ROAD SAFETY REPORT 2026

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Safety is top priority when our roads are workplaces

Jann Fehlauer
Managing Director, DEKRA Automobil GmbH

Professional drivers transport essential goods that we need for our daily lives or in industry, often covering tens of thousands of miles a year. At countless construction sites, people work to repair or expand our road infrastructure. When the police, fire service, and rescue services drive under blue lights, they often negotiate an environment where unpredictable situations could occur at any given moment.

These three examples alone clearly demonstrate the wide-ranging impact and the associated challenges when our roads are workplaces. Many people suffer severe or fatal injuries every year due to traffic accidents at their workplaces. This makes it essential to take a closer look at the issue and analyze what is causing and driving it. We also need to explore which measures we can take to ideally prevent such accidents, or at least mitigate their consequences. The fact that the German Road Safety Council and the European Transport Safety Council, for example, have recently written publications on this very topic shows how urgent this task is.

This is the 19th consecutive issue of the DEKRA Road Safety Report, and this time it examines the various problems that arise when our roads are workplaces. It looks at the topic through the lens of accident analysis, traffic psychology, vehicle technology, infrastructure design, and legislation and sets out potential solutions. The fact is that professional drivers, emergency personnel, and many others whose workplace is the road all bear a great deal of responsibility every day. They drive large vehicles, work under time pressure, and need to react quickly and correctly in dynamic traffic situations. We also increasingly need to direct our attention beyond the vehicles themselves. Safe work zones and construction sites, adequate parking, and reliable organizational workflows are key to eliminating accidents in our everyday working lives.

DEKRA has once again conducted extensive road tests and crash tests specifically for this Road Safety Report, in order to find out how vehicles, assistance systems, and safety equipment actually behave when put to the test in real-life scenarios. Our tests on different ways of securing road work sites, the tests looking at how well modern automated emergency braking systems can detect and react to mobile warning signs or trailers, and the road tests with vans carrying different types of loads all provide important insights for future technical requirements and safety standards. Our survey of professional drivers on the parking situation and level of safety and security at rest stops in Germany and other European countries also revealed some interesting findings.

This issue of the DEKRA Road Safety Report again includes statements from numerous renowned national and international experts and underlines once more just how varied the factors are that influence safety when it comes to our roads as a workplace. It also illustrates that lasting improvements can only be achieved by tackling the topic holistically. Technical innovation, clear rules, safe infrastructure, and responsible conduct must all go hand in hand. DEKRA's mission is to play an active role in shaping this process. I hope you find this report a stimulating read.

Protecting those who keep our roads moving: challenges and responses

Kristian Schmidt
EU Road Safety Coordinator

Every day, millions of professional drivers travel Europe's roads, forming the very backbone of our transport network, keeping essential services running under demanding conditions, quietly, consistently, and often in the face of considerable challenges, while making a vital contribution to our economy.

From lorry operators to bus and taxi drivers, these professionals spend a considerable portion of their working lives behind the wheel. Long shifts and relentless schedules can seriously undermine alertness, whilst the physical strain of prolonged sitting means fatigue and long-term health concerns rank among their most pressing issues. Delivery drivers face further complications in urban environments, where tight deadlines can push even experienced drivers into rushed decisions on congested streets. Yet perhaps no group faces greater exposure than road maintenance and construction crews, working in live traffic just metres from vehicles travelling at speed.

Fully aware of these risks, Europe is tackling them through a robust framework of effective rules. The Road Infrastructure Safety Management Directive places the physical environment at its heart, ensuring that roads are designed and maintained to minimise risk and eliminate dangerous blackspots. Targeted investment — in safe and secure parking areas, clearer road signs and markings, or better-designed work zones — systematically reduces the hazards drivers and workers face day to day. As roads are increasingly shared with vulnerable users, proven quality standards are being developed to keep these spaces safe for everyone.

The EU has also introduced comprehensive vehicle safety rules. All new lorries and buses must now be fitted with blind-spot detection, collision warnings, emergency stop signals, and driver fatigue monitoring — technologies once considered optional but now rightly deemed essential. EU roadworthiness rules further safeguard drivers by ensuring the vehicles they depend on are mechanically sound and legally compliant also when already of some age. Unannounced roadside inspections encourage transport companies to maintain their fleets consistently, rather than simply preparing for the next scheduled test. A significant focus of these checks is cargo securing: shifting loads remain one of the leading causes of lorry rollovers and driver injuries, and rigorous enforcement here makes a tangible difference.

Technology offers further promise. Advanced driver assistance systems, telematics, and improved communication tools can all contribute meaningfully to safer roads, whilst better traffic management systems based on real-time information contribute to safer driving, including in work zones to the benefit of all, including road crews. Cooperative systems enabling vehicle-to-vehicle and vehicle-to-infrastructure communication to share safety information are also part of our toolbox.

The EU is promoting a safety culture, through driver training focusing increasingly on risk awareness and protection of vulnerable road users, on fully tapping into technological developments as regards vehicle safety, alongside tighter health and safety requirements for obtaining and renewing licences. Beyond legal compliance, employers can foster a safety culture within their own companies. A good number of initiatives have already been taken by the private sector in this regard.

Those who work in and around traffic deserve our respect and protection. By combining robust safety rules, technological innovation, and a collective commitment to road safety, we can ensure that professional drivers, delivery personnel, and road workers return home safely each day. Their wellbeing is not merely a workplace issue — it is a duty for our society as a whole.

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Roads are a dangerous place to work

Millions of people head out on the roads for their work every day, including truck drivers, express courier delivery services, professional tradespeople, field sales reps, and emergency personnel. Many of them also work directly on or beside the road itself, often only a few feet away from the flow of traffic or with only thin barriers to protect them. All these groups face high risks due to the fact that the road is their workplace. Although we have made long-term progress in improving road safety, the measures taken to date have not been enough to bring about a continuing reduction in the accident figures in the context of "Vision Zero."

In recent decades, the importance of our roads as workplaces has increased dramatically in our society. This is particularly evident when looking at how many different groups of people this concerns. In addition to the group you might expect here – professional drivers – this also includes road users whose primary job is not driving per se but who nevertheless have to travel regularly for work, such as field sales reps or maintenance personnel. Similarly, it includes people who work directly on or beside the road, such as road construction workers, garbage collectors, winter road maintenance workers, or those responsible for temporary traffic safety measures. However, it also includes other road users who get involved in work-related crashes. »

Milestones in mobility and road safety

100 • • • 1490 • • • • 1800 • • • • 1850 • • • • 1900

1st Century A.D.

- *The "Cursus Publicus" is introduced under Emperor Augustus as a state-mandated and supervised transportation system for messages, goods, and people.*

1490

- *By order of Emperor Maximilian I, Franz von Taxis sets up the first regular postal route between Innsbruck and Brussels – the start of the European postal service.*

1839

- *First horse-drawn streetcar in Europe.*

1865

- *The "Red Flag Act" comes into force in the United Kingdom, stipulating that every car must have two people in it to drive the vehicle. A third person must walk ahead of it with a red flag to warn others of the vehicle's approach.*

1885

- *In the German Empire, the first statutory accident insurance is introduced – a cornerstone of social security legislation.*

1893

- *The company Carl Benz & Cie. obtains the first known driver's license – a local permit allowing it to test drive its "Patent-Motorwagen" (patent motorcar) in Mannheim, Germany.*

STATEMENT

Technology, rules, consideration for others: the triad to make our roads safe places to work

Patrick Schnieder
MdB, German Federal Minister of Transport

Professional drivers, rescue and emergency personnel, road maintenance workers, and construction workers all have one thing in common: their workplace is the road. They move goods and people from A to B. They're there when we need help. They build and renovate roads, perform repairs, and keep things clean and tidy. By their very nature, these jobs are exposed to the risks of road traffic. Other challenges arise due to the fact that the amount of traffic is constantly rising, employers cannot find enough staff, parcel volumes are increasing, and delivery deadlines are becoming tighter and tighter.

People whose workplace is out on the road are put to the test day in, day out and deserve our highest appreciation. This also includes protecting them. For this reason, the German Road Safety Program up to 2030 is focusing on them, as well as other particularly vulnerable groups such as children and senior citizens. In doing so, we as the German federal government are helping to make Vision Zero a reality. The government has committed itself to this goal in the coalition agreement.

Technology is an important lever that we can pull to increase safety. Systems such as automated emergency braking systems, turning assistants, and blind-spot assistants help to prevent accidents. This also applies to digital solutions such as cooperative intelligent transport systems (C-ITS). When vehicles communicate with one another or the infrastructure, dangerous situations can be detected at an early stage. One example of this is the C-ITS construction site warning system, which was developed thanks to pioneering work in Germany. It promptly informs car and truck drivers about construction sites in real time, which enables them to take corresponding action, prevents accidents, and increases safety. Autobahn GmbH (the German government-owned company responsible for managing the country's freeway network) is the first operator of road infrastructure in Europe to introduce the construction site warning service as part of regular operations.

We are also looking at road work sites as they need to give equal consideration to occupational safety requirements and the safety of road users. The German government has, therefore, developed a guide to help with critical borderline cases.

It is crucial that people follow the rules – they are mandatory regulations that protect everyone's lives and keep everyone safe. This applies in particular to the emergency lane that, according to German law, must be created for the emergency services in a traffic jam – it is a legal requirement! Anyone who fails to comply is breaking the rule and acting recklessly, and must expect consequences.

Consideration for others, paying attention, and a sense of responsibility are what underpin safe and respectful conduct out on the road. The German Federal Ministry of Transport is raising awareness of this in a number of ways, including through the initiatives "Runter vom Gas" (Take Your Foot Off the Gas) and "#mehr Achtung" (#Greater Respect). These initiatives also highlight the particular dangers associated with our roads as workplaces.

The DEKRA Road Safety Report shows how complex things become when our roads are workplaces. It sets out findings, highlights fields of action, and shows the measures we need to take to increase safety. It also makes clear that the worlds of politics, industry, and society all have a role to play in ensuring road safety. The German government is playing its part – to make our roads safe places to work, and to make it safe for everyone to travel from A to B.

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When our roads are workplaces, a key factor is how "open" they are. Whereas traditional workplaces in factories, offices, and workshops have fixed structures, defined responsibilities, and in most cases clear safety measures, road traffic is shaped by many different factors that are difficult to calculate. Adverse weather conditions, high volumes of traffic, technical faults, and the behavior of other road users can all lead to unpredictable and critical situations at any given moment.

Adverse weather conditions mean a high risk of accidents, especially when there is road work.

This is compounded by the fact that time pressure, irregular working hours, monotonous driving situations, a lack of breaks, and high demands on driver performance can cause stress and fatigue. Tiredness is one of the key risk factors in road traffic as it significantly compromises the driver's ability to react and pay attention. Night shifts and long assignments that disrupt a natural sleep–wake rhythm are particularly critical. These types of situations adversely affect the driver's ability to concentrate, but the high demands placed on them in terms of driving the vehicle remain unchanged. This combination significantly increases the likelihood of them reacting in the wrong way and being involved in an accident.

The type of traffic environment varies greatly

It is not just human factors that play a role; technical aspects and the infrastructure also influence safety at work on the road. The condition of vehicles, the quality of the road surface, and the design of traffic routing systems are directly linked to the risk of accidents. Although modern vehicles come with numerous assistance systems that can make driving safer, they must be used correctly and work reliably in order to be effective.

International comparisons also illustrate the significant role played by our roads as workplaces. In many countries, traffic accidents are among the most common causes of fatal workplace accidents. "Work zones" – locations where construction or maintenance work is performed on or beside the road while the flow of traffic continues – pose a particular danger. These areas are characterized by changed traffic routing systems, restricted lines

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1900 • 1910 • 1920

1895

- *Benz & Cie. delivers the world's first bus with a combustion engine to the bus company Netphener Omnibus-Gesellschaft, which uses it for scheduled services between Siegen, Netphen, and Deuz in Germany.*

1896

- *Gottlieb Daimler sells the first motorized truck.*

1902

- *British engineer Frederick W. Lanchester invents and patents the disk brake.*

1909

- *A driver's license that is valid throughout the German Empire is introduced.*

1910

- *The precursor to the current Road Traffic Act in Germany comes into force.*

1912

- *Cadillac develops the first electric front headlamp.*

1914

- *Vehicle manufacturers start to equip their vehicles with rear-view and side mirrors.*

1920

- *In the German Empire, comprehensive occupational safety regulations are laid down in law and expanded for the first time.*

1923

- *The world's first diesel truck by Benz and Daimler.*
- *Knorr-Bremse launches the four-wheel air brake.*

STATEMENT

We need a mosaic made up of both technical and organizational measures

Manfred Wirsch
President
German Road Safety Council (DVR)

Last year more than 370,000 people were injured or killed on German roads. Someone who spends their whole day on the road is more exposed than someone who only drives half an hour to their office. However, the risks arising when our roads are workplaces cannot be expressed as a mere arithmetic example. They are heightened by stress factors such as time pressure and conflicts, and by specific situations. For example, a truck drives into road work without braking. The driver has fallen asleep at the wheel. That has fatal consequences for one of the road workers. Or a police officer closes off a lane to collect parts of a tire. A car driver ignores the closure and the officer must save themselves by diving out of the way.

Vision Zero must apply two-fold here: as a strategy for preventing severe accidents out on the road and as a strategy for ensuring occupational safety. That's why the DVR is called upon as an organization that, like DEKRA, views Vision Zero as a core mission. And as an organization that can draw on the experience of accident insurers and employer's liability insurance associations across all industries.

The DVR has declared "Safety at work on the road" to be a key topic for 2025 and 2026. That was a deliberate decision in order to pool expertise and change people's mindsets – those who work on the roads do not impede traffic, they keep it moving. The fact that DEKRA is also tackling this topic is tremendously valuable. Ultimately, the organization doesn't just collate expertise on a wide range of technical and procedural aspects concerning the world of mobility, it also has its own accident research department, giving it the resources to establish technically sound bases for hazard-based preventative measures.

