Federal Ministry
of Transport and
Digital Infrastructure

Mid-Term Review of the 2011-2020 Road Safety Programme

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1. Introduction

Looking back over the past five years, there have been considerable success stories in the field of road safety. Our figures show that the 2011 Road Safety Programme is having an impact. Thanks to our comprehensive and effective road safety activities, which have to be seen as a long-term dynamic process, we are witnessing a clear downward trend in personal injury accidents, despite a rise in passenger kilometres. This is a very positive development. In 2014, 3,377 road users were killed in road accidents, a drop of around 16 % compared with 2011. We are thus heading in the right direction towards achieving the target we set in the 2011 Road Safety Programme, namely to enhance road safety and reduce the number of road deaths by 40 % by 2020. Given the safety advances already achieved and the continuing rise in traffic volumes, this will require further endeavours to be made by all stakeholders.

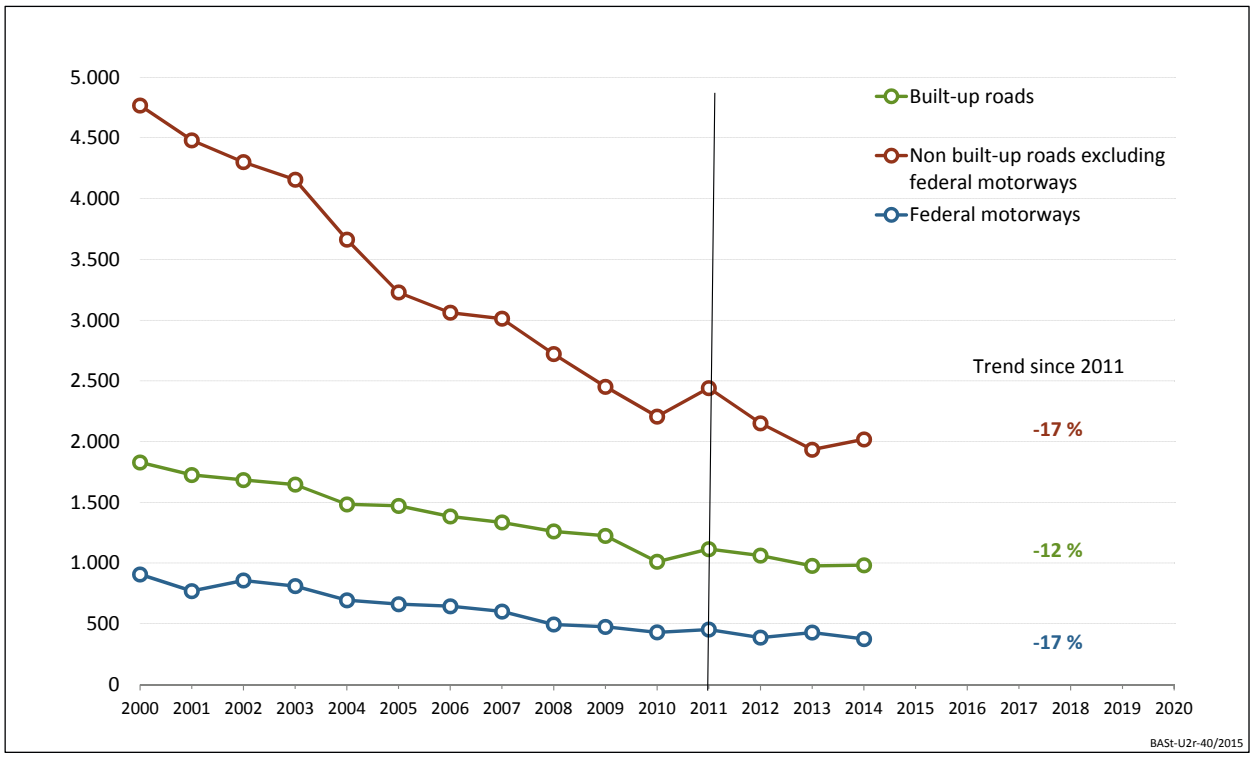
The present mid-term review takes stock of the achievements of recent years and looks ahead to the next five years. In doing so, it identifies the measures that exhibit the greatest potential for further enhancing road safety. In this context, the Federal Government will exploit its scope for action to the full extent.

In November 2011, the then Federal Ministry of Transport, Building and Urban Development (now Federal Ministry of Transport and Digital Infrastructure) published the Road Safety Programme, which provides guidance for the Federal Government's road safety policy. This programme contains 56 measures and was prepared on the basis of scientific evidence. The Road Safety Programme is the outcome of a broadly based process of dialogue involving the federal states and many private sector institutions. It aims to provide a reference framework for programmatic approaches to be adopted by the federal states and private sector institutions. It invites all road safety stakeholders to get involved in, and show commitment to, this major ongoing social task.

The current and detailed status of the implementation of the 2011 Road Safety Programme can be found in the Federal Government's report on measures in the field of road accident prevention (Accident Prevention Report), which is published every two years, most recently in 2014 (Bundestag Document 18/2420, http://dipbt.bundestag.de/dip21/btd/18/024/1802420.pdf).

2. Rate of accidents

The basis for road safety activities is an analysis of the accident figures, both as a long-term trend and in individual years.

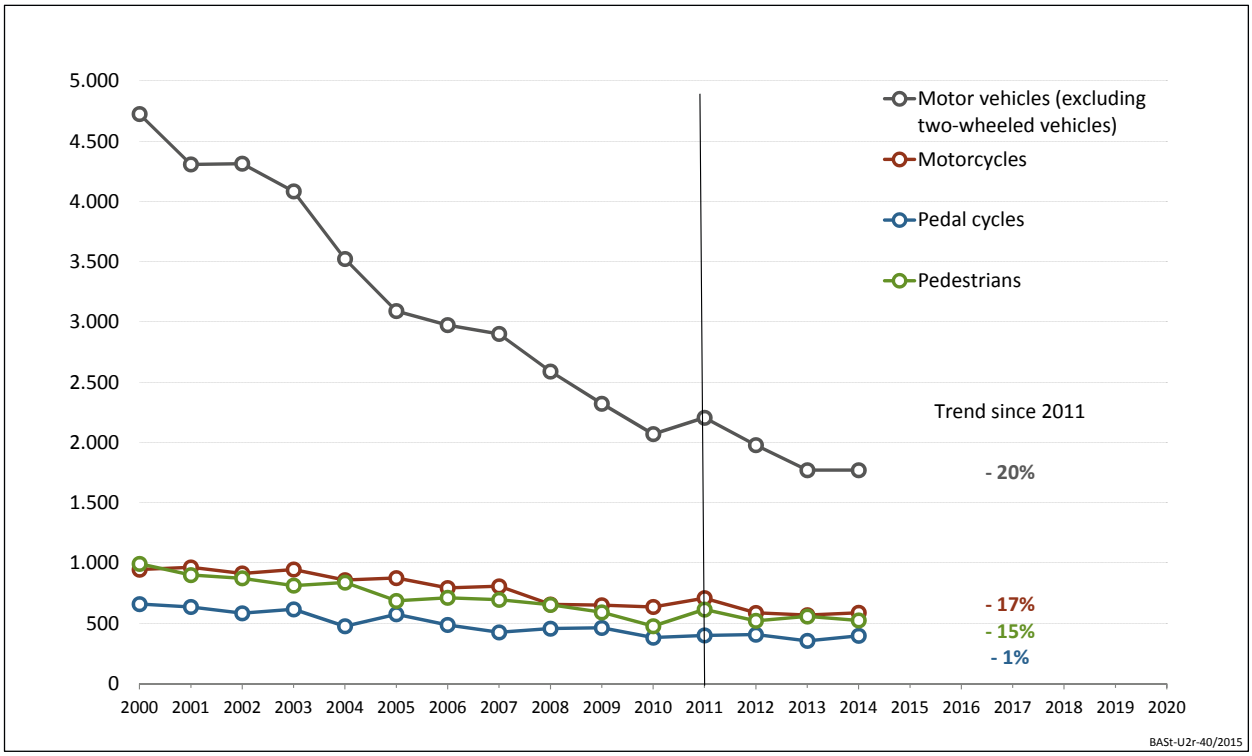


Number of road deaths since 2000 by location (Source: Federal Highway Research Institute)

Related to the lifetime of the current 2011 Road Safety Programme, the number of road deaths fell by around 16 % between 2011 and 2014. The largest number of persons continue to be killed in accidents on rural roads, although there has been a drop here of around 17 % since 2011. Since 2000, the number has fallen by as much as 58 %.

Just under 30 % of deaths occur in accidents on roads within built-up areas. Since 2011, there has been a drop of around 12 % here.

If the long-term trends are considered by type of road user, it is obvious that here, too, considerable success has been achieved in all road user groups. In the case of pedal cyclists, pedestrians and motorcyclists, the drop is somewhat lower, both percentage-wise and in absolute terms, which is why they will continue to be one of the priorities in future road safety activities.



Number of road deaths since 2000 by type of road user (Source: Federal Highway Research Institute)

As far as age groups are concerned, there has been a continuous drop in the number of children killed on the roads, thanks to the tremendous efforts undertaken in the field of road safety. The figure for 2014 is 71 child fatalities, which is around 17 % below the 2011 figure. However, this group continues to be very important in road safety activities, because the foundations of a person's road user behaviour are laid while they are a child. The number of over-65s killed in road accidents fell by around 5 % compared with the other age groups. With demographic trends and the increasing mobility of elderly persons in mind, this group will thus continue to be a further priority area of our road safety activities. In addition, they will also focus on the group of young people aged between 18 and 24 years. It is here that the greatest success has been achieved in recent years (33 % fewer fatalities since 2011). However, because of the great likelihood of individuals in this group becoming involved in an accident, it will remain in the spotlight in order to sustain this success in the future.

