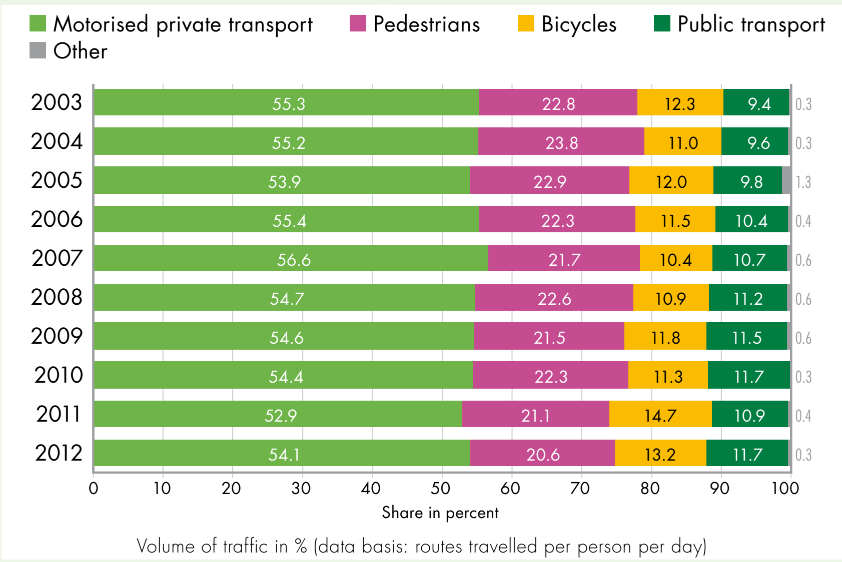
Mobility trend over a lifespan



Source: Graphics from Follmer, R (2013)

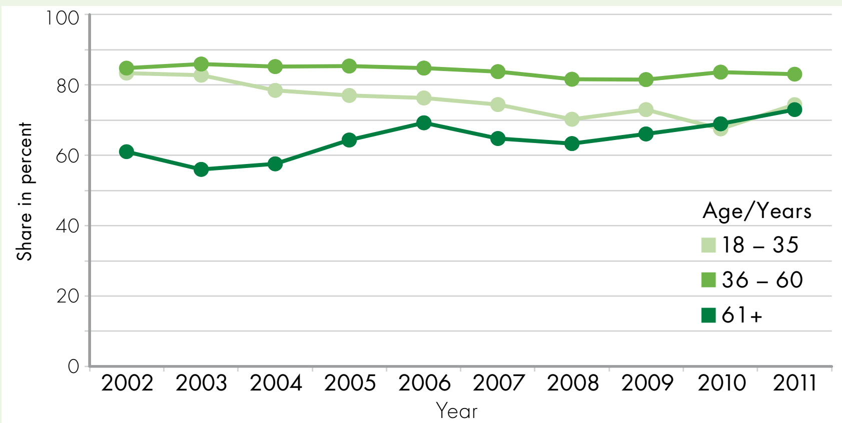
Public transport provides very many advantages but also risks.

48
Use of different modes of transport in Germany



Source: German Mobility Panel, 2013

49
Driving licences and cars per household



Source: German Mobility Panel, 2011

that bicycle use at a young age is on a downward trend whilst it is rising again for middle-aged adults. Older citizens have been characterised recently by the fact that they use cars more, whereas middle-aged adults rarely own a vehicle and are more open to new mobility options (for example, car-sharing). The number of people travelling by public transport is also growing in this age group.

Figure 48 provides another option of looking at mobility behaviour over the last few years. It makes it clear that car use in particular has been declining over the last few years, whereas public transport and the use of bicycles are playing an increasingly important part. As already pointed out, public transport's role is growing in urban areas in particular.

Drivers aged over 60 stand out in terms of car use in particular. Bucking the usual trend, they are the only ones where car use has increased over the last few years (Figure 49). A rising number of female driving licence holders has also been recorded in this context. Against the backdrop of demographic change, it can be expected that the percentage of older road users will increase over the next few decades (Figure 50). In 2050, there will be more people aged over 65 than 20 to 50 year-olds.

In this context it should also be mentioned that extending working life and raising the retirement age means that older employees will have to cope with travelling to work every day over the age of 65. As car use tends to be on the decline, particularly in urban areas, public transport is particularly in demand here (Figure 51). Its development and age-appropriate design is an important contribution to older people participating in life. Cyclists with automatic pedal-assist technology (pedelecs) in

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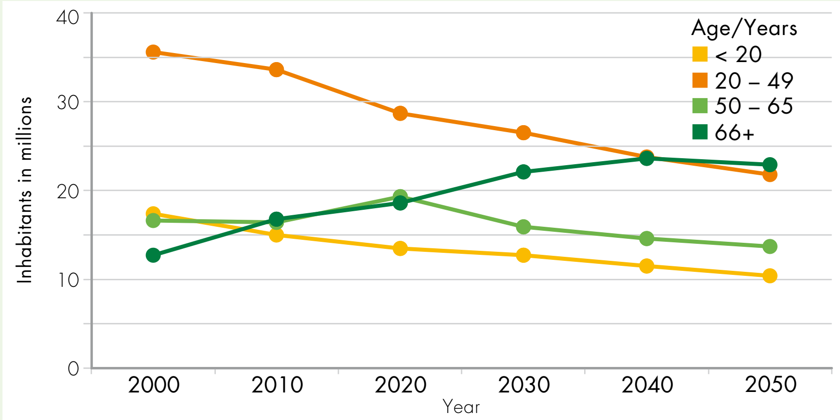
Forecast for age structure in Germany



Source: Consumer Research Association, 2012

a whole variety of different designs will also be a welcome alternative for private mobility in future.

Expanding the public transport options on offer to take into account the special needs of older and disabled people is an important task particularly in light of the stagnation in road traffic network investments (Figure 52).

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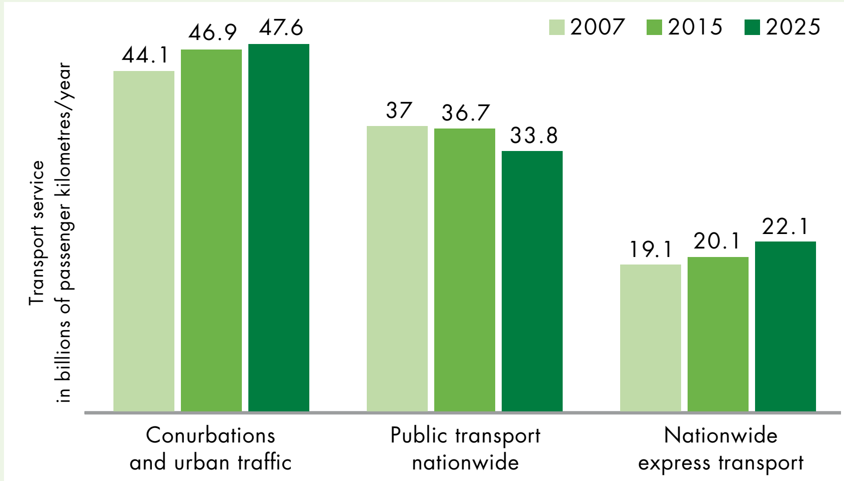
Public transport service trend from 2007 to 2025



Source: Association of German Transport Companies (2009)

Cyclists are among those road users particularly at risk of accidents in cities.