And there's another key reason why we should go forward together: if we really want to make our roads safer as workplaces, we need a mosaic made up of both technical and organizational measures. To ensure these are actually put into practice rather than remaining theoretical recommendations, we also need expertise, networking, and perseverance.

DEKRA is indispensable in this regard. The people who work on and beside our roads protect the very foundations of our mobility, economy, and day-to-day lives. Supporting them protects us all.

1930 • • • • 1940 • • • • 1950 • • • • 1960

1924

- *Patent (USA) to protect pedestrians: a collision with a pedestrian causes a type of scoop to move upward, designed to prevent the pedestrian from slipping from the vehicle onto the road after the collision and being run over. A net then catches the pedestrian.*

1931

- *In the German Empire, the "Überlandverkehrsordnung" (Overland Transport Regulation) enters into force, setting out the legal differences between passenger and goods transport on roads.*

1934

- *The AEC Roadtrain reaches Australia. In April it undertakes its maiden journey from Adelaide to Alice Springs on unpaved roads. It replaces camel caravans and transports up to 30 metric tons of freight, revolutionizing goods transport in the Australian Outback.*

1936

- *The German company Fried. Krupp Motoren- und Kraftwagenfabrik is the first truck manufacturer to install tachographs as standard.*

1949

- *Series production of the Unimog all-terrain utility vehicle starts.*

1951

- *Periodical technical inspection (PTI) for motor vehicles is introduced in the Federal Republic of Germany; 10 years later the inspection sticker on license plates is launched. The goal of the periodical technical inspection is to minimize the number of vehicles with technical safety defects on the road.*

1952

- *The company Kässbohrer-Setra-Fahrzeugwerke presents the first articulated bus as we know it today, with a wide transition between the front and rear section.*

1959

- *Nils Ivar Bohlin is awarded a patent for a seat belt system combining a lap and shoulder belt.*

»

of sight, and very dynamic driving situations. Even minor mistakes by other road users can have severe consequences.

Another relevant aspect of the roads as a workplace is that the type of traffic environment varies greatly. Different types of road pose different potential hazards. Roads in non-built-up areas are often characterized by high speeds, meaning accidents can be particularly severe. In contrast, built-up areas feature dense traffic, and drivers frequently encounter pedestrians and cyclists. Freeways pose other risks, such as when traffic jams form or when drivers encounter road work. These differences show that any necessary safety measures cannot be a one-size-fits-all solution, and instead always need to be tailored to the respective situation.

Traffic jams of any kind, among other things, cost professional drivers time and test their patience.

Interplay between infrastructure, technology, organizational measures, and personal conduct when out on the road

When considering our roads as workplaces, a fundamental problem is the fact that the actual risks involved are not always visible. This is because many statistical systems do not adequately register whether a journey was private or work-related. As a result, a proportion of the accident statistics remains inadequately documented, which makes it much more difficult to devise targeted prevention measures. It is only when the actual extent of the risks becomes visible that we can develop effective measures for the long term. In this context, a particular problem is also the fact that different data sources are not linked with one another. Information from police accident statistics, company reports, and occupational health examinations is often recorded separately, despite the fact that it could paint a more comprehensive picture if combined.

Another aspect to consider is the fact that modern traffic systems are very complex. Digitalization and connected/networked systems are fundamentally changing our workflows in road traffic. Although sat-nav systems, digital job management systems, and automated driving functions make many tasks easier, they also place new demands on drivers. Employees must process multiple sources of information at the same time and take decisions, all while paying attention to what is happening on the road. For this reason, driver distraction caused by technical devices is one of the biggest challenges to overcome to ensure road safety in the modern world. »

1960 • • • • 1965 • • • • 1970 • • • • 1975 • • • • 1980 • • • •

1960

- *In Sweden, Volvo in particular launches certified safety cabs for trucks.*
- *Coordinated rescue service launched in the Federal Republic of Germany.*

1976

- *The Federal Republic of Germany makes it mandatory for occupants on the front seats to fasten their seat belt.*

1978

- *An experimental safety vehicle is developed at four German universities (until 1982). This concept is designed explicitly for the safety of pedestrians and cyclists.*

1981

- *The first vehicles with airbags are available as standard.*

1984

- *EC Directive 85/3/EEC introduces standardized weight and dimension limits for trucks in order to protect driving personnel and other road users from overloaded and/or unstable vehicles.*
- *The Federal Republic of Germany makes it mandatory for occupants on the rear seats to fasten their seat belt.*

1990

- *THESEUS research project investigating the safety of tanker vehicles.*

1991

- *EU Directive 91/671/EEC obliges EU Member States to make the use of seat belts in vehicles under 3.5 metric tons a compulsory legal requirement.*

1992

- *Germany prescribes the installation of seat belts in heavy trucks. According to the German Road Traffic Act (StVO), the belt also has to be fastened during the journey.*

1995

- *Bosch and Mercedes-Benz introduce the Electronic Stability Program ESP – a braking-based dynamic driver assistance system.*

1997

- *Euro NCAP publishes crash test results for the first time and also rates how well pedestrians are protected in an accident.*

1998

- *EU Directive 92/57/EEC mandates the use of traffic safety measures at road work sites.*

STATEMENT

Sharing responsibility to make our roads safer

Umberto de Pretto
Secretary General
International Road Transport Union (IRU)

Every day, professional drivers and transport workers operate in live traffic environments to keep people and goods moving. Truck, bus and coach drivers, along with inspectors, emergency responders, maintenance staff, and many others, work in and around moving vehicles. For professional drivers in particular, working in traffic is an inherent part of the job. Driving, dealing with breakdowns, vehicle checks, loading and unloading, and interactions with enforcement authorities all have the potential to place drivers in vulnerable positions.

While limited road space and infrastructure shortcomings impact risk, the most dominant causal factor is human behaviour. Improperly trained or certified transport professionals, as well as unpredictable behaviour from other road users, significantly increase the likelihood of accidents. In logistics, studies show that over 85% of truck-related accidents are caused by human error, three quarters of which are due to other road users.

Drivers play a critical role in safety, but road safety is ultimately a shared responsibility. Addressing risks requires a holistic systems approach encompassing people, vehicles, infrastructure and institutions. Transport operators must ensure that safety is fully integrated into operations, vehicle management and training. Road authorities must provide safe, clearly marked and well-designed infrastructure. Policymakers must provide clear rules and consistent enforcement. And all these elements should be underpinned by harmonised and robust international standards, an area that IRU has advocated for, developed and supported for almost 80 years.

A strong safety culture starts with competence and professionalism. High-quality, up-to-date training helps drivers recognise risks, make informed decisions and apply safe procedures when operating in complex traffic environments. Initiatives such as IRU's global network of training academies help ensure that drivers and transport professionals receive harmonised practical training that reflects real-world operating conditions.

For authorities, certification based on objective assessments are equally important. Solutions such as IRU Examiner help them improve the quality, transparency and consistency of driver testing, reinforcing trust in licensing systems and driver certification.

Mobility and logistics operators need to maintain excellence among truck, bus and coach drivers using platforms such as IRU RoadMasters to reinforce best practice, demonstrating that safety is integral to a successful career. Well-maintained vehicles and modern safety technologies such as advanced driver assistance systems, visibility solutions and warning devices also significantly reduce risk for drivers and workers operating near live traffic.

Looking ahead, digitalisation and emerging AI tools are opening new pathways to accident prevention. Connected vehicles and intelligent transport systems can help identify high-risk locations, manage speeds in work zones and reduce exposure time during roadside incidents. When used in line with IRU's guidelines on the responsible use of AI, these technologies support better decision-making by drivers, operators and authorities alike.

Industry, road managers, safety organisations and policymakers must work together to ensure that drivers and roadside workers can carry out their duties safely. At IRU, we remain committed to supporting this collective effort through advocacy, training, professional recognition and practical tools that help develop and reinforce safety standards across the global commercial road transport sector. Because every accident is one accident too many.

1985 • • • • 1990 • • • • 1995 • • • • 2000 • • • • 2005 •

1999

- *All newly registered touring coaches in Germany must have seat belts. If belts are provided, they must also be fastened. In the EU, the use of seat belts becomes mandatory in touring coaches and long-distance buses as from May 2006.*

2001

- *German law states that cell phones may only be used while driving in conjunction with a hands-free system.*

2002

- *European Directive 2002/15/EC on the working time of persons performing mobile road transport activities enters into force.*

2003

- *First rear-end collision warning system is launched in Germany.*
- *EU Directive 2003/59/EC on the initial qualification and periodic training of drivers of certain road vehicles enters into force.*

2004

- *The European Road Safety Charter starts – DEKRA is one of the initial signatories. Many companies from the fields of transportation, logistics, and construction voluntarily undertake to improve safety standards for workers in road traffic.*

2005

- *EU Directive 2003/102/EC on the design of the front end of vehicles for the safety of pedestrians and other vulnerable road users enters into force. To obtain EU type approval for new vehicle types up to 2.5 metric tons, the Directive defines limit values that must not be exceeded if vehicles collide with pedestrians.*

2006

- *EU Regulation (EC) No. 561/2006 on driving time and rest periods for professional drivers in road traffic is published. It introduces standardized rules with the aim of increasing road safety, preventing fatigue, and ensuring fair competition in the transportation industry.*
- *Daimler AG presents the "Safety Truck" equipped with adaptive cruise control, lane assistant, (cornering) stability control, and the Active Brake Assist (ABA) automated emergency braking system.*

A Focus on Companies: WHO and ITF Launch a Global Road Safety Framework

Given the high number of traffic fatalities every year – more than one million worldwide – there is an urgent need to take lasting measures at all levels. The World Health Organization (WHO) has therefore joined forces with the International Transport Forum (ITF) to launch the "Road Safety Assessment Framework" (RSAF), an initiative that focuses specifically on companies and is designed to include them more systematically in efforts to reduce traffic accidents. This is not without good reason, as the WHO states that across the globe, around 400,000 traffic fatalities each year are employees either at work or on the way to work. In industrialized countries, traffic accidents are the most common cause of fatal workplace accidents.

The RSAF is designed to help companies incorporate road safety into their existing occupational safety arrangements, such as through training sessions, codes of conduct, and accident management systems. The RSAF focuses mainly on company employees (business trips, commuting, use of company vehicles, safety measures in the work environment, etc.) as well as service providers and suppliers, particularly in the transportation industry (integrating safety requirements in procurement guidelines, obliging suppliers to uphold safety standards, reporting accidents within the supply chain, etc.).

In order to contribute to the United Nations' goal of halving the number of traffic fatalities by 2030, the RSAF's starting point is a compact report comprising no more than 20 questions. It enables companies to rate their progress using a traffic light system, similar to the WHO Global Status Report (green = best practice, yellow = standard, red = minimum requirement or not yet started). The questions cover aspects including the existence and quality of guidelines, training and communication measures, standards for vehicles and safety gear, and systems for recording accidents and countermeasures.

Those behind the initiative stress that the RSAF is not intended as a static system. It is currently still being tested in pilot projects and refined and improved further together with companies, governments, and stakeholders from civil society. Companies who join the RSAF are required to register on a WHO/ITF platform. Their name, logo, and status are shown there as a demonstration of their public commitment to improved road safety. Companies are also encouraged to invite their suppliers to take part.

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Considering all the above, it is clear that the role played by our roads as workplaces cannot be considered in isolation. Rather, it is a question of the interplay between infrastructure, technology, organizational measures, and personal conduct when out on the road. Simply focusing on technical solutions will not be enough if the general conditions or human factors continue to be ignored.

Given our increasing travel patterns, it is likely that more and more people will head out on our roads in the coming years. At the same time, the need to keep everyone safe in this working environment will remain an ongoing challenge; one that will require us to make constant adjustments and develop new strategies. As a result, comprehensively analyzing the role played by our roads as workplaces is not only crucial to ensure safety at work, it is also required for the sustainable development of our economy, infrastructure, and society as a whole. This report sets out in detail where we need to direct our efforts and what improvements can be made to increase road safety.

2010 2015

2007

- *The ETAC study is published, investigating the main causes of traffic accidents involving heavy trucks.*

2010

- *EU Road Safety Program 2011–2020 with the goal of halving the number of traffic fatalities; the measures are predominantly aimed at those who need to travel as part of their jobs (trucks, buses, delivery services).*

2011

- *Daytime driving lights become mandatory in the EU for all new passenger car models and light commercial vehicles.*

2012

- *Daytime driving lights are also prescribed in the EU for newly introduced truck models (N2/3).*

2013

- *For new trucks and coaches, lane departure warning systems (LDWS) and advanced emergency braking systems (AEBS) become mandatory in the EU – initially only for commercial vehicles with air brakes and a permissible gross weight of > 8 metric tons and air-sprung rear axle(s); as from 2016 they become mandatory for all new commercial vehicle models, and as from 2018 they become mandatory for all new commercial vehicles with a permissible gross weight > 3.5 metric tons.*

2014

- *Daimler AG presents the "Mercedes-Benz Future Truck 2025" on a newly constructed section of freeway 14 near Magdeburg. Thanks to the intelligent "Highway Pilot" system, the truck is able to drive fully autonomously at freeway speeds of up to 85 km/h (~53 mph).*

2015

- *The government of the Indian state of Maharashtra bans the text "Horn OK Please" on the rear of commercial vehicles as it encouraged drivers to honk their horn unnecessarily. The text was originally intended to inform other road users that they should honk their horn before overtaking, particularly as rear-view mirrors were either unavailable or rare.*
- *In the EU, heavy trucks registered for the first time (with a permissible gross weight > 3.5 metric tons) and buses with more than eight seats (other than the driver's seat) must be equipped with an advanced emergency braking system (AEBS) and lane departure warning system (LDWS). For newly type-approved vehicles, this equipment already became mandatory in 2013.*

STATEMENT

How road safety, checks, and training can overcome new mobility challenges

Santo Puccia
Director
Traffic Police Service

Road safety is based on three fundamental pillars: targeted checks, technological innovation, and driver training. Increasing traffic volumes, and in particular the growing number of trucks, pose an ever-greater challenge. To overcome it, we need to intensify our prevention and monitoring/inspection activities. Against this backdrop, the traffic police must adjust the tools and strategies they deploy in order to keep pace with an ever-changing and increasingly complex world of mobility.