As far as the locations are concerned, the accident figures mean that rural roads and built-up roads will be key areas of action in the future. For this reason, there will be an in-depth analysis based on the 2014 accident figures.

Rural roads

It continues to be on rural roads – where the Federal Government is only responsible for construction and maintenance to a limited extent – that the most road fatalities in Germany are recorded. 2,019 persons, or 60 % of all persons killed in road accidents, lost their lives on rural roads in 2014.

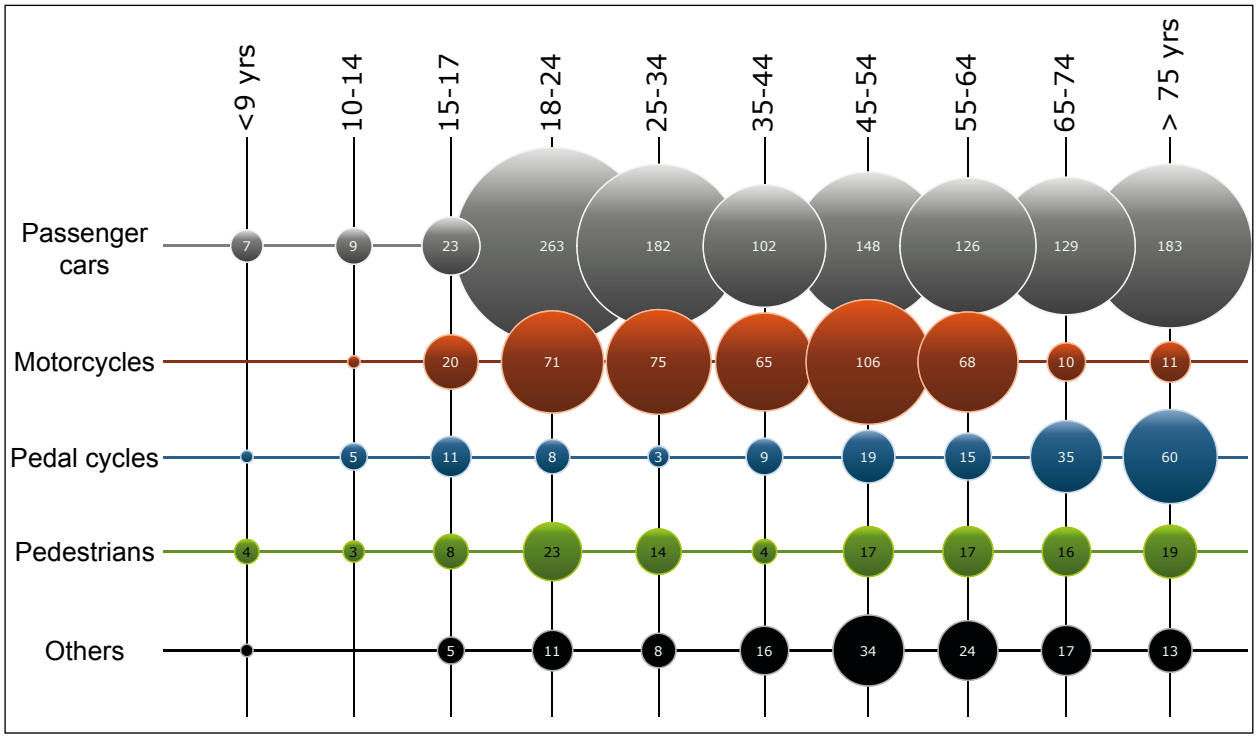
Passenger car occupants accounted for the largest share of these (58 % of all fatalities). Nevertheless, this figure has exhibited the sharpest drop since 2011 (- 21 %).

In terms of membership of an age group, it is young and novice drivers that stand out in the case of passenger car accidents. In the 18 to 24 age category, 263 persons lost their lives on rural roads in 2014. 22 % of passenger car occupants killed on rural roads and 8 % of all fatalities were between 18 and 24 years of age.

Another at-risk group of road users on rural roads is that of motorcycle users (21 % of all fatalities).

Here, too, younger motorcycle users aged between 18 and 34 years feature prominently. However, compared with the other types of road user, the 45 to 54 age category is also disproportionately represented among motorcycle users (106 fatalities).

In the group of young drivers aged between 18 and 24 years, in particular, it has been possible in recent years to achieve significant progress on rural roads as well. Since 2011, there has been a drop in the number of fatalities of around 29 % in this age group on rural roads.



Fatalities on rural roads by age category and road user type – 2014 (Source: Federal Highway Research Institute)

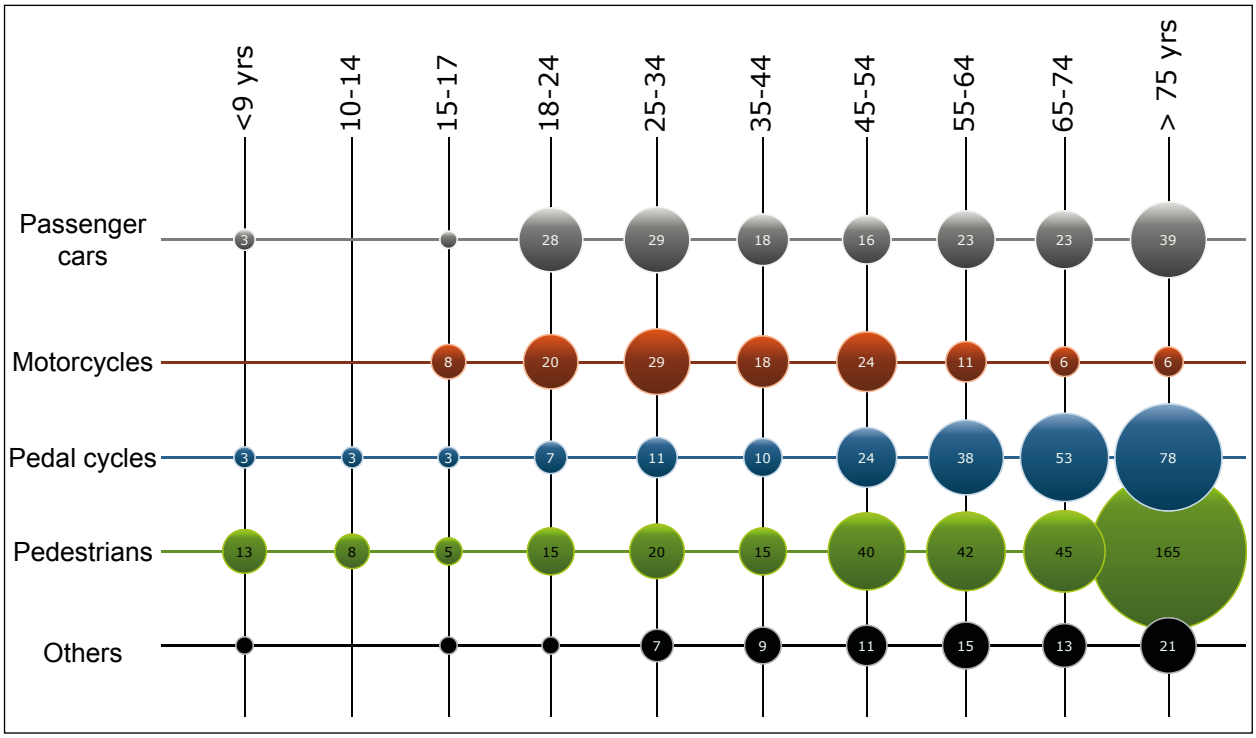
Built-up roads

Accidents within built-up areas – and here, too, the Federal Government is only responsible for construction and maintenance of the roads to a limited extent – tend to be not as serious as accidents in other locations. Nevertheless, 983 fatalities were recorded on built-up roads, which is just under 30 % of all people killed in road accidents.

Vulnerable road users – especially pedestrians – are affected with an above-average level of frequency. 37 % of fatalities on built-up roads were pedestrians (368), of whom 57 % were 65 or older, and almost one in two was 75 or older. The number of pedestrians killed on built-up roads has fallen by 14 % since 2011.

The second largest group of persons killed in accidents on built-up roads was that of pedal cyclists (230 fatalities). In 2014, they accounted for 7 % of all fatalities and 23 % of fatalities on built-up roads. The accident figures also reflect the increasing use of pedal cycles. The drop in the number of pedal cyclists killed on built-up roads since 2011 is a mere 4 %.

Almost 57 % of pedal cyclists killed on built-up roads were 65 or older, and one in three (34 %) was 75 or older.



Fatalities on built-up roads by age category and road user type – 2014 (Source: Federal Highway Research Institute)

3. Regulatory framework and the European dimension

The current transport interconnectivity forecast for 2030 predicts that traffic levels and passenger and tonne kilometres will continue to increase in the future. The density of passenger cars is also set to increase. As far as non-motorized traffic is concerned, cycling is set to increase slightly from a nationwide perspective and walking is set to decrease slightly, which is attributable in particular to declining numbers of schoolchildren and factors relating to settlement patterns.

The transport interconnectivity forecast for 2030 also predicts that there will be a significant growth in transit traffic through Germany in the years ahead. Compared with countries on the European periphery, Germany, as a transit land at the heart of Europe, will also have to shoulder special responsibilities with regard to road safety.