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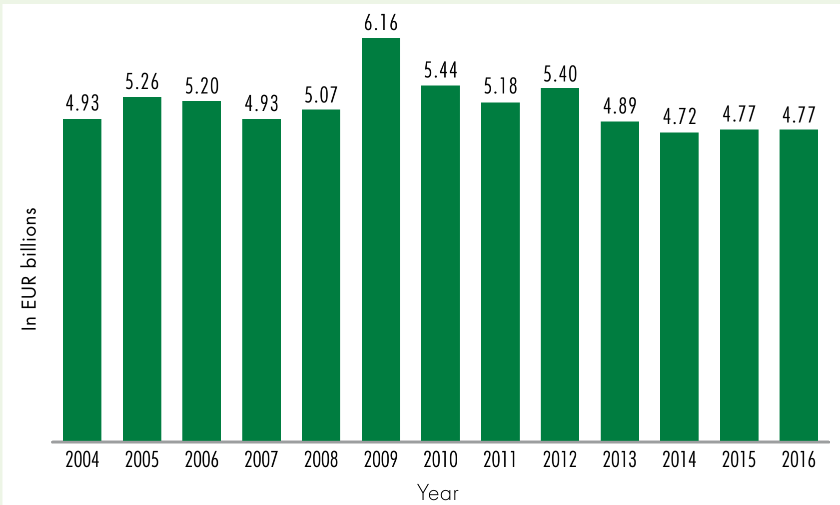
Government investments made in road transport and planned in Germany from 2004 to 2016 (in billions of EUR)



Sources: BGL, BMF, BMVBS, Pro Mobilität, BGL – annual report 2011/2012

Safe travel in cities

Besides measures to counteract road user errors, the improvement of the infrastructure and specific vehicle safety systems play a very important part in road safety in cities.

Regardless of what your visions of mobility in urban areas may be: in all likelihood, different road users are also going to share the same transport space in the "cities of the near future", as they do today. Transport systems which mean we can completely do without motorised commercial traffic or motorised private transport in inner city areas are not currently in sight. The existing conflicts about the finite transport space in conurbations therefore have to be resolved, among other things, by continuing to improve integrated traffic management and working on vehicles and the infrastructure.

Among others, researchers at the vehicle manufacturer Daimler have developed a concept of what a city in Europe might look like in ten years time to understand the impact on urban life and be able to make recommendations for future vehicles and mobility services. In this, mobility is seen as an important link between social and economic activities in urban centres. Residents, visitors and different modes of transport share the city with each other so that almost every mobility requirement can be met with as little conflict as possible and without the risk of accidents.

The term "shared space" has been coined in this context. It means that all those involved can use the same transport routes. For example, there is a lane with red markings for cyclists. If a car driver wants to turn left, other road users are given a warning notice projected directly onto the road nearby. Visitors are not necessarily reliant on public transport but can also use pedelecs to cover short distances through the city centre which they hire at public lending/charging stations. As a result, the urban mobility of the future can offer even more individual flexibility and freedom of choice. Goods traffic, CEP services, delivery services and waste disposal vehicles must also be taken into due account in the process.

CAR-SHARING ON THE RISE

Car-sharing offers are a good alternative or addition to your own car in urban areas in particular. The number of providers has rapidly increased over the last few years along with the demand. For example, the Bundesverband Carsharing e. V. (BVC) writes in its 2013 annual report that the number of car-sharing customers in Germany on 1st January 2013 was 453,000, a 76 percent increase compared to the previous year. Over 11,000 vehicles in total were available to these customers. Mathematically, this means 41 people shared one vehicle. In terms of the population, Germany ranks in second place worldwide. There is only a larger percentage of people taking part in car-sharing in Switzerland.

However, there is quite a lot that needs to be noted in terms of road safety. For example, the operating concepts of pool vehicles sometimes differ considerably. Where do you turn the lights on? How can the windscreen wiper intervals be controlled? Where do you switch the ventilation on to demist the windscreen? What safety and comfort systems is the vehicle fitted with? If you only deal with these issues when the need arises then critical situations are virtually preprogrammed. The response behaviour of the brakes and braking performance also differ from vehicle to vehicle. The dimensions can also be unfamiliar and lead to risks, for example when overtaking cyclists or oncoming traffic in narrow sections. It is therefore not without good reason that drivers with a poorer driving performance have a higher risk of an accident than drivers with a good driving performance. The combination of poor driving performance and regularly changing the vehicle model leads one to expect an even greater risk.

In most cases the vehicles are used over short distances in built-up areas. Unfortunately, correctly adjusting the seat, headrest and rear-view mirrors often falls by the wayside. This also applies to short checks before driving off: walking around the car should not just be restricted to looking for scratches and dents that have not been logged yet. Special attention should be paid to the tyres in particular. Unfortunately, there are car-sharing users who handle vehicles anything but carefully based on the motto “it doesn’t belong to me anyway”. Parking with damage from contact with the kerb is an everyday occurrence.

It is essential to check whether the windscreen washers work in winter. There must be enough screen wash in the tank and the lines should not be frozen.

Most car-sharing providers do a great deal for safety. For example, vehicles are serviced regularly and inspected for faults. Any damage reported by users is responded to very quickly. Ultimately, it is up to the users themselves to ensure a safe trip. There is no question that it takes time to check the tyres, correctly adjust the seat, headrest and rear-view mirror and familiarise yourself with the controls. This time is a good investment though. If you do identify any faults then the provider and subsequent users will be delighted when you report it.

Vision of a major European city in 2023,

A LACK OF NOISE AS A SOURCE OF DANGER WITH ELECTROMOBILITY

Car-sharing using electric cars has experienced a real boom recently. Electromobility is a huge step in terms of reducing urban CO_2 emissions, especially if certified green electricity from regenerative energy sources is used to charge the batteries.

More space for cyclists and pedestrians

Univ.-Prof. Dr-Ing. Jürgen Gerlach

Professor for Road Traffic Planning and Road Traffic Technology at the University of Wuppertal

Continuing demographic change, basic financial conditions and the increasing requirements of environmental and urban quality on urban mobility are leading to sweeping changes that have to have consequences in traffic planning. New standards must be set for systems and traffic processes and these must be consistently implemented in practice. The changes will involve all kinds of transport and will force planners to rethink many aspects or quickly learn. Cyclists and pedestrians in particular are affected. For example, the increasing use of e-bikes/pedelecs has led to a different “picture” on cycle paths. It appears that the partly e-aided “muscle power” traffic in cities will be subjected to huge increase rates. At the same time, pavements in particular have been the facilities most neglected in the past.

The “muscle power” traffic is sensitive to detours. And facilities that are designed poorly or incomprehensibly will partly be acknowledged by use contrary to road traffic regulations. To merely record this under “individual error” though is doing it a significant disservice. There is often a lack of opportunity to safely and conveniently reach the cycle path opposite using adequate crossing facilities at intersections. It is therefore all the more important to apply recurring and easy to understand yet still flexible solutions in cities. One option here besides making cycling on roads safe is to free up the pavement for cyclists at the same time using cycle stripes or protective strips. The same applies to pedestrian zones that can be used by bike.