To achieve this, digital tools will not only need to be deployed more comprehensively, they will also need to be integrated. Examples include remote monitoring, systems designed to monitor data in real time, and smart tachographs, which enable prompt, targeted interventions in risky situations. Technology has become essential for making checks more effective, targeting our activities more accurately at specific regions, and identifying non-compliant behavior sooner.

If we consider how we are set to move around in future, we see a world characterized by the development of autonomous vehicles, smart roads, and advanced driver assistance systems. As a result, the challenges facing traffic police officers will become ever-more complex. This is a world in which technological innovation is rapidly advancing, meaning we need to constantly update our skill-sets and operational tools in order to ensure safety and effective checks.

However, we cannot assume that the technology alone will be enough. In addition to ensuring equipment is state of the art, it is also essential to invest in continuous training for professional drivers, and in measures to raise awareness among all road users. If we want to create a real safety culture, we will need a greater appreciation of the potential consequences of every action we take. This covers everything from keeping to the speed limit to dealing correctly with driving times and rest periods.

The "Vision Zero" milestone of reducing the number of traffic fatalities to zero by 2050 should also be viewed through this lens. This ambitious goal can only be achieved if we consistently focus on the human factor – the guiding principle must always be to protect lives and keep people safe, with technology acting as an important tool to help us in this endeavor.

The goal of the traffic police isn't just to reduce the number of traffic infringements, it is also to foster collaboration with companies and associations from the sector in order to promote correct, responsible conduct. Following the rules must not simply be considered an obligation, but an ethical decision and part of our shared responsibility; something which is essential to protect all road users, no matter their age and whether they are traveling for work or pleasure.

It is only by pulling together and leveraging the synergy between institutions, companies, and citizens that we will succeed in making our roads safer and more modern – so that they meet the needs of how we move around and how our country develops and grows.

2020 2025

- *A section of the A9 freeway in Germany becomes an official test track for automated and connected driving.*

2017

- *Daimler AG is the world's first truck manufacturer to test platooning technology on public U.S. highways.*

2019

- *Regulation (EU) 2019/2144 (the "General Safety Regulation") is adopted, meaning improved safety for vulnerable road users and the use of driver assistance systems gradually become part of type approval regulations.*

2021

- *In Germany, RSA 21 (guidelines for securing work zones on roads) sets out binding traffic regulations for ensuring safety on public roads (originally released in 1980).*

2022

- *The Mercedes-Benz Drive Pilot is the first system for Level 3 automated driving to be approved for use on regular roads.*
- *In the EU, all new models of vehicles must be equipped with an intelligent speed assistant, fatigue warning system, automated emergency braking system, emergency lane guard assistant, reversing assistant, and tire pressure monitoring system (this then applies to all new vehicles as from July 2024).*

2024

- *The automated emergency braking system becomes mandatory for all newly registered passenger cars and light commercial vehicles in the EU.*

2025

- *100 years of DEKRA.*

DEKRA 100 YEARS

2026

- *The United Nations declares that 2021 will mark the "Second Decade of Action for Road Safety." On July 20 and 21, 2026 a high-level meeting takes place in New York. Improving road safety across the globe remains a pressing challenge as more than 1 million people still lose their lives and up to 50 million people are injured in traffic accidents each year.*

DECADE OF ACTION FOR ROAD SAFETY 2021 - 2030

The risk of accidents is severely underestimated

Our public roads and streets aren't just spaces where traffic can move and people can spend time and live their lives – for many, they are also where they work. Every day, professional drivers, delivery drivers and service workers, road construction personnel, and winter road maintenance workers negotiate an environment that is considered one of the world's most dangerous places to work. Although statistical analyses show that progress has been made in a few areas when it comes to road safety, numerous risks still remain – and official figures do not record many of the journeys made for work purposes in sufficient detail.

According to the World Health Organization, just under 1.2 million people lost their lives on our roads in 2021. Although that marks a slight decline compared with the 1.25 million fatalities recorded in 2010, the UN's declared aim for the "Decade of Action for Road Safety 2011–2020" of halving the number of traffic fatalities by 2020 remained a long way off. In 2016, the number of fatalities even reached a record high of 1.35 million. The global trend shows that although some improvements have been made, they are not enough to compensate for the dynamic combination of rising traffic volumes, increasing urban density, and – not least – the growing number of people traveling for work purposes. The "Decade of Action for Road Safety 2021–2030" has once again set the goal of halving the number of traffic fatalities and severely injured people worldwide by 2030. If we are to achieve it, we will need to make great strides. People who work on the road play a key role in this as they are permanently exposed to a wide range of risks. Unlike a traditional workplace, our roads are an open system subject to numerous factors that influence our safety, be it the amount of traffic, the weather, or the behavior of other road users.

Trend in German accident statistics

In order to assess the accident statistics in the context of our roads as workplaces, it is worth looking at the long-term trend for different types of vehicle. Take Germany, for example: according to the German Federal Statistical Office the number of accidents resulting in personal injury that involved at least one bus rose by 6.2 percent between 2015 and 2024. In contrast, goods vehicles show a decrease of 22.3 percent in the number

of accidents resulting in personal injury. Tractors recorded a fall of 6.7 percent in the same period. By way of comparison, the number of accidents resulting in personal injury that involved at least one car fell by 14.7 percent between 2015 and 2024. This underlines that the trends for commercial traffic sometimes differ from those for general traffic.

Overall, just under 290,100 accidents resulting in personal injury were recorded on German roads in 2024. 7.9 percent of these accidents involved at least one goods vehicle, versus 2.1 percent for buses and 0.6 percent for tractors. In 2024 there were 2,770 road traffic fatalities in Germany, around 50,600 people were severely injured, and just under 314,400 suffered minor injuries. In trucks over 3.5 metric tons, 19 drivers lost their lives while 151 suffered severe and 865 suffered minor injuries. Articulated trucks also recorded 19 driver fatalities, as well as 203 with severe and 862 with minor injuries. Bus drivers were much less affected – one fatality, 48 drivers with severe, and 469 drivers with minor injuries were recorded here. In terms of tractors, ten drivers died, 161 suffered severe, and 399 suffered minor injuries. »

STATEMENT

Crash prevention saves time and money

Lorraine M. Martin
CEO
National Safety Council (NSC)

For millions of workers across the United States, including truck drivers, construction and utility employees, salespeople, and delivery and rideshare drivers, the roadways are their workplace. Unfortunately, it is a dangerous one. Each year over 40,000 people lose their lives on U.S. roads, which remain among the most dangerous of any developed country. American transportation policies have historically incentivized high speeds, encouraged larger vehicles, and prioritized a driver-first mentality, all of which have made people less safe. According to the most recent data, getting on, or near, a U.S. road is among the riskiest things an employee can do, with 37% of all workplace deaths transportation related in 2023.

Roadway safety undeniably is workplace safety. Yet many American institutions, agencies, and experts often focus on one or the other, rarely intersecting or collaborating across the two, reinforcing a false and harmful dividing line. Take the Occupational Safety and Health Administration (OSHA). This governmental agency serves a mission of providing workers with safe working conditions. Yet OSHA has neither regulatory nor enforcement control of roadway safety, which falls under the jurisdiction of the U.S. Department of Transportation and the agencies within it that oversee large trucks, public transit, highway systems and vehicle performance standards.

This means millions of workers who operate cars, vans and small trucks, and who do not require commercial licenses, are unprotected by federal standards on the technology, shift limits, and training requirements that could help keep them safe. With these safety gaps at the federal level, employers must take it upon themselves to lead. What is good for safety is good for business. Crash prevention saves time and money by preventing worker injuries, property damage, higher insurance costs, and reputational destruction.

Fortunately, the tools needed to eliminate roadway and workplace deaths have proven effective for local governments and safety-centered organizations. Intelligent speed assistance, fatigue- and impairment-detection, and other technologies are helping prevent unsafe behaviors. Company-wide distracted driving bans are effective ways for employers to put safety first. A Safe System Approach unites safer vehicles, roads, and road users to ensure mistakes don't lead to deaths.

The tools work – we simply need all employers, agencies and advocates to come together and implement them. That's why the National Safety Council (NSC), a nonprofit with a mission to save lives in workplaces and on the roads, has made it a top priority to connect stakeholders with new technologies, resources and strategies – and with each other – as we strive to eliminate preventable deaths and injuries.

Recent data has shown cause for optimism, with several consecutive annual declines in fatalities. Much work remains to be done, but this is proof that change is possible, only if we act together and enact policies that put safety first. We must continue building on this momentum and working together to make people safer until no one loses their life at work or on the road again.

In the United States, “transportation incidents” are among the most common causes of fatal workplace accidents.

» A key reason for these relatively low figures is the design and weight of the vehicles. Trucks and other heavy commercial vehicles protect their occupants better due to the high seat position and vehicle weight. On the other hand, because there is such a big difference in weight, the other party involved in the accident (such as car occupants, riders of two-wheeled vehicles, or pedestrians) is at much higher risk of severe or fatal injury. This underlines the special responsibility associated with driving a heavy commercial vehicle – not just in terms of driving behavior, but also technical safety standards.

Where the statistics reach their limits

However, it is important to note that cars used for work purposes, vans under 3.5 metric tons, taxis, ridehailing vehicles and rental cars, vehicles used in the construction industry and professional trades, and delivery services (including cargo bikes) are not reported separately in the official analyses. This also applies equally to bicycles and pedelecs. If we consider that many workers use precisely these modes of transport for their jobs, it becomes clear that a significant number of work-related traffic accidents are not specifically visible in the statistics. This means that the actual dangers associated with work-related travel are much higher than is reflected in the official figures. As a result, safety measures, precise data acquisition, and targeted prevention measures will continue to play a crucial role on our roads as workplaces.

Comparison of international workplace accident figures

In the United States, “transportation incidents” are among the most common causes of fatal workplace accidents. This includes incidents involving vehicles, mobile machinery, and other means of transportation. The risk becomes particularly clear in “work zones” – sections of road where construction, maintenance, or supply activities are being carried out. These areas are identified by signs, barriers, or work vehicles and

Accidents at work zones in the USA in 2023

“Work zones”, i.e. sections of road where construction, maintenance, or supply activities are being carried out, pose a particular danger for both the workers and the road users. “Transportation incidents” are among the most common causes of fatal workplace accidents.

176
pedestrians killed at work zones

307
fatalities involving motor vehicles

899
total fatalities at work zones

39,000
injured people at work zones (estimated)

101,000
accidents at work zones (estimated)

Source: 2023 Fatality Analysis Reporting System (FARS) Annual Report File (ARF), National Highway Traffic Safety Administration (NHTSA), U.S. Department of Transportation. As at April 2025.

pose a particular danger for both the workers and the road users.

According to the U.S. National Highway Traffic Safety Administration (NHTSA), several hundred fatalities were recorded annually in such work zones in the USA between 2000 and 2023. Analyses of the traffic accident statistics revealed that the figures fluctuated between 586 and over 1,100 fatalities per year in this period. More recent figures also remain high: in 2023 there were over 100,000 accidents in "work zones", including 899 fatalities in connection with road work sites. The issue not only concerns the road users themselves – the workers are also directly affected. In 2023, 176 people were struck by vehicles as pedestrians in these zones and fatally injured – 40 of whom directly at work.

In other parts of the world, the accident figures also illustrate the risks that our roads pose when they are workplaces. In India, for example, more than 10,000 truck drivers died on the road in 2022. Overall, around 43,700 people lost their lives in an accident with a truck – around a quarter of all traffic fatalities in the country. Even in countries with comparatively high safety standards, studies show that some work-related traffic accidents are not fully recorded in the statistics. In Australia we see another problem: the official statistics only record a fraction of the accidents involving commercial delivery cyclists. For example, a single hospital ER department in Sydney recorded more injured delivery cyclists than the total reported for the entire country over the same period.

The risks vary by road type

The type of road also has a significant impact on the accident risks. In many countries, roads in non-built-up areas are considered the most dangerous routes. They are characterized by higher speeds, overtaking maneuvers where the driver moves into oncoming traffic, and less physical safety buffer, which result in severe or fatal accidents more often. Although freeways have a relatively low risk of accidents relative to the distance covered, the high speeds involved mean that any accidents that do occur can have particularly severe consequences. Typical accidents are rear-end collisions at the end of a traffic jam, or collisions near work zones and with safety vehicles.

In built-up areas drivers usually drive at slower speeds, but this is also where many work-related journeys take place, such as deliveries or service assignments. The dense traffic, frequent stops, and encounters with vulnerable road users also pose particular challenges for road safety here.

Workplace accidents on the road in France

As the annual report "*La sécurité routière en France – Bilan de l'accidentalité de l'année 2024*" published by the French Road Safety Observatory (ONISR) shows, French roads are among the most dangerous places to work in the country. According to estimates, in 2024 around 42 percent of the almost 3,200 road traffic fatalities related to accidents involving at least one road user who was traveling for work purposes. Of these 1,349 fatalities, 549 were themselves traveling for work purposes: 407 were traveling between their home and workplace, and 142 were traveling as part of their job.

Motorized two-wheeled vehicles dominated the fatal work trips, accounting for 40 percent of fatalities in the city and 34 percent in non-built-up areas. Two thirds of the fatalities among riders of two-wheeled vehicles were riding heavy motorbikes. In the city, pedestrians (16 percent) and cyclists (11 percent) were also heavily affected. Outside built-up areas, cars dominated and accounted for 56 percent of fatalities. If we look at those who were traveling as part of their job, vans and trucks each accounted for around a quarter of the fatalities.