In 2010, the European Commission encouraged Member States to contribute, through their national road safety strategies, to the achievement of the European objective of halving the number of road deaths by 2020, taking into account their specific starting points, needs and circumstances. In its Road Safety Programme, Germany has, for the first time, formulated a quantitative target, taking into account the European Commission's "policy orientations on road safety 2011 – 2020". Germany's goal is to reduce the number of fatalities by 40 percent by 2020. In a European comparison, it is apparent that developments vary widely from one country to the next. Germany, together with a few other states, has so far been one of the best performers. It can be said that these countries, like Germany, have undertaken significant endeavours in recent years to enhance road safety. When making direct comparisons, the circumstances in each country must be taken into account. Sometimes, the number of inhabitants, vehicle population and vehicle mileage are very different. Likewise, Germany's location as a transit country at the heart of Europe has a significant impact on the accident rate.

Given the level of success already achieved, it will be more difficult to achieve further safety improvements. In addition, given the low absolute numbers of road fatalities, there are likely to be sizeable fluctuations, for instance as a result of weather-related changes in exposure. In this respect, the national target of reducing the number of road fatalities in Germany by 40 % by 2020 while traffic levels continue to rise remains a very ambitious but achievable objective.

4. What has been achieved so far?

The 2011 Road Safety Programme identified a total of 56 measures for enhancing road safety in three action areas: human factors, infrastructure and vehicle safety. The focus was mainly on those measures that can be actively pursued by government and the public authorities. Since then, dedicated efforts have been underway to progress implementation of all the measures.

These measures are based on scientifically sound findings of the Federal Highway Research Institute's road safety research. Here, the Federal Highway Research Institute, with its staff of 400, conducts substantial in-house research in all three action areas (human factors, automotive engineering and infrastructure) in order to generate new findings for improving road safety, which then inform policymaking and technical activities. This in-house research is supported by external research. Funds totalling over five million euros a year are provided for this purpose, inter alia from the road safety research programme and the highway research programme.

A scientific analysis of the large number of measures reveals that some measures have made a particular contribution towards reducing the number of road fatalities. These are measures resulting from the 2011 Road Safety Programme plus measures that were implemented previously but did not become fully effective until the reference period. Because of the fact that many measures were simultaneously introduced and implemented in the period under review, no conclusions can be drawn as to quantifiable individual effects. One of the main reasons for this is that some measures build on each other or are mutually dependent. Through the action they take, government and the public authorities make a major contribution towards improving infrastructure and automotive engineering. Ultimately, road safety is a challenge for society as a whole. The way in which legislation is framed and publicity campaigns are designed helps to encourage every individual to behave correctly and considerately on the roads. The road environment is a social space in which it comes down to every individual moving in it.

In the period from 2011 to today, the following measures are to be singled out with regard to the enhancement of road safety:

4.1 "Human factors" action area

- **Accompanied driving from 17**
  A study conducted by the Federal Highway Research Institute has shown that this scheme, which allows 17-year-olds to drive if accompanied by an experienced driver, reduces the accident rate of novice drivers in the first two years of solo driving by around 20 %. The proportion of novice drivers participating in the "unaccompanied driving" scheme has risen continuously since the nationwide implementation of the pilot project in 2008, and in 2013 comprised 40 % of all persons obtaining a passenger car driving licence. This scheme, in combination with the introduction of a zero alcohol limit for novice drivers and publicity and information campaigns targeting the age group of young drivers, has undoubtedly made a crucial contribution to the significant drop in the number of fatalities in the "young drivers" age bracket in recent years. A Federal Highway Research Institute research project is currently underway with the aim of optimizing the approach of the "accompanied driving" scheme.

- **Publicity and information campaigns**
  Over the period from 2011 to 2015, the Federal Ministry of Transport and Digital Infrastructure, on the basis of the Guidelines for the Funding of Measures to Improve Road Safety and Reduce the Number of Road Accidents, funded a large number of measures aimed at providing road safety information and education to the public. In the period under review, public funding totalling 56 million euros has been/is being made available. Because correct road user behaviour is a mainstay in preventing road accidents and promoting road safety.

  Against this background, we launched the road safety campaign entitled "Runter vom Gas" ("Kill your Speed"). With a wide range of schemes, this campaign is designed to raise road users' awareness of the risks involved in road traffic and the need for more mutual respect. Various accident causes and risks (for instance distraction, inappropriate speed) are addressed, targeting specific groups. Two factors crucial to the success of this approach are broad perception and high acceptance of the campaign. The evaluations

of "Runter vom Gas" conducted so far by the Federal Highway Research Institute show that the campaign is widely perceived and positively assessed by both the public and the media. In recent years, this joint road safety campaign of the Federal Ministry of Transport and Digital Infrastructure and the German Road Safety Council has achieved an enormous level of awareness among the public. Between 2008 and 2014, the average "unaided recall" value of the campaign was around 60 percent. with this figure peaking at 68 % in 2009. According the European Union's appraisal criteria for publicity campaigns, a campaign with a level of awareness of as little as 30 percent is absolutely successful in the fiercely contested competition for the public's attention. By way of example, three schemes from the ongoing "Runter vom Gas" campaign are outlined below:

- The new series of motorway billboards entitled "For Your Nearest and Dearest", which was presented in June 2015, uses universally comprehensible imagery to remind road users, in an emotional manner but without any finger-wagging, of the people for whom they fasten their seat belt, keep a distance from the vehicle in front and do not tailgate.

- The popular "helmet wearers" Darth Vader and Stormtrooper from the Star Wars films were used to address the target group of pedal cyclists in urban areas and young people and to make them aware of the importance of wearing a helmet. With posters in major cities and a competition entitled "dankhelm" (thank you helmet), this scheme met with an outstanding response. The website was visited around 2.5 million times. The printed material reached around 64 million people.

- As part of their series of humorous dictionaries, Langenscheidt published an HGV – car / car – HGV edition. Addressed mainly to car drivers, it illustrated, in a light-hearted manner, typical situations where they "encounter" HGV drivers.

In addition, financial assistance is provided to many other projects, focusing primarily on the safety of vulnerable road user groups such as children, young drivers, elderly road users, pedal cyclists and motorcyclists. These are measures that address road users directly, comprising elements that enable them to experience road safety in real-life situations and thus raising their awareness. They include programmes with facilitators, action days and participation at trade fairs. In 2014 alone, the Federal Ministry of Transport and Digital Infrastructure provided financial assistance to over 13,000 facilitated events for child care workers, parents, children and senior citizens with more than 200,000 participants and to over 2,000 road safety days with a total of more than 1.7 million participants. In addition, it funds targeted publicity campaigns, for instance series of posters on specific traffic-related issues such as alcohol and distraction, the creation and maintenance of dedicated websites with road safety messages, the preparation and targeted dissemination of material for the press, background information, brochures and flyers on specific road safety issues or for specific age groups. The nationwide target group programmes consolidate and use, among other things, the expertise of the central road safety organizations in Germany, which implement these programmes on the ground.

Because of the changing way in which many members of the public communicate and obtain information, the assisted projects and schemes make a point of not confining themselves to the conventional methods of communication such as flyers and brochures. Where appropriate, modern channels of network communications are used to reach the target groups. In addition to the funding of websites with road safety messages, such as www.bf17.de, www.ich-trag-helm.de or www.verkehrssicherheitsprogramme.de, this means above all exploiting the potential inherent in social networks for direct communication or for stimulating discussions to convey road safety messages.

4.2 "Infrastructure" action area

In the federal trunk roads sector, the Federal Ministry of Transport and Digital Infrastructure makes a continuous contribution towards enhancing road safety by providing appropriate funding for the construction, conversion,

upgrading, structural maintenance and operation of the federal trunk road network. Each year, the Federal Government makes a substantial amount of funding available for this purpose, and is investing over 6 billion euros in 2015 alone. The construction work is executed by the federal states with appropriate guidance for the improvement of road safety and/or the flow of traffic.

In addition, the Federal Ministry of Transport and Digital Infrastructure has, for many years, been promoting and supporting the development and continuous updating of the sets of technical regulations governing the planning and construction of roads, so that not only motorways and federal highways, but also other rural roads and roads within built-up areas for which other authorities are responsible can be constructed, converted and upgraded with the maximum level of safety, in keeping with the state of the art.

The introduction of these sets of regulations, which were developed on the basis of extensive research funded by the Federal Government – for instance the "Guidelines for the Design and Construction of Rural Roads" (Road and Transport Research Association, 2012 edition), the "Guidelines for Passive Protection on Roads Using Vehicle Restraint Systems" (Road and Transport Research Association, 2009 edition) or the "Recommendations for Safety Audits on Roads" (Road and Transport Research Association, 2002 edition) – by the Federal Ministry of Transport and Digital Infrastructure is a crucial contribution towards improving road safety.

Thus, the direct improvement of road safety is achieved through the local construction projects based on Federal Government guidance and funded by the Federal Government. These are primarily:

- **Making greater use of safety audits in road planning activities**
  This preventive measure is part of infrastructure safety management and results in planning that is optimized in terms of road safety, so that accidents do not happen in the first place. The safety audit has become an integral component of the planning for new federal trunk roads and is also used in many federal states in the planning of regional roads. The Federal Ministry of Transport and Digital Infrastructure calls on the other federal states and local authorities to conduct more safety audits in their planning activities.

  The development of fundamentals for conducting planning audits, their specific contents and the evaluation of their application are part of the Federal Highway Research Institute's safety research programme ("Safety-Related Aspects of Road Planning, Collection of Examples for Planners and Auditors" and "Evaluation of the Application and of the Results of Safety Audits of Roads in Germany"). The integration of the latest scientific findings on the safety effectiveness of individual road elements into planning audits and their associated optimization will continue to be a research task for which the Federal Government provides funding.