Pedestrians have accidents crossing the road in most cases. There are a lot of combined factors here, especially with age: the pedestrian’s speed decreases considerably with age (therefore the new regulations plan in longer times at appropriate crossing points, for example), their vision and hearing also declines as well as the associated ability to judge speeds correctly. Extremely complex traffic situations (multi-lane roads, fast car speeds, turning off manoeuvres, stops etc.) can then lead to older people in particular being out of their depth. Therefore on the whole it will depend on reclaiming urban space and designing traffic processes to be less complex and inasmuch more understandable.

At the present time, the total number of licensed electric vehicles on the roads in Germany is still relatively low. 13,165 electric cars were licensed here at the end of 2013. Although that is just a negligible share of roughly 0.03 percent of all roughly 44 million licensed cars, with 7,114 electric cars towards the end of 2012 this already means an 85 percent increase, in fact the figure has almost trebled compared to 31st December 2011. If this trend continues e-vehicles will have a relevant share of the whole vehicle fleet.

As far as road safety is concerned, a new source of danger has been added with electromobility: the lack of noise at slow driving speeds of roughly less than 30 km/h. In urban areas with a high noise level, quiet electric motors may be felt to be a blessing at "first glance". However, the risk of an accident increases for careless pedestrians due to this as electric vehicles can barely be located by ear at low speeds, for example in areas with traffic calming measures and play streets. Cyclists have been able to tell a thing or two about pedestrians who run out onto the road relying totally on their hearing without looking in both directions first for some time.

However, the problem does not just extend to careless pedestrians. Hearing is an extremely important sense for visually impaired and blind people to perceive their surroundings. Once relevant noises disappear it becomes more difficult to orient oneself and safely crossing at a place that has not been made accessible to the blind becomes more dangerous than it already is. Measurements by DEKRA accident research have shown that it is almost impossible to acoustically perceive slow travelling electric vehicles in areas with usual ambient noise in built-up areas. This particularly applies to traffic-calmed areas. However, it is these areas in particular which are already classified as extremely critical for visually impaired and blind people anyway. There are a lack of kerbs to help with orientation, the road is a shared space, vehicles parked on the edge of the road have to be avoided on the roadside and traffic calming measures such as humps, bollards and lane narrowing make orientation even more difficult. Vehicles that cannot be perceived acoustically represent a major hazard here especially at low speeds where the tyre rolling noise is also reduced to a minimum. At speeds of 30 km/h on the other hand the vehicles were almost as loud as comparable petrol-driven vehicles. The installation of noise generators in electric vehicles, as required by the United Nations Economic Commission for Europe (UN/ECE), sounds sensible in light of this. The generators should produce appropriate noise at low speeds, which clearly indicate the accelerating or braking of vehicles.

In light of the fact that conventionally driven vehicles are also becoming quieter all the time and the large-scale use of noise generators is still a long way off, additional infrastructure measures have to be considered. For example, tyre noises can

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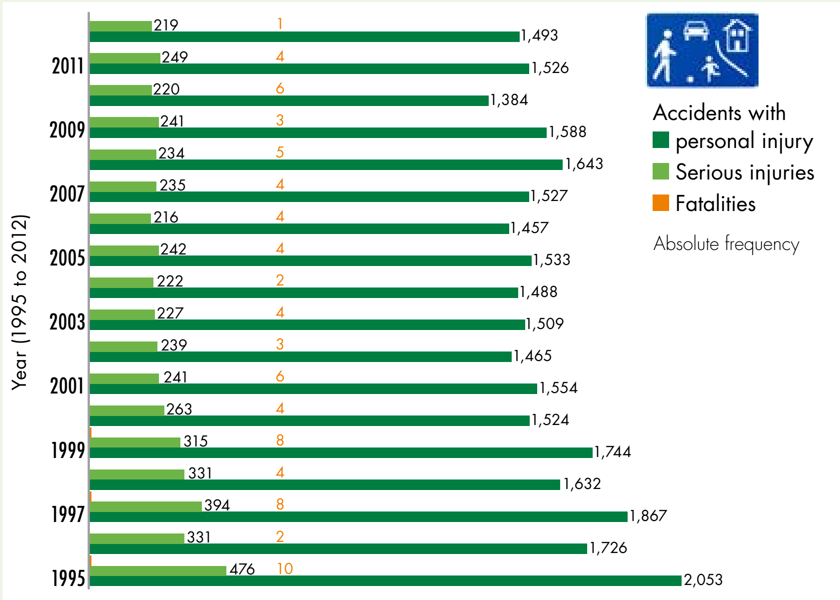
Accidents with personal injury in traffic-calmed areas in Germany from 1995 to 2012



Data source: Federal Statistics Office

The thing about bicycle lights

In the Road Safety Report 2011 DEKRA dealt with specific groups at risk, pedestrians and cyclists. Suggestions were made in this about which improvements in active and passive lighting systems may contribute to cycling and consequently road traffic as a whole being made even safer. It was also clear in the results of a research project on behalf of the Federal Ministry of Transport and the Federal Highway Research Institute: there is basically not really a sensible alternative to permanently available, fixed modern design dynamo lights. Only a modern battery (LED) light with charge level indicator could offer a comparable degree of safety here.

However, with battery-operated lights there is always the problem that the energy storage often only has an insufficient charge level so that the lights only have a limited effect or even fail completely in visibility conditions where the use of active lighting systems is stipulated according to Section 17 of the road traffic regulations. Or what also unfortunately occurs far too frequently, removable front and rear lights are not carried during the day. The usual excuse here is always: The journey was supposed to have been over before dark.

However, the bicycle is certain to assume an even more important place in urban space when coping with the demands of modern mobility at any time of day or night. In light of the technological progress that has already been achieved it should not actually be in an issue for a bicycle to also be regularly used as a popular and constantly employed mode of transport on an equal footing in road traffic, ideally it should have a permanently fixed dynamo lighting system. Even if Section 67 Paragraph 1 of the road traffic regulations in the meantime permits lighting systems that are operated by energy storages as an alternative.

It is possible that in future it will mainly be pedelecs, i.e. bicycles with electromotive support drives, where the usually permanently fixed lighting systems are reliably fed by the drive battery. If the electric support drive should suddenly no longer be available due to a lack of battery capacity, it still has enough residual capacity for the lighting system to still work reliably for a long time or the motor takes over the working of the dynamo.

be produced at pavement crossings by the adjacent road surface. Recessed humps are also conceivable to produce noises as you drive over them.

TRAFFIC-CALMED AREAS AND PEDESTRIAN CROSSINGS

Traffic-calmed areas were created in many places where walking speed applies to improve safety in core urban areas of cities and municipalities. In a broader sense this also includes so-called pedestrian priority zones where you are not allowed to drive faster than 20 km/h and all road users have equal rights. Traffic-calmed areas were introduced in Germany at the end of the 1970s and have been regulated in the road traffic regulations since 1980. There are similar regulations in Europe, for example in Austria, France, Belgium and Switzerland. German road accident statistics show the number of accidents with personal injury in traffic-calmed areas and resulting fatalities since 1995. Back then, 2,053 accidents with personal injury happened here, in which 476 people were seriously injured and 10 people were killed (Figure 53). In 2012, 1,493 accidents with personal injury were recorded, with 219 serious injuries and 1 fatality. This means that "Vision Zero" is almost a reality in terms of fatalities in all traffic-calmed areas in Germany. Naturally, this only refers to accidents in built-up areas. However, it must also be noted that it is difficult to teach children who grow up in these kinds

LED lights (right) provide better brightness and safety on roads.