According to the ONISR, the causes of the accidents also paint a clear picture. Between 2022 and 2024, 1,062 people were identified as being allegedly responsible for fatal work-related accidents. In terms of people traveling to/from work, excessive speed or a failure to adjust the speed played a role in 27 percent of cases, rising to 40 percent in accidents where nobody else was involved. In the city, inattentiveness occurred particularly frequently, accounting for 22 percent. In terms of people traveling as part of their job, distraction was the dominant factor at 27 percent, rising to 43 percent in the city. In terms of single-vehicle accidents while people were traveling as part of their job, a sudden health problem was the cause in 31 percent of cases.

The ONISR's annual report from 2023 also investigated the use of seat belts in this context. It found that between 2021 and 2023, around 14 to 15 percent of fatalities traveling in cars or vans on their way to/from work were not wearing their seat belt. In terms of people traveling as part of their job, 31 percent of truck driver fatalities were not wearing their seat belt.

People who work directly on or beside the road are at particular risk. Work zones and temporary traffic safety measures bring these workers very close to the flow of traffic. Typical accidents here include workers being struck or run over by the flow of traffic, the unauthorized entry of vehicles into cordoned-off work areas, and collisions with safety vehicles or barrier/signage vehicles. For this reason, any intervention in the flow of traffic requires safety measures based on the Safe System principles: physical separation, speed management, and clear visual guidance.

All these facts clearly show that when it comes to our roads as workplaces, we need to pay more attention, use better protection systems, and realistically capture work accidents on the road. The actual risks involved must be made visible; only then can political decision-makers, companies, and society take effective measures to make "Vision Zero" achievable in the context of work.

"DocStop" provides rapid medical assistance in an emergency

A very special campaign that, so far, is unparalleled in Europe: "DocStop" is an initiative that was first launched in Germany in 2007 with support from various organizations, including DEKRA. It aims to make a lasting contribution to greater road safety and to the safety of bus drivers and professional drivers in the transportation industry when they are at work.

It all started from the founders' belief that, if drivers suffer a health problem out on the road, their access to immediate professional medical assistance must be ensured as the self-medication solutions that are so often used in these situations are frequently inadequate or can even be risky. The goal, therefore, was to build up a structured and low-threshold healthcare system along the main traffic routes in Europe so that drivers can obtain immediate assistance for any health problems.

Starting in Germany, a close-knit network has been built up over the years with a view to ensuring that health issues do not end up causing an accident. Today, more than 700 doctors' offices and medical centers as well as rest stops, truck stops, and truckage companies are part of the initiative, acting as ports of call along freeways and the main transport axes. The DocStop points are recognizable by the green and blue DocStop logo. Drivers can also call the free hotline 008000-3627867 to obtain details of suitable doctors' offices and medical centers located nearby where they can obtain treatment and – provided they are medically fit to do so – continue driving after receiving the necessary healthcare. After all, only healthy drivers can drive safely and pose no risk to themselves or others.

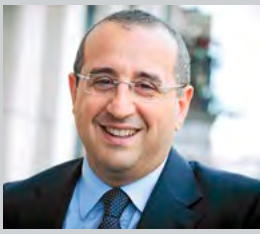
In addition to the network itself, the initiative has now been expanded to include a module called Teledoc. If drivers have health complaints, this telemedical service enables them to obtain an initial medical consultation promptly, no matter where they happen to be. Digital communication channels are used to answer medical questions, recommend what to do, and – if necessary – coordinate any subsequent treatment steps. As a result, the medical assistance is provided even faster, is more flexible, and is available over a wider area.

The Europeanization of the initiative is now complete. Multiple countries such as Germany, France, and Austria now have an established, structured network of DocStop points. In addition, medical assistance is guaranteed in other European countries via a 24/7 hotline. It provides advice, coordinates matters, and handles medical communications in all established national languages, ensuring that professional assistance can be arranged at any time right across Europe.

DocStop is committed to improving the medical care available to drivers of trucks and buses while they are out on the road.

STATEMENT

Work-related road safety is not a niche concern



Antonio Avenoso
Executive Director
European Transport Safety Council

Work-related road safety remains one of the most significant and under-recognised challenges for road safety across Europe. Every year, thousands of people lose their lives in collisions that occur in the course of work or while commuting. Yet, despite this heavy toll, the true scale of the problem remains largely hidden due to gaps in data collection, fragmented reporting and the absence of a common European definition of what constitutes a work-related road collision.

The ETSC Road Safety Performance Index (PIN) Flash report, Tapping the potential for reducing work-related road deaths and injuries (2025), offers a comprehensive update on this topic. Drawing on new data from 32 PIN countries, it highlights where progress has been made, where gaps persist, and how governments, public authorities and employers can act to save lives.

According to Eurostat data, around 2,922 work-related deaths occurred annually in the EU over the period 2020-2022, with about 43% of these in the transport sector, including road, rail, water and aviation. However, these figures likely underestimate the true burden due to incomplete and inconsistent reporting systems across countries.

Where national data exist, they reveal stark variations: in France work-related road deaths account for around 42% of all road deaths, 29% in Ireland, 16% in Italy and about 10% in Germany. These figures depend on differing national definitions and data sources, underscoring the need for harmonised data collection across Europe.

Work-related road deaths encompass a wide range of road users. These include professional drivers, workers on or near the road such as maintenance and collection crews, professional travellers driving on behalf of an employer, and commuters travelling between home and work. Collisions involving these groups often reflect elevated risks from long working hours, fatigue, time pressure and inadequate consideration of road risk within occupational safety frameworks.

One of the core findings of the report is the urgent need to align road safety with occupational safety and health (OSH) systems. Currently, only 20 out of 32 PIN countries have a national definition of a work-related road collision, and fewer than half include a “purpose of journey” field in police reports. Data collected by police, employers and OSH authorities are seldom linked, leaving significant gaps in our understanding of work-related road deaths.

Harmonised, comprehensive data are essential not only to reveal the true extent of work-related road deaths but also to target prevention more effectively. The report urges governments to adopt national and EU-wide definitions of work-related road collisions, integrate data sources, and mandate reporting by employers and employees alike.

Prevention measures with proven potential include integrating road risk into occupational risk assessments, adopting the ISO 39001 Road Traffic Safety Management standard, and embedding Safe System principles in fleet management. Public authorities must also lead by example by procuring safe vehicles for government fleets and incorporating road risk management into procurement and employment policies.

Work-related road safety is not a niche concern. It is central to Europe’s Vision Zero goal of eliminating road deaths and serious injuries by 2050. Recognising driving for work as a shared responsibility among public authorities, employers and individuals is essential to building a culture of prevention both on and off the road.

ETSC Publication
"Tapping the potential for reducing work-related road deaths and injuries"

Other road users often only notice the siren of approaching emergency vehicles late, or do not notice it at all.

Emergency personnel are at high risk of an accident when out on the road

Members of the police, fire service, rescue services, and other blue-light organizations are exposed to particular dangers when deployed out on the road. This applies not only to the journeys they make under blue lights, but also to the work they perform at the scene.

Driving under blue lights is considered one of the most dangerous parts of the day-to-day working lives of the police, fire service, and rescue services. While the blue lights and siren instruct other road users to get out of the way, the emergency personnel themselves have to perform a delicate and very risky balancing act: seconds can make the difference between life and death at the scene, but driving fast and taking risks on the road also dramatically increase the risk of an accident. Although the blue flashing lights and siren tell other road users that the emergency services have special privileges on the road, they cannot override the laws of physics. Many collisions happen because other road users incorrectly judge the situation or do not notice approaching emergency vehicles until it is too late.

In many cases, accidents that occur when driving under blue lights are caused by several factors coming together. For example, if other road users feel overwhelmed or unsure of what to do when an emergency vehicle approaches, this can cause them to react in dangerous ways. At the same time, driving under blue lights places high demands on the person behind the wheel. Time-critical missions, very dynamic driving, and the need to assess traffic situations under very high decision-making pressure all increase the likelihood of misjudgments and, in turn, critical situations. In addition, secondary tasks relating to the mission – such as having to communicate via radio, take in information shown inside the vehicle, or mentally prepare yourself for what you are about to find at the scene – can all absorb the driver's attention and further increase their cognitive load. On the other hand, modern motor vehicles are equipped with increasing amounts of noise insulation, which also affects drivers' ability to notice acoustic warning signals. In particular, other road users often only notice the siren of approaching emergency vehicles late, or do not notice it at all.

Against this backdrop, driving under blue lights necessarily requires emergency personnel to reconcile conflicting goals: reaching the scene as quickly as possible on the one hand, while also ensuring safe driving on the other. General legal and organizational conditions, expectations of fast arrival times, and mission-related priorities all create a great sense of urgency and pressure to act, which then significantly affects the decisions made while driving. As a result, drivers of emergency vehicles may deliberately accept certain risks such as driving at high speed, making daring overtaking maneuvers, or crossing unclear intersections too quickly. Empirical studies show that, in particular, general mission-related conditions together with the drivers' specific driving behavior have a significant impact on the accident statistics. Moreover, the vehicles used by the rescue services are often driven by relatively young and inexperienced drivers, which can further increase the risk of accidents.

STATEMENT

On the importance of ERGs, uniform disable mechanisms, and standardized responder information

Kurt Vollmacher
Independent Expert New Energies
Project leader worldwide standardization of responders' information (ISO 17840)
Owner Energy Safety

As vehicle technology accelerates – bringing high-voltage systems, autonomous features, alternative fuels, and increasingly complex electronic architectures – the challenges for first and second responders grow equally complex. In this landscape, clear, uniform, and authoritative safety information is indispensable. For quick access during the first seconds of an emergency, responders rely on the Rescue Sheet, which provides the essential information needed to begin initial actions safely. But beside the Rescue Sheet, the Emergency Response Guide (ERG) is the mother of all information – the comprehensive, detailed, and authoritative document on which all operational decisions must ultimately rely.

To fulfill this role, the ERG must be standardized, structured, and fully aligned with ISO 17840. However, experience has shown that many manufacturers still deliver uneven content across the ten defined chapters, lacking consistent structure, standardized symbols, and sufficiently clear illustrations. This inconsistency creates risk in emergencies where responders cannot afford uncertainty. A crucial requirement is that every ERG in PDF format must contain quick-access links to the ten ISO 17840 chapters, allowing responders to jump instantly to the needed information – hazard identification, vehicle immobilization, disable procedures, fire considerations, and post-crash measures.

Equally critical is the adoption of a uniform vehicle disable mechanism across all vehicle categories and propulsion types. Responders must clearly understand what systems remain energized, what hazards remain active, and precisely what must be disabled to create a safe operational environment. A standardized disable process, consistently documented and aligned with ISO 17840, will dramatically improve responder safety. To ensure that responders always have access to the latest version of the ERG, the manufacturer's website must serve as the harbor for the ERG – a predictable, permanent, and universally recognized location where the most up-to-date document is always available.

Furthermore, ISO 17840 must continue to evolve with vehicle technology, enabling regular updates, new symbols, and improved terminology ensuring global consistency, clarity, and interoperability. Responder safety depends on clarity, uniformity, and immediate access to trusted, ISO-aligned information. Whether dealing with electric vehicles, hydrogen systems, heavy trucks, buses, or conventional platforms, responders must never be left guessing. The Rescue Sheet gives them the fast essentials – but the ERG remains the mother of all information, the foundational guide for safe and informed actions.

For these reasons, I strongly emphasize the necessity of treating the ERG as the central authoritative reference, ensuring its full standardization under ISO 17840, providing PDF quick links, hosting it reliably on manufacturer websites, and adopting a global uniform disable mechanism for all vehicles.

Different qualification and training standards

Different countries have taken different approaches to the qualifications expected of drivers of emergency vehicles with special privileges on the road. Most notably, these differ in terms of their binding nature, the standard of the training provided, and the legal framework. One popular approach is based on legally enshrined special privileges, without requiring the driver to obtain an additional qualification. Their permission to use special privileges comes directly from the road traffic regulations in that country. A standard driver's license for the relevant vehicle class is enough to meet the formal requirements.

In many cases, organizations compensate for the lack of a legal qualification system by providing their own internal trainings. However, there are big differences between those in terms of their scope, quality, and binding nature. The "compulsary internal training" model is popular in countries such as Austria that do not have a state-regulated additional qualification. Here, the police, fire service, and rescue services develop their own training programs which include theory modules on the basic legal principles, risk assessment, and tactical approaches, as well as practical driver training. With this model, both the organization and the drivers assume the core responsibility for the quality of the training and for ensuring safety when driving under blue lights.

A more standardized approach – and greater road safety – is offered by systems that have a state-regulated additional qualification, such as in Norway. The training typically covers aspects such as the laws of physics as they apply to driving, high-risk situations, stress management, and legal responsibilities. Lastly, countries such as Spain have opted for a model where the ability to drive under blue lights forms an integral part of the necessary professional qualification. A driver's license alone is not sufficient – only qualified drivers with the appropriate certificate are allowed to drive under blue lights.

A dangerous job: when rescue personnel themselves are involved in an accident

The provision of medical assistance in a moving ambulance and the unpredictable nature of the traffic on the road together make for a risky combination. While the medical staff attending to the patient in the back are often unsecured, the vehicle itself remains fully immersed in the flow of traffic. At the same time, data from the U.S. shows that a significant proportion of fatal accidents involving emergency personnel do not occur during the journey, but rather directly at the scene.

For rescue personnel, it's not just the journey to the scene under blue lights that poses significant risks, their duties outside the vehicle do as well.

Despite having special privileges, emergency vehicles (such as those used by the rescue services) negotiate an environment where unpredictable situations could occur at any given moment – and where the emergency personnel themselves only have limited protection. While ambulances are transporting patients from the scene, they remain fully immersed in the flow of traffic and continue to be exposed to the risks associated with their special privileges – particularly if they need to get somewhere urgently. At the same time, complex medical treatment is often being provided in the back, which places high demands on the medical staff, materials used, and freedom of movement required and significantly increases the risk of injury, particularly in the back.