- **Improving the work of the Accident Commission**
  The work of the Accident Commission is an infrastructure safety management measure. Ever since the 1970s, it has been helping to identify accident hot spots and make them more "forgiving" by means of suitable measures and continues to play a major role in reducing the number of people killed on the roads. Research conducted by the Federal Highway Research Institute shows that physical measures, in particular, are very effective in reducing accident numbers. By widening the possibility of funding safety-enhancing measures in the road construction plan, the Federal Ministry of Transport and Digital Infrastructure has facilitated the implementation of physical measures to improve safety on federal trunk roads. The Federal Ministry of Transport and Digital Infrastructure recommends that the federal states and local authorities also pay more attention to the Accident Commission's recommendations when selecting suitable measures.

- **Providing more overtaking lanes**
  The construction of a third lane on previously two-lane rural roads makes it possible for vehicles to overtake safely without having to use the lane for traffic travelling in the opposite direction. This measure will thus result in a significant reduction in the number of overtaking accidents, which usually have serious

consequences. It has been possible to confirm the effectiveness of this measure, in particular, by the findings of the Federal Highway Research Institute's safety on non built-up roads research programme entitled "Improving Safety on Single-Carriageway Two-Lane Non Built-Up Roads" and the R&D project entitled "Quantification of the Safety Impacts of Various Forms of Construction, Design and Operation on Rural Roads".

- **Improving road safety at junctions, including retrofitting traffic control signals**
  At-grade junctions not controlled by traffic signals on non built-up roads, which still make up the bulk of such junctions outside built-up areas, frequently exhibit a higher incidence of accidents, especially when there is a high volume of traffic. Within the scope of the project entitled "Quantification of the Safety Impacts of Various Forms of Construction, Design and Operation on Rural Roads", it has been possible to confirm the various levels of safety at different types of junction (controlled by traffic signals, not controlled by traffic signals, roundabout). By designing junctions in line with requirements (for instance with traffic control signals or as roundabouts), it is thus possible to prevent accidents. In addition, the continuous optimization of city centre traffic control signals also results in improved protection for all road users, including pedestrians and cyclists. Among other things, the fundamentals for improving signalization for pedestrians have been developed within the scope of the Federal Highway Research Institute's research project entitled "Improving Conditions for Pedestrians at Traffic Control Signals".

- **Measures within the scope of the "Road Transport Telematics" project plan**
  Informing, warning and controlling road users by means of telematics systems on federal trunk roads can make a major contribution towards reducing the number of road accidents. In the spring of 2015, there were the following adaptive traffic control systems on federal trunk roads: active traffic management systems: 3,060 km, hard shoulder running: 336 km, strategic traffic management systems (variable direction signs): 253, ramp metering systems: 115. On the basis of the positive experience of installing adaptive traffic control systems on sections of motorway especially prone to accidents and congestion, we have joined forces with the federal states to update the "2015 Road Transport Telematics Project Plan" and launch a new project plan entitled "Road Transport Telematics 2020".

4.3 "Automotive engineering" action area

The Federal Ministry of Transport and Digital Infrastructure is actively involved in activities at international, European and national level to tighten the construction, equipment and operational provisions governing vehicle safety and to promote innovative safety-related technologies in motor vehicles. It receives intensive support in this from the Federal Highway Research Institute. All the measures listed below are based on the findings of national and international research projects that the Federal Highway Research Institute either conducted itself or in which it was heavily involved. Of special significance are, among other things, the supporting scientific research accompanying the Euro NCAP and the support provided by the Federal Ministry of Transport and Digital Infrastructure in international bodies.

Activities that are of particular relevance with regard to vehicle safety:

- **Introduction of mandatory electronic stability control systems (being phased in since 2011)**
  The Europe-wide introduction of electronic stability control systems has resulted in a significant reduction in the number and severity of loss-of-control accidents, especially on rural roads. Scientific studies have shown their effectiveness in the form of a reduction of traffic accidents on rural roads by an order of magnitude of around 30 %.

- **Introduction of mandatory automatic emergency brake assist systems for HGVs (being phased in since 2013)**
  The Federal Ministry of Transport and Digital Infrastructure has successfully championed the introduction of mandatory automatic emergency brake assist systems for HGVs, which are designed to prevent

the very serious consequences that can result from rear-end collisions, especially at the end of a tailback.

- **Introduction of mandatory ABS for motorcycles (under Regulation (EU) No 168/2013, as of 2016)**
  The Federal Ministry of Transport and Digital Infrastructure made a major contribution towards shaping the regulatory EU basis, thereby making Europe-wide introduction possible. The objective of this measure is to reduce the number of motorcycle crashes resulting from emergency braking manoeuvres, which often produce accidents of great severity. Since the measure only applies to new vehicles, the Federal Ministry of Transport and Digital Infrastructure is lobbying, as part of its publicity and information campaigns, to ensure that market penetration is accelerated nationally.

- **Introduction of mandatory daytime running lights for passenger cars (since 2011)**
  The objective was to improve the visibility of passenger cars and thus reduce the number of collisions on rural roads, especially in the case of daytime visibility problems caused, for instance, by tree shadows and similarly strong brightness-darkness contrasts.

- **Participation in Euro NCAP**
  Alongside the introduction of mandatory statutory requirements governing motor vehicle equipment, the safety of selected passenger cars has, since 1997, been assessed by the European New Car Assessment Programme (Euro NCAP – www.euroncap.com). The introduction of additional tests (e.g. simulated impact with a tree) and the tightening of existing statutory tests involving front and side impact, pedestrian protection, the introduction of seatbelt reminders, plus the early inclusion of electronic stability control systems in the assessment procedure have made it possible to enhance the safety of passenger cars. The Euro NCAP requirements have since become part of the performance specifications for many vehicles at most automotive manufacturers. This has also contributed to a reduction in the number of accidents and in the severity of injuries sustained by passenger car occupants. The ongoing tightening of the requirements and the introduction of the assessment of emergency brake assist systems make a further improvement likely over the period to 2020.

5. Challenges in the second half

We face major challenges:

- Traffic volumes will continue to rise, both individual mobility and freight traffic. This requires a further tangible improvement in road safety architecture.

- Demographic change means that we will have more elderly road users in the future. The fact that individual mobility as a whole will increase while population trends remain roughly constant is attributable, in particular, to greater mobility among senior citizens. They are more active than earlier generations and, because of their travel patterns in the past, use their cars more frequently.

- There will be growth and shrinkage regions, which will also have an impact on traffic in the individual regions, mobility patterns and thus road safety.

- The major safety advances of recent decades were mostly characterized by significant individual legislative measures that resulted in an improvement in the "safety architecture", for instance the introduction of the compulsory wearing of seat belts in passenger cars, compulsory helmet wearing for motorcycle users, ESP, etc. Unfortunately, from a scientific perspective, comparable individual measures that offer similarly great potential are not currently available.

- Isolated years in which the number of fatalities was higher than in the previous year illustrate that although the absolute numbers are increasingly falling, a further reduction in the number of road accidents, especially those involving fatalities and critically injured casualties, is not a self-sustaining development, but requires constant and intensive efforts.

6. Priorities in the second half

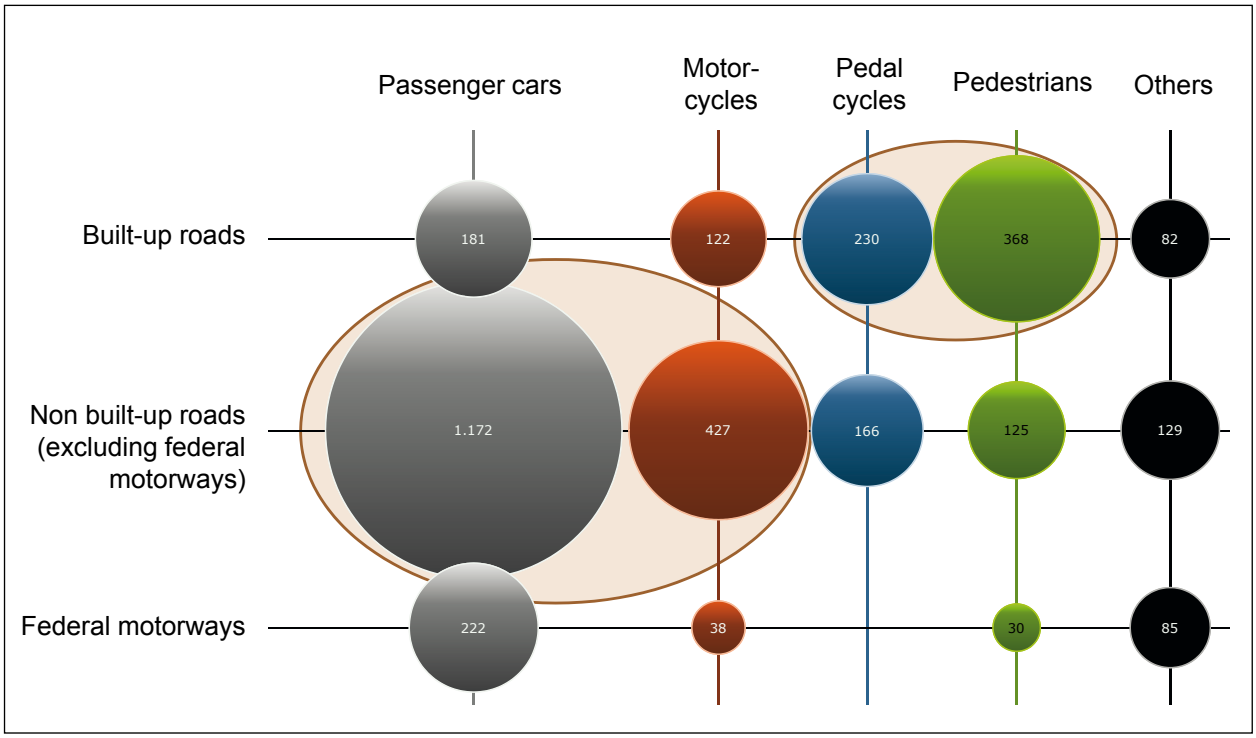
As an analysis of accident figures shows, the trend in recent years has been towards fewer and fewer people being killed in road accidents. This is a major success story of the efforts so far to improve road safety in Germany. This encouraging trend of the past is an incentive and obligation for the future to achieve the goal we have set ourselves under the conditions described above. For this reason, the Federal Ministry of Transport and Digital Infrastructure, with scientific assistance from the Federal Highway Research Institute, has developed a roadmap setting out how the intended impact of the measures of the 2011 Road Safety Programme can be intensified.