Traffic-calmed areas (play streets) are announced by sign 251.1 (left) and lifted by sign 251.2 (right).

of traffic-calmed areas about the risks of flowing traffic. If they transfer their usual behaviour at home to roads in other areas without traffic calming, this can lead to dangerous situations.

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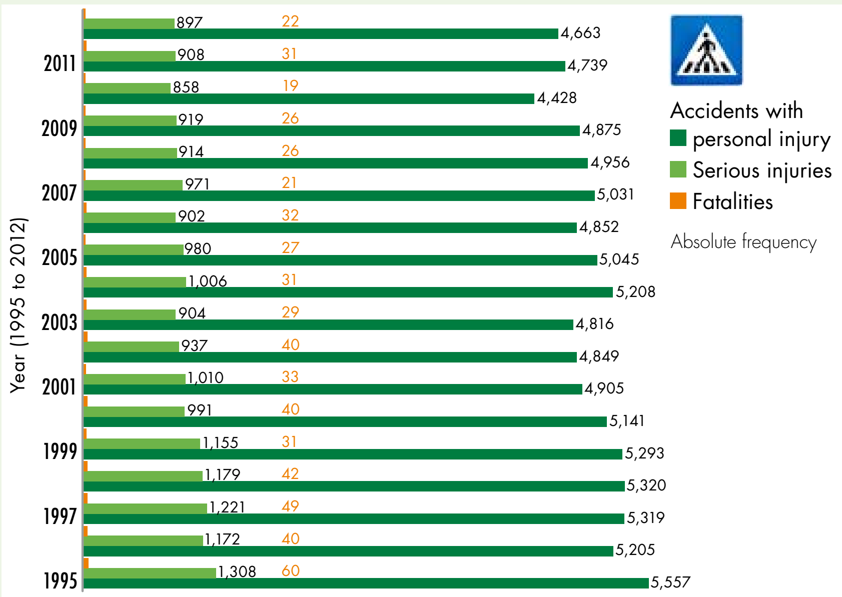
Accidents with personal injury on pedestrian crossings in Germany from 1995 to 2012



Data source: Federal Statistics Office

A pedestrian crossing is marked on the road by wide lines and is also signposted accordingly. In Germany the marking lines are white. This is where the colloquial expression zebra crossing comes from. Yellow is used in other countries, for example Switzerland. If traffic is controlled by traffic lights, broken white lines mark the pedestrian lane. It serves solely to guide the pedestrian who is only allowed to cross the road here when the light is green for them.

The number of accidents with personal injury at pedestrian crossings and resulting fatalities can also be taken from the German road traffic accident statistics since 1995. According to these, 5,557 accidents with 1,308 serious injuries and 60 fatalities happened back then (Figure 54). In 2012, 4,663 of these kinds of accidents were registered with 897 serious injuries and 22 fatalities. This also only refers to accidents in built-up areas.

PUBLIC TRANSPORT ROAD SAFETY

The phrase urban mobility is the variety of modes of transport available. Public transport and rail transport particularly in major cities is becoming more and more important in the process. As far as safety is concerned there is almost no better way to travel in built-up areas than by public rail. Fatalities caused by railway accidents are an absolute exception and the number of injuries caused by falls is also very low. However, collisions involving city railways and trams are very dangerous. These kinds of accidents very often end fatally or with serious injuries for pedestrians and cyclists and even occupants of cars involved have a high risk of injury. For example, 38 people

Car-sharing using electric cars is experiencing a boom in cities.

lost their lives in accidents with city railways and trams in Germany in 2012. 30 of these were pedestrians, four were cyclists. There were no fatalities among railway passengers in Germany.

Looking at the question of guilt is interesting. For example, only roughly 13 percent of the fatal accidents in Germany involving city railways or trams were caused by the vehicles themselves, in 87 percent of cases the main fault lay with the other party involved in the accident. DEKRA's own analysis shows that crossings near stops are particular high-risk danger zones.

The cause for most accidents here is pedestrians not paying attention. However, it is generally car and truck drivers who cause accidents with other motorised vehicles. Turning left or right and turning around across the tracks at the wrong time or skipping red lights are among the most common causes. Collisions with rail vehicles travelling in the same direction are particularly common.

Safety must take priority over speed

George Yannis
Lecturer for road safety at the National Technical University of Athens

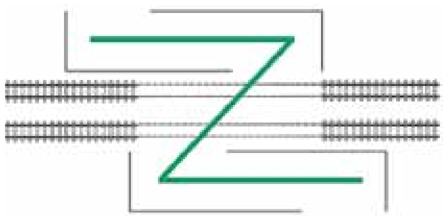
Speed is probably the most common cause of accidents and associated severity of injuries. A road environment (road, pavements, adjacent buildings) that is designed for fast traffic of any kind inevitably leads to a higher number of traffic accidents, deaths and injuries. In contrast to this, there are less accidents and more minor consequences of accidents in a road environment where high speeds are simply not possible.

Nowadays, priority is quite rightly given to safety when deciding between speed and safety. Respect for life takes top priority and cannot be ignored in favour of faster and more efficient mobility. Other alternatives should be sought to enable faster and more efficient mobility, for example redirecting fast traffic to bypass roads outside or near cities as well as developing and improving public transport, which represents a safer and often more efficient option for mobility in cities.

The decision of individual road user groups must be clear in modern cities' complex traffic systems: slower modes of transport and public transport must be given priority with the separation of motorised traffic and pedestrians and cyclists as the ideal solution, in addition to a clear definition and use of priority rules for every road user group. Particularly vulnerable road users, i.e. pedestrians, cyclists, motorcyclists, beginner drivers and older drivers must be considered in the basic design principles with infrastructure development and traffic planning.

There are many approaches from rail operators to alleviate the problem. Local conditions primarily play a part in this. For example, it must be noted whether it is a tram or city railway, whether it is a low or high floor system with appropriately raised platforms and whether the platforms are in the middle or at the edge of the road. With stops in the middle of the road there is always the risk that pedestrians will run across the road to the stop as long as the flowing traffic is not stopped. If stops and waiting areas are together in the middle of the road the entry and exit areas might be protected but access still requires pedestrians to cross one lane.

It is often the established structures that impose tight constraints on the rail operator's options for action. It is not always possible to convert an existing tram network into an almost barrier-free tram network, as was seen in Stuttgart for example. Classic sections with tracks integrated into the road were reduced to a minimum here, flat and wheelchair-friendly access to the vehicles is also guaranteed here thanks to high



The principle of the Z-crossing with provided pathway.

platforms and in addition waiting passengers are protected from flowing traffic.

It is difficult to create a design that draws pedestrians' attention towards the railway traffic. Be it flashing yellow warning lights or lights that alternate between high and low beam or striking coloured markings on the ground, a great many pedestrians appear unimpressed by these kinds of warnings. Approaches where the pedestrian's gaze is forced in both directions using appropriate routing at crossings with rail traffic in opposite directions are promising. These so-called Z-crossings are at least in theory supposed to guide pedestrians to the other side in a zigzag course so that they can always see the track of the platform they are stepping onto.