For example, studies show that medical staff in an ambulance are often not wearing a seat belt while they are attending to their patient. Various studies from the USA confirm that restraint systems in the back of an ambulance are only used consistently in rare cases: only around 3 percent of emergency personnel stated that they always fastened their seat belt while transporting the patient, while more than a third stated that they never use a seat belt when on emergency response. According to the respondents, the main reason for this was that the belt systems used in ambulances significantly restrict them in providing the necessary medical treatment, particularly in the case of critically ill or severely injured patients.

On the other hand, the use of seat belts by occupants on the front seats was much higher, at around 70 to 80 percent. However, this level is also not high enough. The ambulance driver is under particular pressure while transporting the patient: they alone are responsible for driving the vehicle, must observe what is happening on the road, and simultaneously keep an eye on what is happening in the back. In most cases, there is no support from a second person in this phase – e.g., help with monitoring traffic, handling radio communications, or assessing dangerous situations. This additionally increases the cognitive load and, in turn, the risk of an accident.

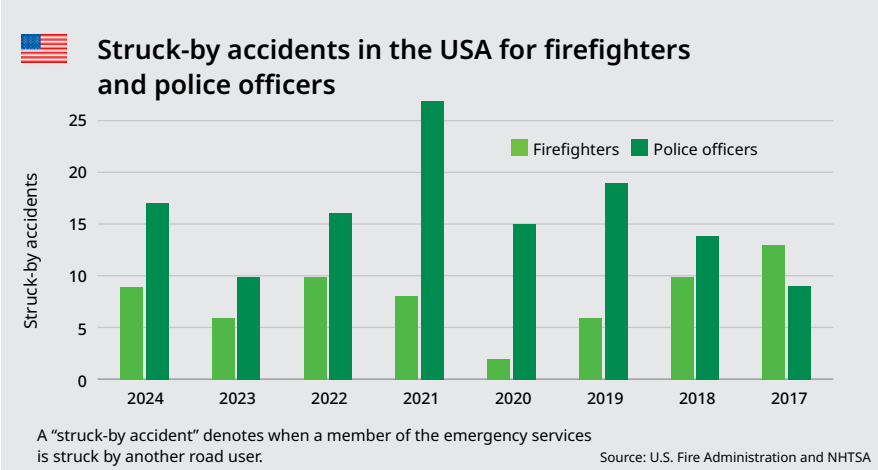
Accidents at the scene

In addition to the risks arising during the journey, we also need to consider the risks arising at the scene itself once the emergency personnel arrive. Data from the United States shows that a significant proportion of fatal traffic accidents involving police officers or firefighters do not occur during the journey, but rather at the scene itself. Around a third of the emergency personnel killed on the road lose their lives because they were struck by other road users at the scene. These "struck-by" accidents typically occur when securing the accident site, managing traffic, or working in the immediate vicinity of the flow of traffic.

If we compare the figures for firefighters and police officers in the period 2017 through 2024, we see that many more police officers lost their lives in struck-by accidents. During this period, around twice as many fatal events of this kind were recorded for police officers as for firefighters. However, this difference is essentially down to the fact that police officers have different responsibilities and are much more involved in managing the situation on the road, particularly traffic

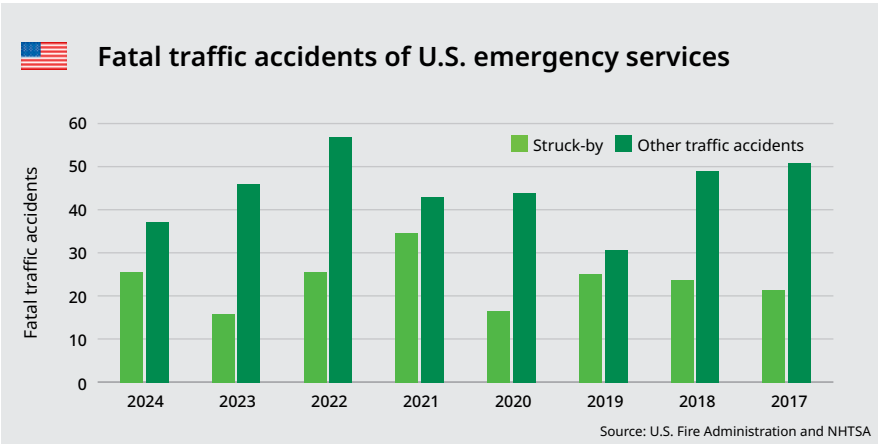
checks, recording the accident, and scene-specific measures to handle the flow of traffic.

Overall, traffic accidents are one of the most common causes of fatal work accidents for emergency personnel in the United States. Looking at police officers, around 30 percent of fatal work accidents are traffic accidents, which is roughly the same proportion as fatalities caused by the use of firearms. Looking at firefighters, around 22 percent of fatal work accidents result from traffic accidents. The results underline that it is not just the journey under blue lights that poses considerable risks for emergency personnel, their duties outside the vehicle do as well, and that the conduct of other road users is a key risk factor.



A "struck-by accident" denotes when a member of the emergency services is struck by another road user.

Source: U.S. Fire Administration and NHTSA



Source: U.S. Fire Administration and NHTSA

Work safely while moving around freely

In Germany, the Road Traffic Act (*Straßenverkehrsordnung*) states that ambulances must stop their journey if medical staff have to stand up to stabilize the patient. The journey cannot resume until the staff have finished providing the medical treatment. However, this is very difficult to do in practice, as valuable time would be lost in the race to transport the patient to hospital as quickly as possible. For this reason, emergency doctors often work standing up – which puts them at significant risk if the ambulance has to brake suddenly or take evasive action.

One solution to this problem could be an innovative belt system which is being developed under the academic supervision of HTW Berlin University of Applied Sciences. This belt system is called the "Body Acceleration Inhibitor" and is designed to stabilize emergency personnel who are standing up while the ambulance is moving. It is mounted above the head in front of the stretcher and enables the staff to move around freely without being unsecured. In future, it would also be conceivable to mount it at the side via a rail system to give the staff even more freedom to move around.

Emergency doctor in the meshed belt (left) and installation of a 50th percentile dummy in the meshed belt at the head of the stretcher.

HTW Berlin is investigating the system using vehicle crash tests and biomechanical simulations in order to record the real loads exerted on the human body. The "Body Acceleration Inhibitor" is made by a German industrial company and the aim is to have it approved during 2026. If the approval proceeds as planned, the system could soon be used in ambulances right across Germany and, therefore, play an important role in ensuring the safety of those who work under huge pressure to save lives every day.

Accidents involving dangerous goods

In many countries, the transportation of dangerous goods plays a fundamental role in industrial value chains and supply infrastructure. Most of these goods are transported by road.

When transporting dangerous goods, many different precautions have to be taken, such as using the best possible containment systems for the goods and securing the cargo correctly. Ultimately, any release of substances following an accident can have a huge impact on human health, the environment, and critical infrastructure.

In the EU, accidents when transporting dangerous goods occur relatively rarely compared with the general accident statistics for transporting goods by road. In Germany, for example, the Federal Highway and Transport Research Institute (BASt) stated that a total of 34,822 goods vehicles were involved in an accident in 2024 – only in 175 cases did dangerous goods play a part. These statistics do not include accidents that occurred when loading and unloading the vehicle, as these processes are not classed as road traffic in the traditional sense. Nevertheless, time and time again we see how important it is to handle dangerous goods carefully, particularly during these processes.

The low number of recorded accidents involving dangerous goods is essentially due to the high technical, organizational, and legal requirements laid down in dangerous goods regulations, which are designed to prevent harmful events. In 55 countries in Europe and far beyond, the transportation of dangerous goods by road is subject to the ADR regulations. The low rate of accidents also illustrates how effective the dangerous goods regulations are. They are geared toward

Responding quickly and carefully is essential when dealing with accidents involving dangerous goods.

ADR = **A**ccord européen relatif au transport international des marchandises **d**angereuses par **r**oute (European Agreement concerning the International Carriage of Dangerous Goods by Road)

Regulations for transporting dangerous goods

Today, the ADR is valid well beyond the borders of the European Union and is applied by numerous countries in Europe and neighboring regions, such as Asia or Africa. As a result, despite some national differences in how the implementation of the regulations is organized, ADR signatory countries help to ensure a high common level of safety.

Even countries where the ADR does not apply, such as the USA or Brazil, have national regulations governing the transportation of dangerous goods which stick closely to international standards in terms of their aims and commitment to safety. They are often based on the UN Model Regulations and are supplemented by mandatory training, exams, and regular refresher courses.

International technical dialog between ADR countries and non-signatory countries helps to improve and enhance tried-and-tested safety concepts and ensure that the level of safety for the global transportation of dangerous goods is as standardized as possible.

improving safety during the transportation of dangerous goods as part of a continuous, multi-stage process.

To achieve this, the ADR regulations for road traffic are updated in a two-year cycle. Although this process is very laborious from an organizational and administrative point of view, it ensures that technical developments, new findings from accident statistics, and scientific assessments are incorporated promptly into the regulations.

In addition, Section 1.8.5 ADR states that severe accidents or incidents when transporting dangerous goods must be reported if defined damage thresholds are exceeded. When evaluating these reports, the aim is expressly not to clarify who was at fault or should assume liability, but rather to systematically analyze the accident statistics. The goal is to identify the causes and main triggers of accidents in order to derive preventative measures and continue developing and improving the dangerous goods regulations. Moreover, the reports are forwarded to the relevant working group at the UNECE (Working Party on the Transport of Dangerous Goods – WP. 15), which coordinates the international regulations of the ADR. This ensures that national findings are incorporated into the regular review and harmonization of international dangerous goods regulations.

Special requirements apply for the training of dangerous goods drivers

The ADR also stipulates that anyone involved in transporting dangerous goods must be trained for their tasks and responsibilities – this therefore also includes the vehicle drivers and crew members as well as the dangerous goods safety advisers. This training not only aims to ensure that the individuals carry out their duties safely, it is also designed to strengthen their self-protection capabilities and ensure they take appropriate measures in the event of an incident, in order to prevent or minimize the dangers for people, the environment, and material assets.

The nature and scope of the qualifications required depend on the quantity and hazard potential of the dangerous goods being transported, and on the type of transportation. If the vehicle is only transporting small quantities which fall below the release limits in the ADR, it is generally sufficient to simply instruct the driver accordingly. This instruction must ensure that they are familiar with the fundamental dangers, the necessary safety measures, and the steps to take in an emergency. However, as soon as larger quantities of dangerous goods are being transported, or if goods are being transported in tanks or in bulk, it is essential that the driver has a valid ADR training certificate.

The training system is standardized in the ADR and is recognized and implemented by all of the current 55 ADR signatory countries. As a result, drivers who have completed the necessary training can also be deployed across national borders. The ADR training certificate is valid for five years and must be renewed at regular intervals. To do so, the driver must complete a refresher training course and pass the exam again before the certificate expires. This ensures that they always stay informed about the latest legal requirements and safety standards.

Types of ADR training certificate

Different additional qualifications may be required depending on the specific circumstances.
Examples include:

- **Basic course:**
  basic requirement for all drivers who transport dangerous goods that require special labeling.
- **Advanced course for tanks:**
  required in addition to the basic course for drivers who transport dangerous goods in permanently installed tanks or in special tank systems for gases (battery/MEGC vehicles).
- **Advanced course for Class 1:**
  for explosive substances and objects.
- **Advanced course for Class 7:**
  for radioactive substances.

When size becomes a risk

Tractors and agricultural machinery are involved in severe and fatal accidents more often than other types of vehicle – and many of these accidents could have been prevented. The causes range from inadequate technical equipment and poor visibility to typical risky situations such as turning off, crossing the road, or trips made during the harvest season.

Most severe accidents involving tractors and agricultural machinery occur outside built-up areas.

Tractors are an indispensable part of modern agriculture, but they also pose a particular safety risk on our roads and when driving along dirt tracks and through forests. International accident analyses confirm an above-average number of severe and fatal collisions, in particular with older vehicles that have inadequate technical equipment and when turning off or crossing the road outside built-up areas. Analyses of data from Europe and the USA clearly show that many of these accidents could have been prevented with better technology, regular maintenance, and targeted preventative measures. As such, urgent action must be taken by stakeholders from the worlds of agriculture, politics, and road safety.

If we look at the situation in Europe, it becomes very clear just how closely the risk of accidents is linked to the age of the vehicle. An analysis of the EU database CARE shows that almost 70 percent of fatal accidents involve tractors that are more than twelve years old. Modern vehicles have much better active and passive safety systems, which reduces their risk of accidents per working hour by around 80 percent. The findings are clear: the older the vehicle, the greater the risk – and the more urgent the need for maintenance, retrofits, or replacement.

Italy shows how drastic the consequences can be if a tractor has missing or defective safety equipment. Between 100 and 150 people die there every year in tractor accidents – there were over 1,400 fatalities in total over the space of just eleven years. One particular noteworthy finding is that more than half of these accidents are caused by the vehicle tipping over or overturning – in many cases these vehicles did not have rollover protection fitted. Three quarters of fatal accidents do not occur on public roads, but rather in fields and on tracks. The victims are often over 50 years old. The data clearly illustrates that simple technical measures such as rollover bars and seat belts could save hundreds of lives.

Also in the Netherlands, we see a recurring pattern: although the number of accidents resulting in personal injury is falling, the number of fatal accidents remains constant. Trips made outside built-up areas and in the dark are particularly dangerous. Two thirds of all accidents occur between April and October, i.e., when a lot of agricultural work is carried out. The most common secondary parties involved in such accidents are cars, followed by bicycles and mopeds. Technical shortcomings such as restricted visibility due to farming attachments, inadequate lights, or sharp edges play a major role. A further factor is an inadequate awareness of the risks involved, particularly among young drivers.

Combination of technical, driver-related, and infrastructure shortcomings

An Austrian study of fatal tractor accidents in 2019 revealed a particularly drastic finding: rollover protection and seat belts could have prevented the fatality in 85 percent of cases. Most of the accidents occurred on dirt tracks and forest roads; only a small number were on public roads. The study underlines the huge potential of technical safety systems – and how fatal it can be if they are not fitted.