In order to further improve road safety under the aforementioned conditions and achieve the goal we have set ourselves of reducing the number of road fatalities by 40 % by 2020, the years ahead will see

- effective measures with a cross-cutting impact being established and
- especially promising measures being defined in the "human factors", "infrastructure" and "automotive engineering" action areas which, especially as a package of measures, will have an impact on rural roads and built-up roads, because it is here that there is the greatest potential for improving road safety.

Successful road safety activities means deploying the available resources at all levels as efficiently as possible in those areas where they are likely to be most effective. For this reason, the Federal Ministry of Transport and Digital Infrastructure has defined not only cross-cutting measures, but also the following key areas of action and packages of measures:

- Rural roads: here, the main focus will be on users of passenger cars and motorcycles
- Built-up roads: priority activities will be measures to protect pedestrians and pedal cyclists, in particular



Fatalities by road user group and location – 2014 (Source: Federal Highway Research Institute) Federal Highway Research Institute

Taken together, these four sub-groups cover around two thirds of all road fatalities in 2014. Thus, together with the cross-cutting measures, it will be possible, by means of targeted road safety activities in the "rural roads" and "built-up roads" action areas, to achieve further progress and continue the downward trend in the number of road accidents. The purpose of the cross-cutting measures defined here is always to enhance road safety in all spheres, as is the purpose of the measures in the three action areas.

6.1 Cross-cutting measures

In many spheres relevant to road safety, especially enforcement of the rules of the road and punishment of offenders, responsibility rests with the federal states or local authorities. In addition, many of the measures to improve road safety can only be implemented by the federal states and regional or local authorities because they are the agencies responsible for the construction and maintenance of regional, district and built-up roads. The Federal Ministry of Transport and Digital Infrastructure will thus continue to engage in a close exchange of ideas and experience with the federal states to raise their awareness and encourage them to implement appropriate measures. Likewise, the regional or local authorities will be requested to continue their successful road safety activities. Adapting road behaviour to any given situation, observing rules, anticipating road conditions and driving carefully is a responsibility for the whole of society. Here, not-for-profit organizations, industry, trade associations, schools and other institutions perform valuable work in contributing to road safety campaigns and education and awareness-raising activities to improve road safety. Nor is the evolution of automotive engineering conceivable without the commitment shown by industry. There is enormous potential inherent in technological innovations and their market penetration for the improvement of road safety.

The Federal Government will exhaust its scope for action in order to progress measures which, on the basis of scientific criteria, are likely to achieve the objective we have set ourselves.

- **Systematically focusing the Federal Government's road safety research on the requirements of accident trends**
  The Federal Highway Research Institute is conducting substantial and indispensable research in all three action areas (human factors, engineering and infrastructure) in order to generate new findings for improving road safety, which then inform technical activities and policymaking. It will continue to be important that appropriate funding (over 5 million euros to date) be provided.

- **An appeal to the federal states**
  Many especially effective measures are the responsibility of the federal states. The Federal Ministry of Transport and Digital Infrastructure expects the federal states, within the framework of their responsibilities and scope for action, to continue to pursue the enhancement of road safety as a priority objective. In addition to the activities of the federal states in the aforementioned action area, the road safety activities of the police are of great importance. This includes prevention work by the police, such as cycle training in schools, and enforcement measures to ensure compliance with the rules of the road. This is a crucial pillar in the overall approach to reducing the number of road accidents. The Federal Ministry of Transport and Digital Infrastructure welcomes the announcement by the Chairman of the Standing Conference of Interior Ministers that the road safety activities of the police are and will remain an indispensable core function, ranking equal with operational deployment and crime fighting.

  In order to give the police more scope for these activities, which are indispensable for reasons of road safety, the Federal Ministry of Transport and Digital Infrastructure has complied with a wish expressed by the Standing Conference of Interior Ministers to relieve the burden on the police when escorting movements of abnormally large or heavy loads. In the future, it is to be possible for private sector administrative assistants to escort movements that can be planned in advance, that can be regulated by a traffic order to make them safe and that do not require the police on the ground to take any discretionary decisions to

ensure a safe and orderly movement in the interests of all road users. These administrative assistants will then display the traffic signs ordered by the competent road transport authorities. After consulting the federal states, the Federal Ministry of Transport and Digital Infrastructure has already published a fact sheet with technical requirements for the escort vehicles required for this purpose. In addition, the models for the necessary traffic sign orders have also been completed in consultation with the federal states. On this basis, the federal states will be able to relieve the burden on their police forces at short notice. The Federal Highway Research Institute has already received applications from escort firms for approval of their vehicles. Subsequently, the models will be incorporated into the Guidelines for the Carriage of Abnormal Loads, and the General Administrative Regulation on the Road Traffic Regulations will be adapted.

- **Creation of an urban transport academy**
  In the medium term, consideration will be given to whether, and if so how, the transfer of knowledge of the sets of regulations can be optimized, for instance by converting an institution that already exists, such as the Cycling Academy at the German Institute of Urban Affairs, into an urban transport academy which, by staging additional information events, could promote the transfer of knowledge, especially for urban areas.

6.2 "Human factors" action area

- **Stepping up the nationwide publicity and information campaigns**
  In 2015, the Federal Ministry of Transport and Digital Infrastructure is providing a total of 13 million euros for publicity and information campaigns to tackle road accidents. This is 1.5 million euros more than in the previous two years, and 3 million euros more than in 2011 and 2012. To continue to achieve our objectives and meet the great challenges in the field of publicity and information, we will sustain appropriations at the level that has been reached and, if necessary, increase them as demand requires – and fund numerous projects addressing the road safety of specific vulnerable target groups such as senior citizens, children, young drivers, pedal cyclists, pedestrians and motorcyclists, plus campaigns and projects addressed to all road users. The corresponding activities and schemes will be continuously evolved.

New projects in 2015/2016 are the city centre campaign, launched in the summer of 2015 as part of "Runter vom Gas", focusing on the topical key issue of "distraction", the project to encourage the wearing of cycle helmets, especially by adults, and the project to promote "accompanied driving from 17". Each project involves a multiplicity of activities, many of them also web-based.

The very successful implementation of the Internet and communications platform entitled "Motorrad: Aber sicher!" (Motorcycling? Sure, but stay safe) in cooperation with the German Motorcycle Industry Association addressing the issue of motorcycle safety reached over 10 million persons on the Internet between its launch in July and the beginning of September 2015 on the website and social networks. Road safety messages for motorcyclists and viral videos (over 3 million viewings) are at the heart of this project. It was possible to direct 150,000 Facebook users to the more detailed website. Given that electronic and digital assistance systems can significantly increase the active safety of motorcycles and that the use of ABS will be mandatory throughout Europe for new type approvals as of 2016, an instructional film is currently being produced, funded by the Federal Ministry of Transport and Digital Infrastructure, which is to illustrate the entire range of application in a practical manner and demonstrate it in everyday situations. The film will be made available free of charge on the online platform, so that it can also be shown in sequences, for instance in instruction at driving schools. One of the objectives is to speed up the market penetration of motorcycles with ABS.

Future projects: In addition to the continuation and evolution of successful existing activities, work addressing senior citizens, for instance, will be evolved. After conclusion of a Federal Highway Research Institute research project on the "Development and Evaluation of Training Schemes for Elderly Road Users to Promote their Driving Skills", a publicity campaign is

to be launched, in cooperation with the German Road Safety Council and driving instructor associations, on voluntary practical driving schemes to preserve the safety of elderly road users. Initial exploratory talks have already been held. By way of preparation for 2016, and as part of the implementation of the 2011 Road Safety Programme, we are currently collaborating with the German Road Safety Council and numerous stakeholders, including from the federal states, to devise a project addressing the issue of "fatigue on the roads". A request we have submitted via the Federal Highway Research Institute to the federal state ministries of education and cultural affairs is designed to identify the need for additional teaching material for the mobility and road safety education of children and young people of various age brackets, so that it can be produced, possibly with Federal Government funds, and made available nationwide. The issue of how refugees can be familiarized with road safety and the rules of the road in Germany is also playing a role in our activities to plan the future fields of activity.

- **Further measures to improve the preparation of novice drivers**
  On the basis of the "Framework Strategy for the Evolution of the Preparation of Novice Drivers in Germany", which was commissioned by the Federal Ministry of Transport and Digital Infrastructure and developed between 2011 and 2013, a Federal Highway Research Institute project group is currently developing further measures and approaches for novice drivers which follow on from the positive experience of the "accompanied driving from 17" scheme and the zero alcohol limit for novice drivers and which promise further safety improvements.