Far too little attention is given to blind and severely visually impaired people at most level crossings. There is hardly any marking using lane separators, the crossing points cannot be identified and the tracks constitute an obstacle for blind people's canes. There are not generally any acoustic or haptic signals. Relying on their hearing alone, even though it may be superb, poses a danger to life. There is still a great need for improvement here in terms of traffic infrastructure design.

Inattentiveness at crossings is the most common cause of accidents in public transport.

Flowing traffic instead of frustrating traffic jams

Dr-Ing. Stefan Lämmer
Chair of Traffic Modelling and Econometrics, Technical University of Dresden

Fully actuated traffic light systems with self-control have already proved to be very successful at isolated single intersections. Traffic scientists are convinced that these advantages can also be shown in complex road networks in future. After all, fully actuated traffic controls have the potential of responding extraordinarily flexibly and appropriately to any irregularities, such as spontaneous fluctuations in demand or the registration of buses and trams.

A promising control-oriented approach for fully actuated traffic light signal controls has been developed at TU Dresden. In a simulation study, the so-called self-control was tested using the example of a complex route network and compared with the coordinated traffic actuated controls there. Assuming the ideal detection of vehicles it is shown that the new in the meantime patent pending process is up to the complexity of real road networks and furthermore means significant improvements for all kinds of transport. Its further development and preparation based on widespread use in practice are therefore assessed as being extremely worthwhile.

The control-oriented approach of self-control opens up a new approach to the flexible, appropriate organisation of complex road traffic systems. Traffic scientists and scientists from other disciplines provide various starting points for further-reaching, more in-depth studies into how other objective functions, which also measure the number of stops or fuel consumption besides the total waiting time, affect the quality of traffic flow and also road safety in urban areas.

DRIVER ASSISTANT SYSTEMS FOR URBAN TRAFFIC

If road users want to travel safely through urban road traffic, their maximum attention is required. Whether they are car or bus drivers, pedestrians or cyclists: everyone must observe everyone else, predict their next movement and react properly in a split second. As the annual accident statistics show this is exactly where the problem lies. As the most common cause of accidents by far is road user error. This also applies particularly in built-up areas. Intelligent driver assistant systems may definitely provide assistance in this point and improve road safety, be it an emergency braking assistant, blind spot assistant, cross traffic alert and intersection assistant, lane change assistant, recommended speed depending on surroundings and traffic flow and night vision assistant or emergency steer assistant, congestion assistant or narrow section assistant.

The effectiveness of individual systems has been confirmed by several widely applied studies in the last few years. Examples of this include the "AKTIV" (Adaptive and Cooperative Technologies for Intelligent Traffic) research project carried out from 2006 to 2010 or the "euroFOT" (European Field Operational Test) field study also applied over four years (2008 to 2012). The special thing about the "euroFOT" was mainly that "ordinary" drivers were on Europe's roads in real traffic in 1,000 cars and trucks fitted with modern driver assistant systems. For most of them their movements were tracked and recorded every time they turned off, accelerated and changed lane.

Another project was launched in September 2012. It is called UR:BAN (Urban Space: User-Friendly Assistant Systems and Network Management) and is dedicated to developing or further developing innovative driver assistant systems and traffic management systems for urban areas. Special attention is paid to people in their many varied roles in the traffic system, as car drivers, pedestrians, cyclists or traffic planners. 30 partners are involved from the car industry and automotive supply industry, electronics, communications and software firms, universities and research institutes and cities. UR:BAN is being funded with roughly EUR 40 million by the Federal Ministry of Economics and Technology as part of the 3rd traffic research programme and it is running until 2016. The joint project focuses on three pillars "cognitive assistance", "networked traffic systems" and the "people in traffic".

What is crucial for greater safety in urban traffic for the car sector is to continuously assist the driver in complex situations such as intersections, narrow sections or changing lanes. As part of the "cognitive assistance" pillar, experts are dealing with innovative assistant systems, which record

In order to also guarantee the best possible traffic flow with a high volume of traffic, it is necessary for public transport companies, the police and bodies responsible for road use and maintenance to work well together. Joint control centres like Sicherheit und Mobilität in Stuttgard (SIMOS) serve as role models for this.

Road safety education campaigns will also be essential in future

Polish car drivers believe that the poor condition of roads is the main reason for traffic accidents. At the start of the 21st century we were still of this opinion, at the end of the day the poor condition of roads could not be missed. We thought that the number of traffic accidents would drop if we fixed up the roads. After Poland joined the European Union we repaired the roads all over the country using union funding and built new motorways. This was no different in Warsaw. After Poland joined the European Union we were only able to use the funds from the budget for road repairs as the funds came from the union for road construction. In 2006 we started to replace road surfaces and financed this from the city's budget. This year we are replacing 50 to 110 kilometres of asphalt surface. However, pedestrians are afraid to cross the repaired roads as car drivers now think that they can really put their foot down. The first traffic accidents with fatal consequences happened very shortly after the roads were repaired. That the poor condition of the roads is the sole reason for traffic accidents has accordingly turned out to be a myth and prompted a change in our thinking. We have analysed the situation together with the police and the public order office. The road surface has continued to be replaced together with the installation of safety equipment for road traffic, for example traffic islands for pedestrians, lane narrowing, an increase in pedestrian crossings, humps to slow down traffic, junctions with roundabouts and linear barriers. The public order office has also set up speed check equipment

Whilst most systems to improve road safety are accepted by society the same cannot be said for speed check equipment. The media does not make things any easier but it supports the prevailing opinion in society that speeds checks merely serve to plug the holes in our budget. However, a clear conclusion can be drawn from the statistics: anywhere in Warsaw where speed check equipment has been installed has not had any deaths caused by road accidents so far, the number of accidents has dropped by 98 percent and collisions by 50 percent.

To continue to improve how road safety and other measures are perceived by the population, the city's road administration in Warsaw has started public campaigns as part of the "Decade of Action for Road Safety 2011-2020" launched by the United Nations Organisation. In 2012, we concentrated on road safety education for pedestrians, in 2013 we addressed cyclists and in 2014 we are focusing on motorcyclists. We are delighted to carry out these campaigns with non-governmental organisations, who see us a partner for a shared goal.

Adam Sobieraj
Spokesperson for the Warsaw's Road Administration

the current traffic situation just as ad hoc as precisely with the aim of preventing threatening collisions (with pedestrians too) using automatic braking or swerving into open space without causing any danger.

As part of the project's "networked traffic systems" pillar the traffic infrastructure and "intelligent" vehicles are to be networked with each other using new information and communication technologies. Vehicles can then exchange traffic data with each other and with the infrastructure. In the vehicle, the data can be forwarded to the driver as recommended action by the information and assistant systems or taken into account in traffic control. The capacities of the existing road network can therefore be used better, drivers can avoid very busy roads and cover distances more economically.

The project's "people in traffic" pillar focuses on people as users of the future assistant and information systems. The details deal with new technologies and concepts so that the systems can be operated conveniently and contribute to improving road safety using optimised information displays. At the end of the day it is particularly important in cities to present information in an understandable way at the right time to guarantee targeted interaction between the driver and vehicles.