In Sweden, more than 2,500 accidents with tractors were recorded over a period of 14 years. Each year there were an average of seven fatalities and over 180 people injured. One noteworthy finding was that

in 80 percent of cases, it was not the tractor driver themselves who was injured, but rather the secondary party involved in the accident – usually a car driver. Most severe accidents occur outside built-up areas, in daylight, and in good weather conditions. Young drivers cause an above-average number of single-vehicle accidents, which indicates a lack of experience and an inadequate awareness of the risks involved.

We also have comprehensive data available from the USA. A study from Ohio shows that turning off to the left is one of the most dangerous situations for tractor drivers there – particularly when other road users are overtaking. At night, the number of rear-end collisions increases dramatically. Extra-wide vehicles and inadequate turn signals/flashing beacons also increase the risk. Most accidents occur in daylight, which shows that the main problem is not poor visibility, but rather conflict-heavy traffic situations.

A German study that analyzed 905 accidents came to a similar conclusion. Two thirds of accidents occur in non-built-up areas, and almost 90 percent in daylight. In most cases the secondary party involved in the accident is a car, followed by motorized two-wheeled vehicles and bicycles. The most common types of accident are accidents when turning off, joining, and crossing the road, and collisions in longitudinal traffic. The main causes attributable to the tractor driver are mistakes made when turning off, turning around, or reversing, as well as ignoring the rights of way. The main causes attributable to the secondary party involved in the accident are overtaking mistakes and a failure to adjust their speed. In more than a quarter of relevant cases the turn signal was faulty, difficult to see, or not activated – a small detail with a big impact.

Stakeholders from the worlds of politics, agriculture, and road safety therefore have a clear mission: to promote the use of modern technology, retrofit old vehicles, improve infrastructure, and train drivers. This is the only way to bring about long-term improvements in safety for tractor drivers and all other road users.

Measures to reduce accidents involving tractors

Measures by drivers

- Consistent compliance with accident prevention regulations by tractor drivers
- Driver safety training for tractor drivers
- Making all road users more aware of the particular dangers posed by tractors on the road

Technical measures

- Functioning lights and turn signals (including on trailers and farming attachments)
- Regular maintenance and cleaning
- Installation of rollover protection equipment and use of seat belt
- Mirror and camera systems (robust design)
- Only using farming attachments according to the manufacturer's specifications

Infrastructure measures

- Using separate agricultural roads (if available)
- Better visibility at intersections (including for dirt tracks)
- Ban on overtaking, speed restrictions, and hazard signs highlighting the presence of agricultural traffic in high-risk locations

STATEMENT

Road safety is a shared responsibility

Estelle Balit
Interministerial Delegate
Directorate for Road Traffic Safety

Year after year, work-related traffic risks remain one of the main causes of fatalities at work in France, accounting for around a third of deaths. In 2024, 549 people lost their lives when traveling between their home and workplace or traveling for work purposes. Tens of thousands of instances of personal injury are recorded every year, which have a significant impact not just on the employee, but also our society and economy as a whole. These accidents cause 5 million sick days per year, with each injured person out of work for an average of 89 days.

These figures remind us of something that is often forgotten: our roads are also workplaces. In order to improve road safety, we must not only consider "traditional" factors influencing accident figures, but also aspects relating to the world of work. When analyzing which fields of action could help us create a safer environment, we need to look at things like planning rest periods when organizing deliveries, ensuring vehicles are regularly maintained, and refraining from telephone calls when employees are traveling for work purposes. Employers, therefore, play a crucial role in all this. They can create a company culture which gives road safety the importance it deserves. Traffic risks in a work context are closely linked to whether the company engages with this topic or is not interested in it.

In a context where we are traveling more and more, using increasingly varied methods of transport, and are seeing a fundamental change in our working world, it is clear that we need to pay more attention to such risks. The state is taking concrete measures to play its part: the introduction of a special prevention-focused platform (www.enroutepourlaprevention.pro) in 2025 which gives companies and HR managers practical tools for structuring their internal processes; strengthening the Charter of 7 Commitments for Safer Roads which has now been signed by over 3,800 employers and covers around 5.5 million employees; and targeted campaigns in specific sectors to help SMEs and industry with the implementation of suitable measures.

Road safety is a shared responsibility. It affects us all equally: government agencies, employers, and employees. So let's join forces to achieve our goal!

Risks of an accident with bicycles and pedelecs

Whether it's post, parcels, or food deliveries, bicycles and pedelecs are increasingly also being used for work purposes, particularly in cities. However, a special analysis for Germany by the German employer's liability insurance association for transportation, postal logistics, and telecommunications (BG Verkehr) shows that this trend can now also be seen in the accident statistics. According to its findings, bicycles and pedelecs together are now involved in workplace accidents on the road more frequently than heavy trucks. The special analysis was published in February 2025. To obtain the data, BG Verkehr recorded notifiable workplace accidents and accidents while on official travel that its policyholders were involved in on the road. It did this on a random basis for the period July 2022 through June 2023.

Once the data was extrapolated, 7,650 of these types of accidents had occurred, of which 6,388 were classified as minor accidents without the need for hospital admission as an in-patient. There were also 1,220 severe and 42 fatal accidents. At 31 percent, cars made up the lion's share of the accident statistics. Second place was occupied by bicycles and pedelecs, which together accounted for 23 percent of accidents. Trucks over 7.5 metric tons were involved in 22 percent of accidents, followed by small vans up to 3.5 metric tons (11 percent) and buses (6 percent). According to BG Verkehr, one particularly noteworthy finding for bicycles and pedelecs was the high number of single-vehicle accidents – like the rider falling off or coming off the road. Across all industries, single-vehicle accidents made up 34 percent. In industries that use bicycles and pedelecs, the percentage was much higher: for example, of the 643 accidents from the food delivery sector, 583 cases involved bicycles or pedelecs. Of these, two thirds were single-vehicle accidents.

“Waiters on wheels” and the associated challenges

Courier and delivery riders transport orders from suppliers to customers’ homes. This could be anything from ready-made dishes from restaurants to groceries from places like supermarkets. All orders are handled via an app. When their shift begins, the riders must log in at certain points within their delivery zones. The couriers are distributed based on forecasts. Jobs are allocated based on the rider’s location, which is transmitted by GPS signal.

Working as a rider is considered a “low skill level” – i.e., an activity that does not require any specific qualifications or education. Multiple studies have shown that low wages are a cornerstone of the business models in the sector. The riders usually have no access to the basic pillars underpinning industrial relations as there are barely any co-determination structures under industrial constitution law, and also no collective labor agreements. The workers sometimes use their own equipment (car, bicycle) and are not paid while waiting for jobs. This work certainly can be classified as piecework as the riders have to meet tight deadlines to complete a job.

The riders’ work is constantly monitored via the app. Many of them consider this to be a burden, and it adversely affects factors such as job satisfaction and how much they identify with their work. In addition to the mental strain, those affected also report physical symptoms such as back problems, pain in the knee joints, or abnormal sensations in the hands.

In a study, two thirds of the riders surveyed confirmed that road traffic was a bothersome source of noise. This is associated with stress reactions – according to the German Social Accident Insurance association (DGUV) this can cause headaches, weariness, muscle tension, sleep problems, impaired hearing, ringing in the ears, cardiovascular problems, and digestive problems. In addition, the riders are exposed to a specific accident risk as the faster their delivery, the better their ranking and likelihood of getting jobs. However, faster deliveries are always associated with an increased risk of accidents.

Accident Statistics: the facts at a glance

- **Although the number of road traffic fatalities worldwide has fallen slightly compared with before, long-term goals for reducing it are not being achieved. Our increasing travel patterns and greater urbanization often offset progress made in terms of safety. For employees who work on our roads, this means they are permanently exposed to a high level of risk.**
- **Thanks to modern assistance systems, heavy commercial vehicles provide an ever-increasing level of protection for their occupants and other road users. However, the risks associated with their inevitable higher weight remain.**
- **Many occupation groups such as delivery drivers, professional trades, or taxi drivers are not recorded separately in official statistics. Bicycles and pedelecs used for work purposes are often not recorded in full either. As a result, a large proportion of the true accident statistics remains invisible. This means the real risks associated with work-related travel on the road are much higher than official figures show.**
- **In non-built-up areas, severe accidents occur more often due to the high speeds. While built-up areas have more traffic, it moves more slowly; there are other risks to contend with, such as conflicts with pedestrians. Freeways are relatively safe, but if an accident does occur the consequences are often particularly severe.**
- **People who work directly on our roads are at particular risk. Work zones or temporary traffic safety measures bring them very close to the flow of traffic. Accidents are frequently caused by vehicles driving into cordoned-off areas or workers being struck by vehicles. For this reason, clear safety and traffic routing measures are crucial.**
- **The police, fire service, and rescue services are exposed to high risks when deployed to incidents. Driving under blue lights and the need to get to the scene as quickly as possible significantly increase the risk of an accident. At the same time, stress, high speed, and additional tasks make it more difficult to drive the vehicle safely. Once at the scene they are again at high risk, for example from passing vehicles.**
- **Bicycles and pedelecs make up an increasing proportion of work-related traffic, particularly in cities. In some countries, they are now involved in workplace accidents more often than heavy trucks. One noteworthy finding is the high number of single-vehicle accidents, for example from falls. Delivery riders in particular are at much higher risk.**
- **Accidents involving dangerous goods are relatively rare because strict regulations apply. However, they can have serious consequences for people and the environment. The existing regulations and training play a major role in ensuring safety. Continuous updates ensure that new findings are incorporated.**
- **Tractors and agricultural machinery are disproportionately involved in severe accidents. The risk is increased in particular by older vehicles without modern safety equipment. Accidents commonly occur when the tractor turns off or is overtaken. Many of these accidents could have been prevented with better technology and training.**

Compelling examples of accidents in detail

Truck trailer detaches and ends up in oncoming traffic

Sequence of events:

Two truck-trailer combinations were driving along a road in a built-up area, comprising one marked lane in each direction, and encountered one another on a slight right-hand bend. While driving, the trailer of one of the truck-trailer combinations detached and ended up in the opposite lane. It then caused a frontal collision with the truck-trailer combination coming the other way.

Consequences/injuries:

The driver of the oncoming truck was severely injured.

Location/lighting/road conditions:

Built-up area/daylight/dry

Causes and possibility of preventing the accident:

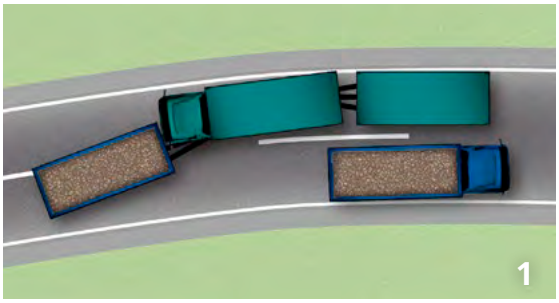
The driver of the oncoming truck had no possibility of preventing the accident. In contrast, the driver of the first truck-trailer combination (whose trailer detached) could have prevented the accident by conducting a careful pre-departure check. If they had done so, they would have been able to identify the worn coupling eye on the trailer and the increased play on the coupling jaw on the tractor vehicle. In conjunction with the load and the uneven road surface, this caused the screwed connection to fail. The incipient failure of the flange connection would only have been visible by a targeted visual inspection from below, if at all. The accident occurred shortly before the next periodical technical inspection, for the truck and trailer. During the previous inspection, the affected components were not yet worn. The incipient failure of the flange connection would also have been very difficult to identify.

Background information:

Technical defects on vehicles pose a significant risk to road safety – particularly if they are not identified or incorrectly assessed. On heavy commercial vehicles in particular, defects on coupling systems, braking systems, or other safety-related components can have severe consequences. For this reason, it is essential to conduct a professional inspection of all vehicle-related systems, including trailers and superstructures, at regular intervals.

In addition to the technical checks, it is also important to raise awareness of the topic among drivers. A basic understanding of how the technical equipment works and the potential risks associated with it can make it easier to identify abnormalities at an early stage and take the necessary action.

In addition, the vehicle owners assume significant responsibility for ensuring road safety. This includes performing the prescribed inspections under accident prevention regulations in full and at regular intervals, and actively including vehicle drivers in the technical reporting process. Reports of defects not only need to be taken seriously, but also explicitly requested so as to identify and rectify potential risks at an early stage.



1 Sketch of the collision position
2 Scene of accident
3 Damage to truck
4 Damage to flange

Car collides with ambulance driving under blue lights

Sequence of events:

An ambulance was driving under blue lights with the siren activated and entered a traffic-light-controlled intersection with the traffic signal on red. A car coming from the left collided with the rear left corner of the ambulance, causing it to skid and smash sideways against a lamppost.

Consequences/injuries:

The driver of the ambulance was severely injured;
his passenger was fatally injured.

Location/lighting/road conditions:

Built-up area/daylight/damp

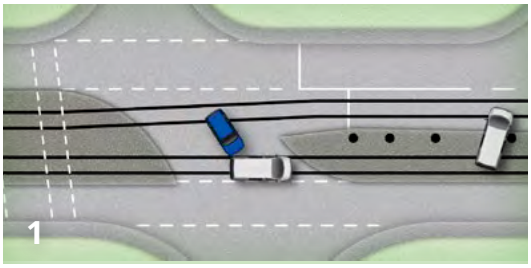
Causes and possibility of preventing the accident:

If emergency vehicles are driving under blue lights and using their special privileges, a special duty of care applies. Slowing right down would have made it easier to notice the ambulance and enabled the driver to check whether it was safe to drive on. The car driver had a green traffic signal and could not see the full intersection on account of structures blocking their view. Measurements taken while reconstructing the accident revealed that it was not possible to hear the ambulance until the moment it became visible. As a result, it would not have been possible to react sooner. Witness statements indicate that the car driver possibly accelerated on the approach to the intersection in order to catch the green traffic signal.