- **Improving the system of medico-psychological assessment of a person's fitness to drive and measures to restore their fitness to drive**

  - **Reform of the medico-psychological examination**
    In March 2012, the Federal Highway Research Institute was tasked with devising a reform of the medico-psychological examination, with the aim of achieving more quality, transparency and acceptance for the examination and identifying starting points for a scientific/professional evolution of the medico-psychological examination. The final report of the "Reform of the Medico-Psychological Examination" project group, which comprised professional experts, representatives of the agencies sponsoring the driver fitness assessment bodies, sponsors of courses for the restoration of driver fitness under section 70 of the Driver Licensing Regulations, practising traffic psychologists, specialist societies and representatives of public authorities, is now available, and parts of it have been implemented. Persons affected receive better information, the set of regulations is clearer and an independent body will review the methods used. Other recommendations, such as the official recognition and publicly accessible list of driver fitness advisors, the development of a uniform set of questions, the legal codification of senior experts as ombudsmen and the resolution of legal issues relating to possible audio or video recordings, are currently being clarified.

  - **Alcohol ignition interlock systems**
    Breath alcohol ignition interlock devices, also known as "alcolocks", are designed to prevent a vehicle from being started or continuing its journey if the driver is impaired by alcohol. It is not possible to start the engine until the driver's breath alcohol concentration has been measured. Research findings show that the introduction of alcohol ignition interlocks, accompanied by a course of rehabilitation, can, in the case of drivers who have already committed alcohol-related offences, meaningfully complement the current measures of the German driver licensing system. In this connection, research has been conducted into the way in which alcohol ignition interlock systems work and which group of convicted drink drivers is an eligible target group. The legal problems have been discussed with representatives of federal state and Federal Government ministries. In addition, a research project was conducted to identify the participation criteria and how to flesh out an accompanying rehabilitation scheme. The Federal Ministry of Transport and Digital Infrastructure

is currently preparing the legal bases for the introduction of breath alcohol ignition interlock devices.

- **Voluntary practical driving schemes to preserve the safety of elderly road users**
  Scientific studies show that if elderly citizens perform individual practical driving exercises in their home town with specially trained driving instructors, their individual skills and shortcomings can be discussed to ensure that they can remain safe drivers for as long as possible. The Federal Ministry of Transport and Digital Infrastructure will join forces with the relevant stakeholders to develop and evaluate a voluntary practical driving scheme for elderly vehicle drivers to preserve their safety and implement this scheme to the extent possible, for instance by implementing a communications strategy to raise acceptance of this scheme in the target group.

- **Widening the range of schemes for providing transport-related medical advice to elderly road users**
  Surveys among senior citizens (for instance as part of the German Road Safety Council's "Schulterblick" (shoulder check) campaign, which was funded by the Federal Ministry of Transport and Digital Infrastructure), have shown that physicians are trustworthy points of contact for their patients and their advice – including advice on driving – is taken very seriously. Thus, the provision of appropriate information and mobility advice, especially by physicians, is a suitable prevention instrument and will become increasingly important in the future as the number of elderly road users rises. The instruments for the provision of appropriate mobility advice to elderly persons by physicians are in place. The Federal Ministry of Transport and Digital Infrastructure will join forces with the Federal Ministry of Health to explore the possibility of providing incentives, to ensure that more advice is actually provided.

- **Appropriate designation and classification of medicines**
  As international studies (including the EU's DRUID project – Driving under the Influence of Drugs, Alcohol and Medicines) and practical experience in other European countries demonstrate, a user-friendly, simple system of labelling for medicines that can have an impact on driver fitness can help to inform patients about possible impairments at a glance. The objective should be that they do not drive under the influence of the medicine and/or seek medical advice. Labelling is a highly efficient form of risk communication that reaches the entire target group. The Federal Government will therefore consider whether there are possibilities, and if so what, for progressing the implementation of a user-friendly, simple system of labelling.

- **Brightly coloured and/or retroreflective clothing to improve the visibility of motorcycle users**
  In addition to automotive engineering measures, such as the introduction of daytime running lights, there is still untapped safety potential for making motorcycle users more visible by means of brightly coloured clothing (especially with retroreflective materials). This is designed to address the large number of (turning) accidents in which other road users overlook motorcycle users or see them too late. The decision to wear such clothing is of course the responsibility of the motorcycle user. Various publicity and information campaigns that receive financial assistance from the Federal Ministry of Transport and Digital Infrastructure call on motorcycle users to wear retroreflective materials and enhance their safety by means of other activities.

- **Improving mutual respect between cyclists and other road users**
  The findings of a Federal Highway Research Institute research project show that pedal cyclists who have been involved in an accident within the last three years state more frequently than cyclists who have not been involved in an accident that they knowingly ride in a risky manner, make mistakes in the use of the road or cycle without due care and attention. At the same time, however, these persons more frequently experience risky road behaviour towards them by other road users. Within the scope of its schemes and campaigns, the Federal Ministry of Transport and Digital Infrastructure will attempt, by means of targeted publicity, to encourage pedal cyclists to adopt considerate and safe

road user behaviour and to comply with the rules of the road. Likewise, however, similar messages are to address other road users' behaviour towards cyclists and promote mutual understanding and respect.

- **Encouraging the voluntary wearing of cycle helmets by children and young people / Encouraging the voluntary wearing of helmets (all age brackets)**
  Helmets can reduce the severity of or prevent head injuries. It thus makes sense to encourage cyclists to wear helmets, irrespective of their age. Children wear helmets more frequently than adults, but there is still great potential here that has to be unlocked. In the years ahead, the Federal Ministry of Transport and Digital Infrastructure will continue its endeavours to encourage the voluntary wearing of cycle helmets, especially in order to remind and convince adults of their function as a role model. It will also include recent trends, such as the current rise in the number of people using 25 km/h pedelecs (which have the same status as pedal cycles under traffic law), in the fleshing-out of the publicity and information campaigns. As an accompanying measure, the Federal Highway Research Institute has, for many years, been annually collecting data on helmet wearing rates among cyclists by age group on built-up roads in order to identify timelines and potential for the use of cycle helmets. There has been a continuous rise in helmet wearing rates in recent years. In 2014, 17 % of all pedal cyclists across all age groups wore a protective helmet (in 2013 the figure was 15 %). This is undoubtedly attributable to the intensive publicity activities. Whereas more than two thirds of all children between six and ten years of age and 31 % of 11 to 16-year-olds wear a helmet, the helmet wearing rate among cyclists aged 17 or more in 2014 was between 7 % and 16 % in the respective age groups. This is why we will step up our publicity activities targeting adults in particular.

- **Making it possible for young child cyclists to be accompanied on footways**
  An amendment to section 2(5) of the German Road Traffic Regulations is designed to make it possible, in the future, for adults to cycle on the footway to supervise young child cyclists. This is designed to enhance the safety of children on pedal cycles and make it easier for adults to perform their duty of supervision. It goes without saying that they must also have due regard for pedestrians. So far, adults have not been allowed to accompany children on the footway. As the law stands now, children under eight years of age must use the footway for cycling and older children under ten years of age may use the footway for cycling. The amendments are to be included in the next recast of the German Road Traffic Regulations.

- **Improving safety for e-bike users**
  As part of the next recast of the German Road Traffic Regulations, a new supplementary sign with pictogram is to be made available for the uniform nationwide signage of suitable cycle lanes that may be used by e-bikes. The segregation of fast-moving motor traffic from e-bikes because of the very high differential speeds supports the safety and easy flow of traffic as a whole. For the purposes of the planned amendment, e-bikes are vehicles that can be ridden at a speed not exceeding 25 km/h with the help of an electric drivetrain and a twist grip or switch without the rider having to simultaneously pedal (comparable to motor-assisted bicycles). In the future, these vehicles are to be generally allowed to use cycle tracks. This is also to be regulated as part of this recast.

- **Making it easier to lower the speed limit in front of especially sensitive institutions**
  If social institutions such as primary schools, nurseries or old peoples' homes are located on major transport arteries, the road traffic authorities have so far had to demonstrate that there is a specific local hazard (e.g. proof of an accident blackspot) before they can lower the speed limit on a stretch of road (section 45(9) of the German Road Traffic Regulations). This means that today there is a high threshold for imposing such limits.

  It should be obvious, however, that a specific hazard does exist near, for instance, nurseries and primary schools as a result of the development of children, and without having to prove that there is an accident blackspot, which makes it imperative that the law be amended to protect the most vulnerable road users. Elderly road users exhibit diminished mental and physical skills as a result of the human ageing process,

which means that the option of imposing a 30 km/h speed limit in front of old peoples' homes, for instance, appears appropriate. The Federal Ministry of Transport and Digital Infrastructure is currently working on the text of regulations.