Cars detect crossing pedestrians

Frank Leimbach
Chair of the vFSS – Advanced Forward-Looking Safety Systems working group

Almost 15 percent of deaths caused by road accidents in Germany are pedestrians. After lane changing and blind spot assistants, as well as emergency braking assistants, which are in the meantime becoming increasingly widespread, car manufacturers' development departments and suppliers are now working full steam ahead on systems that can detect crossing pedestrians, warn inattentive drivers about them and brake the vehicle in an emergency. The technical approaches vary considerably: depending on the manufacturer pedestrians are detected using radar, lidar, infrared or video technology and sometimes even a combination of different sensors. The "vFSS – Advanced Forward-Looking Safety Systems" working group, which all German and some foreign car manufacturers, the Federal Highway Research Institute and the insurance sector belong to, have developed objective and internationally respected test processes for these kinds of systems.

In July 2013, a new facility was opened for this purpose at the DEKRA Technology Center in Klettwitz. which is the first of its kind to be customised to the requirements of the vFSS test protocols. The new test bench is shaped like a bridge on which various dummies can be attached, which simulate moving pedestrians. Regardless of whether it is an adult or child, whether the person is walking or running, whether they are initially obscured or unobscured: the facility can reproduce all the scenarios laid down in the vFSS test protocol. The bridge arm can also be rotated by 180 degrees so that a whole range of different test configurations can be realised. The facility works independently of the sensor technology used in the vehicle. It is not just used for test runs with collisions but also for so-called non-crashable tests where the dummy is thrown out of the way split seconds before the collision. For this purpose, the facility could accelerate the dummy over a distance of twelve metres from 0 to 200 kilometres an hour.

In the long-term, it is the working group's goal that the same test processes and same criteria for assessing systems should be applied as far as possible in Germany, Europe, the USA and Asia. This reduces development costs for manufacturers and supports market penetration of the assistant systems even with volume models.

ASSISTANT SYSTEMS FOR "NON-CONTACT" TRAFFIC IN BUILT-UP AREAS

In light of the ever increasingly denser volume of traffic and limited parking capacity an rise in instances of danger must be reckoned with, particularly in traffic areas in built-up areas. Resulting time and again in personal injury and damage to property, generally due to carelessness when suddenly opening vehicle doors or vehicle occupants getting out without thinking. This particularly applies to the side facing flowing traffic and also cycling areas, generally on the right-hand edge of the road. One safety risk, albeit a low one, also exists in the context of opening vehicle doors in parking spaces. These are often far too small nowadays in terms of increasingly wider and longer vehicles, which does not just apply to SUVs.

A vehicle door assistant/warning system at a low speed range or when stationary could minimise these instances of danger mentioned, in combination with a parking assistant system if necessary, and contribute to vehicle doors not being able to be opened abruptly without further ado while other road users are approaching in future. This particularly plays an important part with regards to the growing number of pedelec riders on the roads. Their approaching speed and potential collision speed could be higher than that of conventional bicycles. The consequences of accidents are accordingly more serious, as also shown in DEKRA crash tests.

GREATER SAFETY WHEN COMMERCIAL VEHICLES ARE TURNING RIGHT

A driver assistant systems could also contain the accident risk for a dangerous situation that mainly occurs frequently in cities,

In many European cities, the areas required today for flowing and stationary traffic often have to be provided in road networks that have grown over centuries.

The new truck mirror systems improve the driver's indirect field of vision provided that the mirrors are set correctly. This is easy to do at special mirror setting areas. DEKRA explains what has to be observed in doing so in a small information brochure.

that is commercial vehicles turning right. We are talking here about the truck turning and braking assistant, which warns truck drivers in good time when, despite every precaution, they have overlooked a cyclist or pedestrian on the nearside of the vehicle when turning right and brings the truck fully to a stop by automatically braking in the event of danger. In combination with the mirrors that are in the meantime prescribed as per 2003/97/EC to reduce the blind spot or improve the direct field of vision, this kind of system would provide a high degree of safety as long as it works perfectly.

Background: Accidents involving trucks in the city sometimes happen as a result of restricted vision connected to a very large blind spot. This particularly applies to trucks turning right, which is a very dangerous situation in road traffic for pedestrians and cyclists specifically. Pedestrians and cyclists often end up in the blind spot when they stop right next to the truck at an intersection where they are either partly not seen or not seen at all by the truck driver. If the truck then turns right there is a major risk of being run over. The risk is no less in cases when a vulnerable road user travelling straight on wants to pass a truck on the right believing that the truck driver can see them and trusting in their right of way.

CORRECT MIRROR SETTINGS

Besides infrastructure measures, for example bringing forward the stop line and "green lights" appearing earlier for cyclists, the mirror systems mentioned can contribute to a great degree to reducing the accident figures in these kinds of dangerous situations. At the same time, it does not make any sense to fit even more mirrors

Right or left turn accidents are a traumatic event for truck drivers

Accidents when trucks, refuse collection vehicles, buses or vans are turning right when pedestrians or cyclists are killed or seriously injured are the focus of intense and often public discussion. These accidents are frequently characterised by the fact that the truck drivers and pedestrians or cyclists concerned both have a green light for them at the same time. The road user passes the junction with the feeling of being able to cycle over or cross the road without any danger. In doing so, cyclists and pedestrians assume that the truck driver can see them. However, this is one of the key problems. The truck driver has an awkward view of the vehicle's nearside. Simulations for the BG Verkehr (Transport employer's liability insurance association) have shown the cyclist travelling alongside the vehicle could only be seen for a few seconds in one of the numerous exterior mirrors.

Another extensive investigation by the BG Verkehr showed that the truck driver is not generally injured in right turn accidents but has to come to terms with a variety of consequences from this traumatic event. This often leads to post-traumatic stress disorder (PTSD) and results in them leaving their profession. Even successful left or right turn manoeuvres are fraught with a significant potential for stress and contribute to the truck driver's psychological strain.

GB Verkehr has picked up on the problem of left or right turn accidents and its consequences for the industry and society and held a conference on this on 14th November 2013 with over 80 participants including manufacturers, scientific institutes, associations and authorities. The result of this event was industry networking with up-to-date knowledge about left or right turn accidents as well as identification of the unanswered questions and discussion about possible measures, for example camera monitor systems and also target group specific public relations work to point out the dangers of left or right turn accidents.

So that one day left or right hand turn accidents are a thing of the past, BG Verkehr is analysing and funding possible solutions for the future with the help of a project team. There is a special appeal in this context for manufacturers to meet their responsibility to continue developing reliable assistant systems.

Dr Jörg Hedtmann
Head of the Prevention Business Division at the Berufsgenossenschaft für Transport und Verkehrswirtschaft (BG Verkehr)

or mirrors that are ore curved. The truck driver has four mirrors on the right, which all together make a large area in front of and next to their vehicle visible to them. However, they can only focus on one mirror and consciously process the information visible in it at any one time. The order in which the mirrors are used is down to their personal judgement. Nobody tells the truck driver whether and when a pedestrian or cyclists becomes visible in one of the mirrors. Bending the mirror more also does not make sense as the human eye's resolution limit has already been reached with the current curvature.