Background information:

For many road users, an encounter with an emergency vehicle driving under blue lights means a stressful situation where they may feel uncertain and overwhelmed and, therefore, react in the “wrong” way. This typically results in unclear judgments, abrupt braking maneuvers, or high-risk evasive action.

Driving under blue lights entails a high level of responsibility and requires excellent driving skills. For this reason, special training on how to drive under blue lights as well as regular awareness-raising initiatives are essential to increase safety for all parties involved. In practice, however, the training tends to focus on core duties such as fighting the fire, providing technical support, or administering medical treatment in the rescue service; the driving qualifications often fall by the wayside. Norway and Estonia are positive examples in this respect as they have clear regulations governing the training and qualifications for driving under blue lights. This type of approach could also help improve road safety in other countries.



1 Sketch of the collision position
2 Scene of accident
3 View from the car at the stop line
4 Damage to the ambulance

Fire truck securing accident site on freeway is struck by articulated truck

Sequence of events:

On a freeway, a fire truck with a flashing arrow mounted on the back was stationary in the right-hand lane to secure the site of a traffic accident. The stretch of road was straight and visibility was good. An articulated truck approached and collided with the fire truck, causing it to skid to the right and end up on a slope.

Consequences/injuries:

The driver of the articulated truck and a firefighter were fatally injured; a further firefighter was severely injured.

Location/lighting/road conditions:

Freeway/daylight/dry

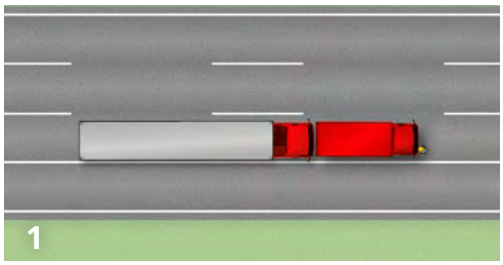
Causes and possibility of preventing the accident:

There are no technical reasons that could explain this accident. The accident occurred on a virtually straight, three-lane road with a slight slope; the location could be seen over a distance of several kilometers. No technical defects were identifiable on the articulated truck. The accident could have been prevented if the driver had paid more attention.

Background information:

According to a Europe-wide survey conducted by the European Transport Workers' Federation (ETF), fatigue is a significant risk for professional drivers. Around 60 percent of respondents stated that they regularly drive while tired, while almost a third reported that they had fallen asleep behind the wheel at least once over the last 12 months. In addition, many respondents explained that they were not always able to take a break, even if they felt tired. The reasons given included deadline pressure and a lack of suitable parking. In order to prevent accidents, the vehicles should have a modern automated emergency braking system that warns the driver promptly before a collision and, if they fail to react, automatically initiates partial or emergency braking.

A tried-and-tested method for securing incident scenes on high-speed roads is to use a heavy truck as a safety vehicle – they protect the workers and other parties involved. However, nobody should ever remain in or near these vehicles.



1 Sketch of the collision position
2 Scene of accident, viewed in the direction of travel
3 Impact marks
4 Scene of accident, viewed against the direction of travel

Streetcar hits pedestrian

Sequence of events:

A streetcar driver was approaching a stop. There is a pedestrian crossing over the tracks just before the stop. A pedestrian approached the crossing and did not stop, despite the streetcar sounding its warning bell. The collision could not be prevented, even with emergency braking. The pedestrian was dragged several meters to their final position.

Consequences/injuries:

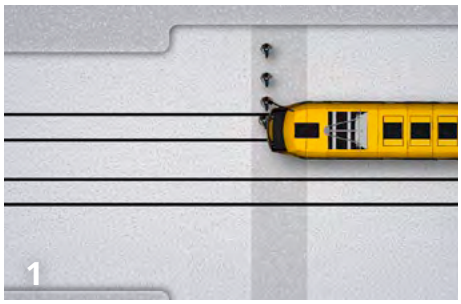
The pedestrian was fatally injured.

Location/lighting/road conditions:

Built-up area/daylight/snow

Causes and possibility of preventing the accident:

The site of the accident was clearly visible to both the streetcar driver and the pedestrian. There were no indications that the pedestrian had been distracted, e.g. by using a smartphone, or that their vision had been obstructed by their headgear. The only pedestrian safety measures at the crossing point in question were a red light signaling system and a warning sign. As a result, the streetcar driver was not able to judge what the pedestrian was doing and identify that they had failed to stop in front of the tracks in accordance with the red signal until very late. At this point, despite a quick reaction and emergency braking, it was no longer possible to prevent the accident.



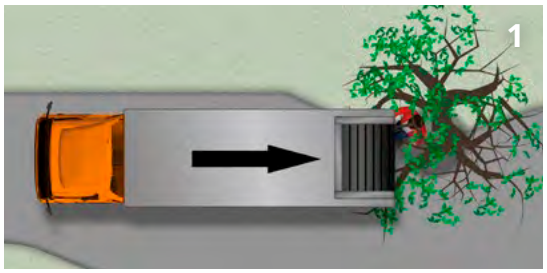
Background information:

A study commissioned by German Insurers Accident Research (UDV) and published in 2016 analyzed streetcar accidents recorded by the police that resulted in personal injury, l ooking at the period 2009 through 2011 in 58 German cities. The study shows that pedestrians' and cyclists' behavior was often the main cause of these accidents – usually because they crossed the tracks after not paying attention or failing to follow the rules. In addition, the infrastructure failed to provide the necessary level of safety at all identified accident black spots.

Measures to make people pay more attention, such as an acoustic signal, or the use of "Z-crossings" that guide pedestrians along a specific route to ensure they look in the direction of approaching streetcars as they cross the tracks, would help to reduce the risk of accidents. Moreover, a targeted campaign to raise awareness among the general public about the physical limits of railway vehicles and, in particular, their long braking distances is important so that people gain a better understanding of the potential risks.

1 Sketch of the collision position
2 Scene of accident (red arrow = direction in which the pedestrian was walking)
3 Damage to the streetcar
4 Pedestrian's view of the site

Garbage truck reverses and crushes colleague



1 Sketch of the collision position
2 Scene of accident
3 Damage to truck
4 Step with tampering using chain (left-hand side)

Sequence of events:

The driver of a garbage truck was slowly reversing in a residential area. At the rear end of the vehicle there was a colleague standing on the platform on the right-hand side. As the truck was reversing, it struck a tree on the right-hand side of the road. The colleague on the platform was crushed between the truck and tree and then fell onto the road.

Consequences/injuries:

The person on the platform at the rear of the truck was fatally injured.

Location/lighting/ road conditions:

Built-up area/daylight/dry

Causes and possibility of preventing the accident:

The accident could have been prevented if the vehicle had not reversed with someone standing on the platform. To allow this to happen, the safety mechanism had been tampered with: a chain mechanically relieved the load on the step, meaning the system didn't register that somebody was on the platform. The vehicle owner could only present an inspection certificate under accident prevention regulations for the base vehicle, but not the body. If one had been carried out for the body, the tampering would presumably have been spotted. In addition, the vehicle backup camera was incorrectly configured, meaning the driver could not see his colleague at the rear end of the vehicle. Neither the risk assessment nor the company's instruction procedure contained information about the risks of reversing the truck with someone on the platform.

Background information:

Accidents such as this illustrate how important it is to consistently follow existing safety rules and regularly review operational procedures. The prescribed inspections under accident prevention regulations must be performed in full in order to identify tampering or safety-related defects at an early stage. Improving road safety for the long term during municipal garbage collection and comparable activities requires combining several measures. This includes raising awareness among workers of the risks of making improper modifications to vehicles, and of the important safety role played by technical systems such as vehicle backup cameras. Risk assessments and company instruction procedures also need to become more precise – particularly for activities with a higher risk of accidents. Reducing time pressure in day-to-day work can help to promote safe working practices. Additionally, making sure people do not work on their own in critical situations encourages them to check on each other and increases their confidence in taking the right action. Finally, we need to focus more on ergonomic vehicle concepts designed to increase safety.

Car strikes police officer due to assistance system

1

1 Sketch of the collision position
2 Scene of accident
3 Marks indicating where pedestrian made contact

2

3

Sequence of events:

Following an accident in a non-built-up area, a police officer was managing traffic and directing vehicles past the scene, alternating between the lanes in either direction. After the officer had released the traffic traveling toward the village, the first vehicle in the queue accelerated sharply. The subsequent car accelerated at the same fast pace, collided with a warning triangle, and despite initiating emergency braking, was unable to prevent a collision with the police officer.

Consequences/injuries:

The police officer was seriously injured.

Location/lighting/ road conditions:

Non-built-up area/daylight/dry

Causes and possibility of preventing the accident:

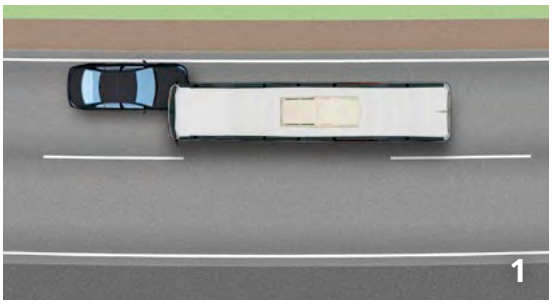
The accident occurred despite the fact that the police officer was clearly visible and other traffic safety measures had been taken at the scene. The police officer had no possibility of preventing the accident. On the vehicle, technical defects could be ruled out as the cause of the accident. In this case, it is assumed that the driver had not sufficiently familiarized themselves with how the driver assistance systems of their new vehicle worked. The active Adaptive Cruise Control reacted to the front car quickly moving off and also accelerated. At that moment, the driver was also distracted by a warning on the display (impending collision) and the vehicle collided with the police officer.

Background information:

Traffic safety duties – such as when recording accidents, providing roadside assistance, or closing roads – are among the most dangerous situations for police officers. The main risks stem from vehicles behind moving too quickly, drivers being distracted, and drivers spotting road closures too late. In order for police officers to stay safe, it is crucial that they secure the scene early on and extensively, using warning lights, flash lamps, and traffic cones. Emergency vehicles should be used as a shield and positioned far enough away from the site, with the warning system activated. All personnel deployed to the site must also wear high-visibility clothing with reflective strips to warn other road users – even in daylight. Furthermore, regular training on the best ways to secure the site and how to react to vehicles that suddenly approach, as well as following up on critical situations – such as by documenting near-misses – all play a key role in improving safety.

To make the most of assistance systems, drivers must know which systems are installed in their vehicles and must have been informed about their areas of application and limits. Before making their first trip, drivers need to familiarize themselves with how to operate the vehicle and how it might respond. This also applies to rental vehicles and if they buy a used vehicle.

Bus and car collide head on



Sequence of events:

A car driver traveling along a long left-hand bend ended up in the opposite lane. Despite the driver of the oncoming bus immediately initiating an emergengy braking maneuver and attempting to take evasive action, both vehicles collided head on.

Consequences/injuries:

The car driver was seriously injured; the bus driver and eight passengers suffered minor injuries.

Location/lighting/road conditions:

Non-built-up area/daylight/dry

Causes and possibility of preventing the accident:

On the car, no technical causes could be identified to explain how it ended up in the opposite lane. In this case it was suspected that the car driver suffered a medical emergency. Despite reacting immediately, the bus driver could not have prevented the accident. He was able to slow the bus right down and, in doing so, significantly reduce the severity of the injuries suffered by the occupants. A positive factor was also that the car collided with the front of the bus on the right-hand side, away from the driver.

Background information:

In 2025 the Norwegian Institute of Transport Economics published an analysis of the CARE database, looking at accidents involving buses in the period 2013 through 2022. 216 bus drivers, 876 bus occupants, and 4,775 other road users were fatally injured during this time. In most cases (50 percent of those examined) another vehicle collided with the front of the bus. In 11 percent of cases the front left area was struck (where the driver sits), which then predictably resulted in the driver being injured or killed in 13 percent of all cases. Where the front right area was struck (away from the driver), this resulted in the driver being injured or killed in 7 percent of cases. This study, and a look at the regulations that currently apply, show that current structural designs for the front of buses offer inadequate protection against collisions.

1 Sketch of the collision position
2 Scene of accident
3 Damage inside the bus
4 Damage to car

Turning tractor driver does not see motorcyclist

Sequence of events:

A motorcyclist was riding behind a tractor on a rural road. He started to overtake on a slight right-hand bend. At the same moment, the tractor driver turned off to the left onto a dirt track. The motorcyclist collided with the front left wheel of the tractor.

Consequences/injuries:

The motorcyclist was seriously injured.

Location/lighting/road conditions:

Non-built-up area/daylight/dry

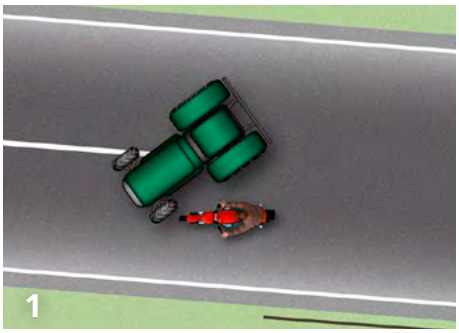
Causes and possibility of preventing the accident:

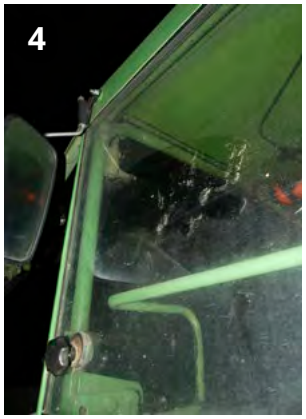
The motorcyclist could not have prevented the accident at the point when he was able to spot that the tractor wanted to turn off. The tractor driver could have prevented the accident if he had spotted the motorcyclist and allowed him to pass, and if he had kept his vehicle in good technical condition. The motorcyclist was easily recognizable (headlamp turned on). However, the mirrors and side window on the tractor were dirty and the mirror mount was loose (technical defect contributing to the accident). This made it more difficult for the driver to spot the motorbike.