- **Revitalizing the emergency corridor**
  Although "behaviour towards special vehicles" has been part of learner driver training for many years and the provisions governing the formation of an emergency corridor have been in place for decades, many road users do not know the details of the rule or cannot recall it in an emergency. Even driving instructor associations and renowned automobile clubs have difficulty with the literal interpretation of the current section 11(2) of the German Road Traffic Regulations. In the past, this resulted in well-meant publicity campaigns giving an erroneous description of the law as it stood, which helped to sow total confusion among road users. The consequence is that emergency corridors are often formed that are not permeable and the emergency services can only get through with much delay. To encourage correct behaviour, the Federal Ministry of Transport and Digital Infrastructure has already progressed this issue as part of its "Runter vom Gas" campaign and via media channels. Thus, in cooperation with the German Road Safety Council, banners bearing the word "Rettungsgasse" (emergency corridor) have been developed. These banners, along with other material, are available to the competent federal state authorities, which can install them on motorway bridges, among other things. The competent federal state authorities decide how and to what extent these materials are to be used. In addition, the Federal Ministry of Transport and Digital Infrastructure has approached the public service broadcasting corporations with the aim of getting the formation of emergency corridors included in the traffic news. The Association of Public Broadcasting Corporations in the Federal Republic of Germany has assured us that the topic of "emergency corridors" is included in the traffic alerts and traffic bulletins of their radio stations. It also informed us that the traffic alerts of the individual stations always broadcast information on the formation of emergency corridors on the basis of the incident in question and taking the specific local circumstances and needs into account. The Federal Ministry of Transport and Digital Infrastructure hopes that this will make a major contribution towards improving road user behaviour. To enable emergency corridors to be formed even more smoothly in accident situations in the future, thereby enabling emergency services to reach the scene of an accident more quickly, the Federal Ministry of Transport and Digital Infrastructure will simplify the behavioural rules. We will do away with the existing distinction based on the number of lanes. In doing so, we will be guided by the arrangement already practised in Austria, where the emergency corridor is to be formed between the outermost left-hand lane and the lane adjacent to it on the right. This is easy to remember and understand. This amendment will also be made as part of the next recast of the German Road Traffic Regulations.

6. 3 "Infrastructure" action area

- **Digital Motorway Test Bed**
  It is the Federal Ministry of Transport and Digital Infrastructure's aim to progress the trend towards connected vehicles and Mobility 4.0 and to leverage the associated potential for road safety. We have thus joined forces with the automotive industry and the digital technology sector to construct a "Digital Motorway Test Bed" on the A 9 motorway in Bavaria, on which innovations such as vehicle-to-infrastructure communications and automated driving can be trialled and evolved.

  The Digital Motorway Test Bed will thus pave the way for an intelligent and fully digitalized road network and for a significant enhancement of road safety through innovative technologies. In addition, telematics systems providing wrong-way warnings are being trialled at three junctions on the A 9 (Eching, Garching-Nord and Garching-Süd). These pilot projects are designed to shed light on how modern systems can automatically detect wrong-way drivers and warn these drivers and other road users quickly and in a targeted manner. They will provide a comprehensive overview of the state of the art in digital technology and help us to gain new insights into intelligent traffic control.

- **Proper application/implementation of the current sets of technical regulations**
  New research findings and practical experience inform the revision of existing and the creation of new sets of regulations. These regulations thus represent the current state of the art. To enable the safety potential inherent in sets of regulations to be extensively unlocked, these regulations must be applied systematically and speedily in everyday practice. To this end, the Federal Ministry of Transport and Digital Infrastructure notifies the federal states of the most important regulations (by publishing them officially in the Federal Ministry of Transport Gazette) for application on the federal trunk roads. At the same time, the federal states are requested to introduce these regulations on regional and district roads. With regard to the proper application of the sets of technical regulations, a major contribution is made not only by the conferences, symposia, etc. of the Road and Transport Research Association, but also, in particular, by the federal state associations of the Association of Road Construction and Transport Engineers with their extensive range of advanced training courses.

- **Optimizing road infrastructure safety management**
  Many rural roads on the existing road network were planned and constructed on the basis of sets of technical regulations that were up-to-date at the time but are obsolete today. They have "evolved naturally", frequently still follow the courses of old routes and do not meet the requirements of a "present-day" alignment. Thus, the targeted identification of shortcomings, which result in drivers misjudging the situation and consequently behaving inappropriately, is of particularly great importance. To this end, greater use must be made of the existing instruments, such as the road condition review or the identification of safety potential, the activities of the Accident Commission must be further strengthened and optimized, and new instruments must be developed. The Federal Ministry of Transport and Digital Infrastructure supports and – in some cases represented by the Federal Highway Research Institute – participates in the development of such apparatus with which safety shortcomings are systematically identified and human factors are also taken into account by providing financial assistance to and participating in a number of national and international research projects (e.g. the EU's "Pilot4Safety" project) both on the corresponding national (primarily the Road and Transport Research Association) and international bodies (e.g. CEDR SP3 Task N5 Improvements in the field of road safety). This also includes the development of sets of technical regulations for an audit of the existing network, which is to be performed whenever the occasion so requires. The objective is to identify shortcomings in the road infrastructure – be it markings, signage, safety barriers or an alignment deficiency – with a moderate amount of effort and to remedy them efficiently.

- **Creating additional overtaking lanes**
  Accidents involving oncoming vehicles on rural roads can in some cases be prevented by creating additional overtaking lanes and imposing bans on overtaking. With additional overtaking lanes, the pressure to overtake can be reduced safely and independently of the numbers of vehicles moving in the opposite direction. When planning for the construction of new and the upgrading of existing federal highways with the highest importance for the network, provision is made for overtaking lanes as standard under the current Guidelines for the Design and Construction of Rural Roads, in order to create more opportunities for safe overtaking on these stretches of road. It has been possible to confirm the effectiveness of this measure, in particular, by the findings of the Federal Highway Research Institute's research programme entitled "Improving Safety on Single-Carriageway Two-Lane Non Built-Up Roads".

- **Reducing the number of accidents involving trees**
  Impacts with trees on the edge of the carriageway are characterized by a high level of accident severity. However, it is not possible to create roadsides that are free of obstacles everywhere. Appropriate measures thus have to be taken, both on the existing network and in the planning of new roads. Application of the "Recommendations for Protection against Accidents involving Impacts with Trees" and "Guidelines for Passive Protection on Roads using Vehicle Restraint Systems" pays due regard to road safety and the protection of existing trees. Recommendations by

national bodies have resulted in special safety barriers for use in front of trees now being tested. It has been possible to derive other recommendations for this field of application from the research project entitled "Development of Recommendations for Action for Application of the 2009 Guidelines for Passive Protection on Roads using Vehicle Restraint Systems".

With this in mind, the Federal Ministry of Transport and Digital Infrastructure has requested the federal states to give greater consideration to the retrofitting of passive safety barriers on federal highways and, wherever possible, to extend this consideration to regional and district roads. Various federal states have already established – in their traffic safety programmes, avenue strategies or nature conservation acts – rules for the safe and environmentally sound design of the street environment and for a reduction in the number of accidents involving impacts with trees. The Federal Ministry of Transport and Digital Infrastructure calls on the other federal states to implement measures to prevent accidents involving impacts with trees and to comply with the state of the art when planting new trees on roads.

- **Enhancing road safety at junctions**
  A high number of accidents and a high level of accident severity can be observed in particular at at-grade intersections and three-way junctions on the rural road network. Numerous research projects commissioned by the Federal Highway Research Institute, such as those on "Elements of At-Grade junctions", "An Appraisal Model for Road Safety" or "A Review of Road Safety for Turning Left with various Forms of Traffic Signals" have shown that various measures are suitable for improving road safety which can ensure safe management of traffic flows, so that the intersections and junctions can be identified in good time by all types of traffic and from all approaches and are clearly laid out and comprehensible in terms of traffic management and right of way rules, and can be easily and safely used. To this end, decision-makers have to be convinced and their awareness raised, in accordance with the administrative responsibilities.

- **Deploying speed monitoring at accident blackspots**
  In general, there is great potential in the enforcement of speed limits (especially at accident blackspots) for avoiding loss-of-control and overtaking accidents on rural roads and at intersections/three-way junctions. The Federal Highway Research Institute's "Safety on Non Built-Up Roads" research programme has shown, inter alia, that stationary speed monitoring systems (with warnings/information) are an effective way of reducing the number of accidents due to excessive speed. There is a need for action by decision-makers, who have to convince the public that these measures are taken in the interests of road safety and not to generate additional revenue.

- **Motorcycle-friendly safety barriers**
  Building on the tests and studies carried out on passive safety barriers for motorcycle users, more and more secondary rail systems have been installed on crash barriers in recent years on routes popular with motorcyclists and at accident blackspots. In addition, we are stepping up our efforts to ensure that, when new safety barriers are installed, systems are selected during the tendering phase that pose less of a danger to motorcyclists. Thus, in Germany, the criterion that the safety barrier must not exhibit any components with an aggressive shape is applied. Complementing this, it has been possible to derive requirements and recommendations from the research projects entitled "Development of Recommendations for Action for Application of the 2009 Guidelines for Passive Protection on Roads using Vehicle Restraint Systems" and "Development of Proposals for New Technical Supply and Testing Conditions for Vehicle Restraint Systems". But there are also other infrastructure measures designed to mitigate the consequences of accidents and to prevent motorcycle accidents. Under the chair of the Federal Ministry of Transport and Digital Infrastructure, the safety of motorcyclists has been repeatedly addressed in Federal Government/federal state groups of experts. Various federal states have decided to tackle the issue and have implemented special programmes to identify and remove accident blackspots on routes popular with motorcyclists. In addition, staff from the highway authorities have been trained to identify and remove potential hazards for

motorcyclists. The official accident statistics show that the measures already implemented are having an impact. Since the introduction of the "Fact Sheet for the Improvement of Road Safety on Routes popular with Motorcyclists", the number of motorcycle users killed outside built-up areas has fallen on the same scale as the number of all fatalities outside built-up areas. This was not the case before the fact sheet was introduced. Based on the lessons learned, the "Fact Sheet for the Improvement of Road Safety on Routes popular with Motorcyclists" will be revised and updated. The Federal Ministry of Transport and Digital Infrastructure will thus continue to lobby to ensure that the fact sheet is used as widely as possible in order to enhance infrastructure safety.