The correct setting of the mirrors is what is far more crucial. And that is precisely where things go wrong, as an investigation by DEKRA has shown. The result was that DEKRA therefore developed a guide to setting mirrors together with the commercial vehicle manufacturers Daimler and MAN. Besides the tips for handling commercial vehicle mirror systems put together in the small brochure, an innovative method was developed to practically check the fields of vision are guaranteed using all the individual mirrors prescribed, which allows for mirrors to be perfectly set in no time at all. The appropriate markings can be placed in any fleet or motorway services using simple means. This method is another contribution by DEKRA to realise the EU Charter's target regarding the reduction of fatalities and serious injuries caused by accidents.

FURTHER POTENTIAL FOR A HIGHER SEAT BELT RATE

The constantly new safety technologies and driver assistant systems should not fool us about one thing though: using a seat belt is still the most important measure for lowering the risk of serious injuries for vehicle occupants. This not only applies on rural roads and motorways but also in urban traffic of course. However, many car drivers are under a dangerous misapprehension though: not wearing a seat belt happens only too often in built-up areas in particular and at low speeds, in the assumption you can stop yourself using your hands in an emergency involving an accident in the city. However, this is a fatal misjudgement, as crash tests by DEKRA, among other things, regularly prove. Even in the event of impact with a stationary obstacle at 14 kilometres an hour the forces correspond to eight times your body weight. People cannot absorb these kinds of forces.

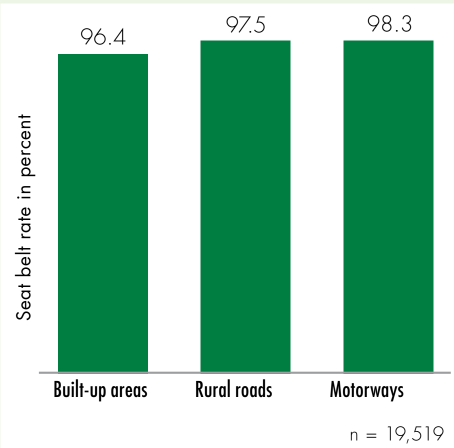
You should never start your journey before putting on your seat belt.

As part of a nationwide study in May 2012, DEKRA analysed the safety of children and adults in roughly 20,000 vehicles. The seat belt rate was lowest in built-up areas at 96.4 percent, by contrast it was 97.5 on rural roads and 98.3 percent on motorways (Figure 55). It was also observed that the older the car was the lower the seat belt rate was. With cars from the years 1995 to 1999 the figures in built-up areas dropped down to 93 percent (Figure 56).

These figures clearly show: there must still be more campaigning for the wearing of seat belts. A rate of well above 90 percent certainly looks good at first glance. However, that still means one in 25 vehicle occupants in built-up areas are not wearing a seat belt. There is still considerable potential for greater road safety by further increasing this rate. The seat belt constitutes basic safety in a stable passenger compartment for car occupants, if applicable supported by the effects of other occupant protection systems such as the seat belt tightener and seat belt force limiter. It is also an essential prerequisite for various airbags to work properly.

55

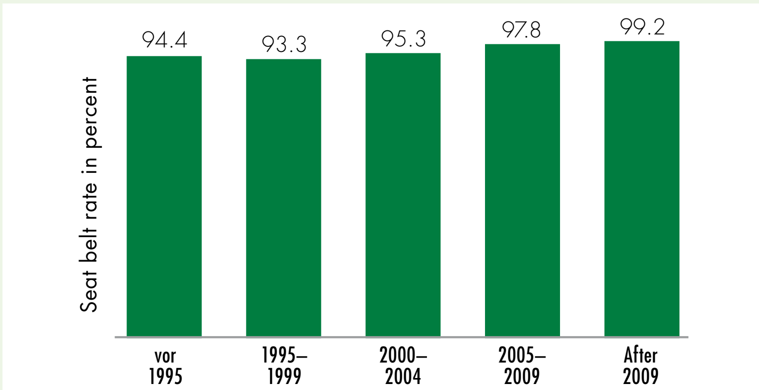
Seat belt rate of car occupants by location



Data source: DEKRA survey

56

Seat belt rate in built-up areas broken down by car year of manufacture



Note: There were only a few cases for cars older than 1995.
This results in statistical uncertainty which might explain the increase.
n = 7,775

Data source: DEKRA survey

Urban traffic must become even safer

Despite the number of road users killed and injured across Europe decreasing for years there is still a need for action on many points. This not only applies to rural roads and motorways but also to accidents on urban roads in particular. What is required is for all road users to contribute to achieving this goal through a greater awareness of the risks and by observing regulations and safety standards. Whilst modern vehicle engineering already offers a very high level of safety, among other things thanks to numerous electronic safety systems in new vehicles that are fitted with these, the potential for improvement in terms of infrastructure is still far from exhausted.

The previous sections of this Road Safety Report have clearly shown that a lot of progress has been made in terms of urban road safety on Europe's roads over the last few years. For example in Germany: The number of road users killed in built-up areas between the years 2001 (1,726 fatalities) and 2012 (1,062 fatalities) has dropped by roughly 38 percent after all. The decrease was even more drastic in France: in 2001, 2,154 people lost their lives in road traffic accidents in built-up areas, in 2012 it was just 1,027, that is roughly 52 percent less. And in Italy, to mention another EU member state, the decrease was just under 50 percent during the aforementioned period (2001: 3,096 deaths caused by road accidents in built-up areas, 2012: 1,562).

The basically positive trend is of course not a reason to sit on our laurels, especially not when considering the target set by the EU Commission in July 2010 of halving the number of deaths caused by road accidents on Europe's roads every year again by 2020. The fact is: Most accidents still happen in built-up areas and furthermore this is where most people sustain serious and minor injuries. This applies to almost all EU states.

In light of the forecasts that some often already large cities now and their surrounding conurbations will continue to experience population growth over the next few decades, the transport situation is likely to become even more acute with all the resulting dangerous situations in some urban regions. It is therefore all the more important to use all the possibilities for improvement that present themselves to either prevent accidents in advance or at least diminish the consequences for all those involved and specifically for vulnerable road users. Prevention is therefore the top priority.

It means starting at several different places at once. For example, road user behaviour. A more cooperative attitude towards each other in road traffic is an absolute must. As in the majority of cases, a lack of risk awareness, too little consideration towards others, error and aggression are the causes of accidents with personal injury and damage to property. There is frequently also a lack of essential knowledge and acceptance of road traffic regulations. There is often also a lack of ability to see the other person's perspective or a willingness to put yourself in the position of other road users to understand their behaviour. Every road user, whether they are young or old, using a motorised vehicle or not, is challenged in this respect.

Electronic driver assistant systems provide great potential to prevent accidents either as elements of active or integrated safety. These systems can also to a certain degree compensate for dangerous situations, which result due to inattentiveness or error. The rate that new cars, trucks and motorcycles are fitted with these kind of systems could be significantly higher though, especially as manufacturers are moving more and more to offering these systems not just in upper class models but also in volume models of small and medium class cars as standard or for a comparatively low extra charge, usually in combination with attractive equipment packages. These systems should therefore be considered for reasons of your own safety when buying a car.

The infrastructure also contributes to road safety to a great extent in urban areas. Whether it is a question of junction areas, multi-lane roads, turning manoeuvres or stops: with all complex traffic situations it is important to design them as easy to understand as possible for all road users. Key concerns should also be improving inner city cycle paths and adapting street lighting to the latest technology. Good traffic flow must also be ensured.