- **Improving cycling safety at junctions**
  The safe design of cycling facilities through traffic engineering measures (for instance advisory cycle lanes, pre-green at traffic signals) can be delivered quickly. Within the scope of numerous studies commissioned by the Federal Highway Research Institute on safety assessment and the improvement of cycling safety, appropriate recommendations for improving the sets of technical regulations and legislation have been and are being developed.

- **Improving safety for cyclists using cycle tracks in a contra-flow direction**
  Evidence available so far shows that the proportion of cyclists unlawfully using the left-hand cycle track on roads with segregated cycle tracks on both sides may be over 50 %, and even on average is around 15 to 20 % of all cyclists on one road. These cyclists are exposed to significantly higher risks than cyclists riding on the right, especially at three-way junctions or entrances to a property with a high level of traffic, because drivers turning into the road, who are obliged to give way, do not expect cyclists to approach from the right. The study, commissioned by the Federal Highway Research Institute and entitled "Improving Safety for Cyclists using Cycle Tracks in a Contra-Flow Direction", has confirmed that the General Administrative Regulation on the German Road Traffic Regulations and the sets of regulations should, as an exception, allow cyclists to use left-hand cycle tracks. The Federal Ministry of Transport and Digital Infrastructure will lobby to ensure that safety measures required as a result of allowing such use are systematically implemented.

- **Improving the safety of pedestrians crossing the road**
  A study commissioned by the Federal Highway Research Institute has shown that accidents in the vicinity of crossing facilities account for a large proportion of the total number of pedestrian accidents – in absolute figures, sometimes higher than at the facilities themselves. A major key to more safety for pedestrians is thus not just the selection of a suitable crossing facility but also the correct siting of the facility in the street environment. The aim of the research project entitled "A Study of Safety-Related Pedestrian Behaviour" is to derive the possibilities and limitations of using such facilities and to develop measures to improve the road safety of pedestrians at crossing facilities. In addition, as part of the Federal Ministry of Transport and Digital Infrastructure's publicity and information activities, funds are currently being provided for the development of a series of seminars for persons from local authorities and consultancy firms on the design of safe crossing facilities in order to impart, as quickly as possible, the available knowledge and the application of the set of regulations and legal bases to the players on the ground.

6.4 "Automotive engineering" action area

- **Enhancing road safety by means of automated driving**
  Accident statistics show time and again: the principal cause of road accidents is human error – triggered, for instance, by inappropriate speed, failure to pay attention or not keeping a safe distance from the vehicle in front. Thus, in 2014, around 90 percent of accidents were attributable to human-related causes, whereas not even one percent were due to technical deficiencies.

  Accordingly, the provision of support to the driver by assistance systems offers enormous potential for enhancing road safety, especially in critical driving and traffic situations. The evolution of such systems, from anti-lock braking systems at the end of the 1980s

to complex technical systems such as lane keep assist or advanced emergency braking systems, is already a success story today. This is illustrated by the trends in the number of road traffic casualties. Despite the fact that the volume of traffic has been rising sharply over the years, there has been a significant increase in road safety.

The evolution and consolidation of existing and proven assistance systems to form automated and connected vehicles will further expand the positive contribution towards enhancing road safety. Additional indirect effects are likely to result from the fact that the sensor technologies that are improved through the development of automated driving functions will also be used in conventional assistance systems. This will make it possible to operate non-automated vehicles more safely in the expected mixed traffic.

- **Promoting the market penetration of vehicle safety systems**
  There is great potential inherent in vehicle safety systems for preventing accidents and mitigating the consequences of accidents. Many practical vehicle safety systems are already in use but are not required by law, such as the advanced emergency braking system on passenger cars. In the case of other systems, it will become mandatory for vehicles to be equipped with them in the years ahead (for instance ABS for motorcycles). To be able to unlock the potential of these systems as quickly as possible, the Federal Government will fund their market penetration in different ways. The basis for this is continuous monitoring of the market penetration of vehicle safety systems in the vehicle population. To this end, the second representative survey of the safety-related features of vehicles is currently being conducted on behalf of the Federal Highway Research Institute.

  In addition to the projects to revise the statutory requirements (for instance seatbelt reminders on all seats in passenger cars), the requirements to be met by seatbelt reminders on the rear seats, for instance, will be tightened as of 2017 in the assessment of new vehicles within the scope of Euro NCAP. It is also planned to include lane keeping assist systems in Euro NCAP as of 2016 or 2018 in the assessment of driver assistance systems. Currently, Euro NCAP only awards points for systems that warn drivers when they are leaving their lane. Alongside the lane guard systems that provide warnings, lane keeping assist systems additionally help to reduce the number of collisions with objects on the edge of the road or with oncoming vehicles that are caused by drivers unintentionally leaving their own lane. In addition, publicity campaigns will highlight the additional safety improvements that every individual can achieve by purchasing and using vehicles with assistance systems. The provision of individual advice to people when deciding which vehicle to purchase can help here.

- **Rapid introduction of turning assist systems for HGVs**
  Turning accidents involving collisions between goods vehicles turning right and pedal cycles usually have serious consequences for the unprotected road user. In the past, an increasing number of mirrors have enlarged HGV drivers' individual field of vision and thus reduced their "blind spot", improving safety for unprotected road users. Since turning accidents still occur today, despite the large number of mirrors, but at the same time driver assistance systems have found their way into many vehicle categories, it stands to reason that such systems should be used to prevent turning accidents. It is assumed that a turning assist system will have a very positive influence on the rate of accidents between HGVs turning right and pedal cycles. The Federal Ministry of Transport and Digital Infrastructure will thus step up its lobbying for the deployment of new technologies to solve the "blind spot" problem.

  Thus, the Ministry hosted a Round Table on "Turning Assist Systems for HGVs" with the aim of engaging in an exchange of views on introducing these systems as quickly as possible. All the parties involved welcomed this aim. In addition, in 2014 the Federal Ministry of Transport and Digital Infrastructure conducted a research project on turning assist systems for heavy goods vehicles in order to establish the bases for a testing procedure for these systems. The UN Economic Commission for Europe (UNECE) is now to discuss the

next steps towards the mandatory installation of these systems in heavy goods vehicles.

The Federal Ministry of Transport and Digital Infrastructure is already providing funding for the optional installation of turning assist systems in HGVs within the scope of the de minimis financial assistance programme.

- **Introduction of the eCall system as mandatory**
  Forecasts by the European Commission predict that around 2,500 lives could be saved each year by the EU-wide introduction of eCall. The Federal Ministry of Transport and Digital Infrastructure has played a crucial role in progressing the introduction of the 112 eCall as mandatory in the EU Member States by 31 March 2018 at the latest.

- **Automatic emergency braking (AEB) systems for the protection of cyclists)**
  It is planned to include emergency braking systems for the protection of cyclists in the Euro NCAP assessment procedure as of 2018. This will involve widening the test protocol, which has hitherto focused on pedestrians, to cover cyclists. The need for action in 2018 will be the same as that for emergency braking systems for the protection of pedestrians in 2016. This will create market incentives and is designed to speed up market penetration in the mass-market vehicle sector.

- **Automatic emergency braking systems for pedestrians (AEB-Ped)**
  Starting in 2016, emergency braking systems to prevent and mitigate the consequences of accidents involving passenger cars and pedestrians crossing the road are to be assessed in the Euro NCAP. The criterion is the reduction in speed that can be achieved with the system. Accordingly, many vehicles with this system will enter the market in 2016. The first positive effects in this type of accident should become apparent by 2017 at the latest. The inclusion of such emergency braking systems in the Euro NCAP safety assessment is designed to promote the rollout of the systems in mass-market models.

7. Concluding remarks and looking to the future

The road safety activities of recent years have been very successful. The trend in the number of fatalities up to and including 2014 has so far on the whole followed the path towards the objective set by the 2011 Road Safety Programme. The implementation of the measures listed in the programme is having an impact, so that there is no need for a strategic realignment. With the firm intention of reaching the set target of reducing the number of fatalities by 40 percent by 2020, the Federal Ministry of Transport and Digital Infrastructure will thus use all the instruments at its disposal to once again tighten the measures of the Road Safety Programme and apply them where there is the greatest potential.

The present mid-term review has identified measures which, on a scientific basis, appear particularly likely to appreciably intensify road safety and to reduce as efficiently as possible the number of road users killed over the period to 2020. In the selection and implementation of the measures, other road users involved in accidents, especially those with serious injuries, will also be taken into account.

Road safety, however, is a challenge for society as a whole. All players involved in road safety activities are required to keep up their great efforts to continue along the path of success of recent years and decades. The 2011 National Road Safety Programme continues to form the appropriate framework and guidance for road safety activities in Germany.

The endeavours in the research, development and implementation of measures to enhance road safety go way beyond 2020. Infrastructure schemes, in particular, are designed to be effective over a longer period of time.

Thus, the construction, conversion and upgrading of federal trunk roads planned and built until 2020 on the basis of the new sets of technical regulations – for instance the 2012 Guidelines for the Design and Construction of Rural Roads – will generate a direct positive impact on road safety until the end of the lifetime of the Road Safety Programme, but will also achieve sustained improvements way beyond 2020.

This mid-term review is designed to encourage all stakeholders to continue and, if possible, intensify their efforts to improve road safety.

We will not succeed in reducing the number of road fatalities by 40 percent against 2011 levels by 2020 unless everyone makes a contribution.

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