In order to tone down the density of traffic undoubtedly associated with the forecast growth in population in some cities and above all to stay abreast of change caused by the demographic trend, public transport will play an even more important part in future than it does today. Public rail and bus services are among the safest modes of transport at all. Despite this there are accidents involving pedestrians and car drivers time and again, some of which have significant consequences. Transport companies are therefore constantly working on solutions and campaigns to further reduce the number of accidents. One example of this is the "Sicher zu Fuß" (Walk safely) initiative organised by Stuttgarter Straßenbahnen AG (SSB) and the Deutsche Verkehrswacht, which is to raise awareness of the dangers of road traffic and particular aspects concerning trams. Specific tips on how to behave and information about safety-improving measures are also associated with the initiative. This approach must continue to be pursued consistently.

DEKRA's demands in brief

- To see road traffic as social interaction and behave accordingly.
- To increase every single road user's sense of responsibility.
- More education campaigns about critical traffic situations.
- The earliest possible road safety education at pre-school/primary school age.
- Active and attentive road use (no headphones, no writing or reading of text messages at the same time etc.).
- To comply with and implement all road traffic regulations (speed, traffic lights, mobile phone ban, stopping and parking causing an obstruction, giving signals for other road users, observing the special regulations for cyclists etc.).
- More targeted traffic controls, not just speed checks, at well-known accident black spots and in risk areas.
- To standardise the meaning of traffic signs in Europe (for example, pedestrian crossing).
- 100 percent use of statutory restraint systems (seat belts and child seats).
- Even better market penetration of electronic driver assistant systems in cars, trucks and motorcycles.
- A guarantee that mechanical and electronic vehicle safety components work throughout the vehicle's whole life.
- To sustainably improve the road infrastructure with maintenance and development.
- Speed limits in cities must be as uniform as possible and understandable for all road users.
- To ensure that roads, cycle paths and pavements can be used without any risks in all weather conditions.
- To advance the intelligent networking of modes of transport (expand the park and ride scheme, suitable bicycle parking facilities at public transport stops, expand flexible car-sharing schemes etc.).
- To develop public transport in urban and rural areas to relieve the strain on the road network and guarantee mobility, also taking demographic change into account.
- Greater awareness of danger to life in the blind spot and sustainable minimisation of risks due to correctly set mirrors that are used on trucks.
- Wider distribution of reversing cameras to protect pedestrians, specifically in vans.
- Trucks in urban distribution transport or municipal vehicles should have a low-lying driver's cab or ideally a low floor driver's cab.
- Pedestrians and cyclists: To wear high contrast clothing, if possible with retro-reflective elements. Retro-reflective elements also on bicycles, walking aids, wheelchairs and prams.
- All bicycles fitted with the stipulated lights and reflectors which must also always be in a roadworthy condition. Lights must be switched on at the right time.
- To reduce ferrying traffic (parent taxis) on the way to school, kindergarten and back, wherever possible (to accompany on foot or ride together by bike or use public transport = to learn skills for using different transport early).
- An infrastructure suitable for senior citizens and disabled people (avoid steps/unevenness and standardise signalisation at pedestrian lights for blind/visually impaired people).
- Qualified voluntary medical and/or psychological health checks offered nationwide for older holders of driving licences to improve road safety and maintain private mobility.
- EU-wide standardised specifications on first aid courses as a requirement for obtaining a driving licence.
- Regular further training and automatic accident and damage to property insurance for first aiders as well as a general obligation for reasonable first aid in emergencies with suitable legal cover.

Jörg Ahlgrimm, DEKRA,
Head of the Analytical Expertise on Accidents
Business Division

A comment to conclude

"Vision Zero", which originally came from Sweden, is still often seen as an unrealistic fantasy today. The way over 400 European cities that have already achieved zero fatalities in at least one year may help to convince sceptics about "Vision Zero" becoming a reality, in urban regions to start with.

DEKRA is therefore supporting the efforts of the German Road Safety Council (DVR) under the motto: "Nobody dies. Everyone arrives." The campaign's key element is also to endeavour to promote the distribution and use of driver assistant systems wherever possible so that avoidable accidents are not even caused in the first place.

VISION ZERO.
KEINER KOMMT UM. ALLE KOMMEN AN.

However, nobody can afford to rely on technology alone! Everyone who is involved in road traffic, be they pedestrians, cyclists or especially vehicle drivers, must always apply a maximum degree of attention and sense of responsibility to protect everyone around them and for their own safety too. Every single person's social responsibility is required just like in your family, personal environment and working life. There is an old saying that says: "One should treat others as one would like others to treat oneself." Acting egotistically, craving recognition and not accommodating others are the worst qualities to have on our roads.

Moving vehicles cause risks and dangers can only be prevented by calm and considerate behaviour at the wheel and in your environment.

Any questions?

TESTING TECHNOLOGY

Hans-Jürgen Mäurer
Phone: +49.7 11.78 61-24 87
hans-juergen.maeurer@dekra.com

Reiner Sauer
Phone: +49.7 11.78 61-24 86
reiner.sauer@dekra.com

Florian von Glasner
Phone: +49.7 11.78 61-23 28
florian.von.glasner@dekra.com

ACCIDENT RESEARCH

Alexander Berg
Phone: +49.7 11.78 61-22 61
alexander.berg@dekra.com

Markus Egelhaaf
Phone: +49.7 11.78 61-26 10
markus.egelhaaf@dekra.com

Walter Niewöhner
Phone: +49.7 11.78 61-26 08
walter.niewoehner@dekra.com

ANALYTICAL EXPERTISE ON ACCIDENTS

Jörg Ahlgrimm
Phone: +49.7 11.78 61-25 41
joerg.ahlgrimm@dekra.com

DEKRA Automobil GmbH
Handwerkstraße 15
70565 Stuttgart

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PRINCIPLES/PROCESSES

André Skupin
Phone: +49.3 57 54.73 44-2 57
andre.skupin@dekra.com

Hans-Peter David
Phone: +49.3 57 54.73 44-2 53
hans-peter.david@dekra.com

DEKRA Automobil GmbH
Senftenberger Str. 30
01998 Klettwitz

TRAFFIC PSYCHOLOGY

Dipl.-Psych. Caroline Reimann
Phone: +49.30.20 05 38 13
caroline.reimann@dekra.com

DEKRA Automobil GmbH
Branch Berlin
Warschauer Str. 32
(Entrance Revaler Str. 100)
10243 Berlin

Prof. Dr. rer. nat. Wolfgang Schubert
Phone: +49.30.98 60 98 38 00
wolfgang.schubert@dekra.com

DEKRA Automobil GmbH
Traffic psychology department
Ferdinand-Schultze-Str. 65
13055 Berlin

GROUP COMMUNICATIONS

Wolfgang Sigloch
Phone: +49.7 11.78 61-23 86
wolfgang.sigloch@dekra.com

DEKRA e. V.
Handwerkstraße 15
70565 Stuttgart

3 DEKRA BUSINESS UNITS SERVICE LINES

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DEKRA Automobil GmbH
Handwerkstraße 15
70565 Stuttgart
Phone: +49.7 11.78 61-0
Fax: +49.7 11.78 61-22 40
www.dekra.com