Background information:

In Europe, the accident statistics involving tractors paint a consistent picture: in both built-up areas and non-built-up areas, single-vehicle accidents make up the majority of accidents for tractor occupants. Where another party was involved in accidents in built-up areas, this was most often cyclists and pedestrians. In non-built-up areas, it was mostly motorbikes and cars. One noteworthy situation in this context is when a tractor is turning off to the left while being overtaken by a motorbike or car, resulting in a collision. This situation requires both road users to pay more attention. In addition, it is essential that the tractor driver activates their turn signals in good time to tell other road users what they are intending to do. For this to work, however, the other road users must also be able to see these signals. This means that drivers of agricultural and forestry vehicles in particular must ensure that the effect of their turn signals and any other lights is not compromised by dirt or any equipment mounted on the vehicle.

1 Sketch of the collision position
2 Scene of accident, viewed against the direction of travel
3 Damage to tractor
4 Dirt on the side window and mirror





New requirements in an evolving mobile world

Technological developments such as automation, connected systems, and electrification are not just changing our vehicles and infrastructure, they also change the role that people play when they head out on the road. At the same time, the human factor – with all our capabilities, limits, different types of stress/strain, and behavior patterns – remains decisive for road safety. If we consider this in the context of our roads as workplaces, we see issues such as being distracted by secondary tasks, cell phones, intoxicants, or searching for a charging station, as well as work-related stress, monotonous driving situations, health issues, and aggressive interactions with others out on the road. This places particular physical, mental, and organizational demands on us, in particular on professional drivers, the emergency services, and riders/courier and delivery drivers, and in future also teleoperators and safety drivers.

Quickly lighting a cigarette, adjusting the sat-nav system, or answering a text message: many professional drivers, emergency services personnel, field customer advisors, and courier/express delivery drivers spend many hours a day behind the wheel. As a result, once in their vehicle they can easily be "seduced" by different types of distraction. For example, in 2023 alone the German Federal Statistical Office recorded over 7,500 accidents resulting in personal injury in Germany as a result of distracted drivers. The problem is that, as demonstrated by the saying "out of sight, out of mind", a distracted person is less able to process information, which significantly increases the likelihood of near-misses, being involved in an accident, or sudden corrective action to avoid a hazard.

For instance, a survey from spring 2013 of around 785 taxi drivers in Ankara in Türkiye showed that it is not uncommon for drivers to be distracted while out on the road. 81 percent of those surveyed stated that they make calls on a cell phone while driving. 32 percent stated that they wrote text messages at least occasionally. In addition, a significant correlation could be identified between the drivers using a phone while driving and their own reports of being involved in a dangerous situation while driving. Furthermore, a simulator study involving taxi drivers showed that being distracted by a secondary task, such as writing a text message or searching for a destination in the sat-nav system, increased the task of driving the vehicle and, in turn, the burden placed on the driver. These additional demands reduce their

Distractions out on the road: visual, acoustic, physical, or cognitive?

As a basic principle, we can distinguish between several types of distraction. With visual distractions, the driver takes their eyes off the road and focuses instead on a distracting object, such as the screen of their cell phone. Acoustic distractions are when the driver turns their attention to a signal, such as a notification sound or the radio. Physical distractions refer to the driver taking their hands off the wheel, for example to pick up their cell phone or another object, or to adjust something on technical equipment. Cognitive or mental distraction is when the driver's mental focus and attention is redirected from the task of driving the vehicle to a different task, such as writing or reading text messages. These different types of distraction generally also occur in combination with one another, such as when the driver reaches for their cell phone to read a text message.

driving performance – demonstrated by them not maintaining enough distance from the vehicle in front or failing to keep to the speed limit.

According to a study published in 2022 that analyzed a survey of 490 Indian truck drivers, 55 percent of those surveyed stated that they use their cell phone while driving, primarily to make calls. Frequent users of their phone were 29 times more likely than infrequent users to be involved in an accident caused by them using their phone. Similarly, analyses of truck accidents in the USA where the vehicle tipped onto its side or overturned identified that driver distraction – primarily by other passengers, cell phones, and the radio – was the cause of 5.6 percent of these accidents.

A Swedish study from 2018 used observations, interviews, and questionnaires to investigate the extent to which long-distance truck drivers did secondary tasks while driving. It revealed that over the course of a six-hour journey, an average of 30 secondary tasks were performed. The main reasons given for this were boredom, self-imposed stress, compensating for risks, and the effects of age-related conditions. Looking specifically at boredom, the survey participants reported that they usually drive long distances alone and that the landscape barely changes. In some cases they have to drive at night and repeatedly drive the same route.

An Austrian study published in 2018 showed similar results. Interviews and driving data of professional drivers revealed that, due to their working conditions, they have to fight boredom and monotony on very long journeys, which can increase the risk of accidents. Just under 40 percent of all near-misses occurred while the driver had their eyes off the road or was performing another, potentially distracting task. In particular, the use of cell phones was a significant distraction here.

STATEMENT

Road safety concerns us all!

Alain Areal
President & CEO
Portuguese Road Safety

It is widely recognized that work-related traffic accidents are among the most common causes of fatalities and injuries in our working world. Be it when traveling for work or commuting, work-related traffic accidents have a high human, social, and economic cost, and the impact is felt by employees, companies, and our wider society.

Our increasing travel patterns, time pressure, tiredness, excess speed, the consumption of alcohol or narcotics, distractions (in particular by cell phones), and the condition of infrastructure and vehicles are all decisive risk factors. This is compounded by organizational factors such as inadequate planning, unrealistic targets, and the lack of structured traffic safety measures.

Against this backdrop, companies have a vital obligation to play their part in reducing traffic accidents at work and achieving Vision Zero (meaning zero people killed or injured). It is essential to introduce a safety system that not only recognizes that human error is unavoidable, but is also designed to minimize the consequences of these errors – and this affects companies too. Succeeding in this endeavor requires integrated action and shared responsibility, responsible behavior, speed management, safer vehicles, suitable infrastructure, and effective emergency and rescue measures.

In order to keep pace with the changes in how we move around and organize our work, companies must make it a strategic priority to create, implement, and monitor road safety plans that are based on integrated risk management and contain measures for the company and its employees. Risk assessment, employee training, the definition of internal guidelines, and the promotion of a safety culture must all lie at the heart of companies' business operations.

We underestimate the consequences of accidents, such as injuries, permanent disabilities, loss of productivity, and high socio-economic costs. Investing in road safety in a work context is a shared responsibility and a moral, legal, and strategic obligation; one that is essential to protect lives and ensure that companies are fit for the future. Road safety concerns us all!

Driver distraction due to intoxication

Professional drivers sometimes find themselves in very difficult working conditions. In moments like this, it can be tempting for them to turn to drugs such as alcohol, amphetamines, cannabis, or cocaine in order to relax and escape from the stress or improve their performance. In a nutshell, the drivers distract themselves by actively turning toward a means of escape. However, the consumption of addictive substances is an unsuitable and dangerous compensation strategy given the very difficult tasks out on the road.

Driving under the influence of alcohol is not uncommon when transporting goods by road and frequently causes severe accidents.

A systematic review of the use of psychoactive substances by truck drivers, published back in 2013 by the State University of Londrina in Brazil, paints a truly bleak picture. According to the drivers' own reports, alcohol was the most common 'compensatory substance' used, followed by amphetamines, cannabis, and cocaine. The team of authors led by Prof. Edmarlon Girotto identified the following factors linked to the consumption of psychoactive substances: young age, long journeys, driving at night, driving trans-regional routes, fewer rest hours, inexperienced drivers, productivity-dependent earnings, and past involvement in accidents. It also showed that personal traits such as young age and smoking are particularly linked with the consumption of alcohol, whereas poor working conditions such as night shifts and long journeys are predominantly "compensated" by the consumption of amphetamines.

Numerous other studies have delivered similar findings, such as that the consumption of drugs to improve performance is widespread among professional drivers. It is also clear that chronic and high consumption adversely affects acute driving safety due to the long periods of intoxication and time taken for it to wear off. Additionally, regular excessive alcohol consumption is observed more often among truck drivers than the rest of the population. For example, in a pilot study of truck drivers published in Italy in 2016, 24 percent of the 335 drivers stated that they consume alcoholic beverages while working or on their breaks. Over 21 percent of drivers exceeded the threshold for unhealthy alcohol consumption. Moreover, interviews with 343 truck drivers from the Netherlands revealed that more than 56 percent of alcohol-drinkers surveyed occasionally drove with a hangover. They rated their driving style as much less relaxed, less safe, and less responsible as a result.

Overall, the results show that the consumption of psychoactive substances can be linked to indicators of poor working conditions. Vice versa, this also means that better working conditions could reduce the consumption of illegal psychoactive substances by truck drivers – which would, in turn, have a positive effect on their health and on road safety.

STATEMENT

Specific training programs for bike couriers are urgently needed

Henk Swarttouw
President
European Cyclists' Federation (ECF)

In 2024, the European Declaration on Cycling was adopted; a landmark political commitment to strengthen cycling across the continent. One of its commitments is to support "cycling service industries, such as bike sharing and cycle logistics … including by strengthening the integration of cycle logistics into the logistics system."

The growing availability and variety of cargo bicycles are changing how people move and how goods are delivered. Cargo bikes have the power to replace car and van trips, and people are doing just that: individuals use cargo bicycles to take their children to school, to transport groceries, but also to move larger or heavier volumes of goods.

This is not limited to private life. Businesses and employers are realising that many deliveries can be made more cheaply, quickly and more safely on a professionally equipped cargo bicycle. Independent workers and businesses who use bicycles for logistics discover that traffic congestion causes less delays than using delivery vans. Finding parking spaces to load and unload is also less of a problem for cycle logistics riders, as they can ride straight up to the logistics point and to a person's or business' front door to make their delivery. Society benefits from streets that are safer and less congested with large and heavy vans and trucks. Neighbourhoods are quieter and enjoy cleaner air.

Large logistics companies are also realising the potential of cargo bike deliveries. This rise in cycle logistics has however created an urgent need for training programmes for riders to stay safe while on the road. There is a growing number of people who fundamentally depend on using cargo bicycles for their livelihood. From DHL Express couriers to independent logistics riders for companies such as Wolt, who deliver food and groceries to people's doors.

That's why tailor-made trainings must be developed for cycle logistics couriers, and safety and environmental protection must be integrated into their training and job requirements. Professional electric cargo bicycles are much heavier and larger than regular privately-owned bicycles. They require specific training to ride safely in various terrain and weather conditions, and in cities where it is either necessary to share the road with motor vehicles or use narrow cycle infrastructure. The European Cyclists' Federation has been working on these topics, most recently in an EU-funded project called Safe Last-Mile Delivery, to create training curricula specifically targeting courier riders and cycle logistics enterprises.

Let's work together to realise the potential that cargo bicycles and cycle logistics services can deliver for safer cities, cleaner air and a more efficient and economically viable European logistics system.

Being distracted by the search for an electric charging station

Charging infrastructure is vital to the daily work and efficiency of professional drivers who use electric vehicles. The availability, accessibility, and reliability of charging stations have a direct impact on route planning, working time, and the overall productivity of the drivers.

The fact is that searching for a suitable charging station can sometimes absorb a lot of our attention and put us in a state of "inner distraction." Range anxiety is still common. To reduce it, we therefore need reliable and efficient charging strategies which take particular account of aspects such as timely deliveries and compliance with legally mandated breaks. Possible alternatives to charging points for heavy commercial vehicles include battery changes and electric road systems where the vehicle can charge while on the move.

It has also been shown that improvements in battery capacity go hand in hand with a reduced need for dense charging infrastructure. According to the Fraunhofer Institute for Systems and Innovation Research ISI, if battery-powered trucks made up 15 percent of the long-haul fleet, then 1,000 optimally selected charging stations distributed across Europe could cover 91 percent of battery-electric long-haul traffic. As a result, the planning of charging infrastructure and the management of charging requirements for the various electric vehicles are vital aspects in our efforts to further improve the acceptance and use of electric vehicles.

“Risks and side effects” of the road as a workplace

Whether it’s professional drivers, drivers of buses, taxis, and emergency vehicles, or sales reps traveling from customer to customer, what they all have in common is that they aren’t just confronted with the specific requirements of their jobs, they also have to fight the unwanted effects associated with them. These include tiredness, distraction, stress from traffic jams and the behavior of other road users, as well as stress from being overwhelmed or bored.

Tiredness behind the wheel exponentially increases the risk of an accident.

People who head out on the road for their work often have to work at night, which makes tiredness a key factor. Most tiredness-related accidents occur between 2 and 6 a.m. and between 2 and 4 p.m. This could indicate a correlation with the inner biological clock that we as human beings have. It is known as the circadian rhythm and regulates physiological processes such as our sleep–wake cycle, body temperature, and hormone production.

The first signs of tiredness include frequent and repeated yawning, a reduced ability to stay attentive for long periods, double vision, and twitching eyelids. Tiredness generally occurs in conjunction with several factors, such as dense traffic, adverse weather conditions, ergonomic aspects relating to the seats or controls, a lack of ventilation, too much heat or noise in the vehicle, a lack of breaks, excessive speed, stress, depression, or alcohol consumption. These influencing factors make it more difficult to drive the vehicle. At the same time, the risk of accidents increases due to things like slower reactions, lower levels of attentiveness and perception, inadequate basic activation of the body, or errors when handling the vehicle.

The working conditions also play a big part in how tired drivers feel. For example, according to a Brazilian literature review from 2023, truck drivers who are paid by distance covered or number of deliveries are particularly susceptible to signs of fatigue. Any time spent waiting is not paid, which means they might earn less money. This could motivate them to offset the time lost by driving/working additional hours.

In a survey of truck and bus drivers commissioned by the Brussels-based European Transport Workers’ Federation (ETF), 60 percent of those surveyed admitted to regularly feeling tired behind the wheel. The study, published in 2021, also assumes a large number of unrecorded cases as many of those affected were worried about possible consequences. In the survey, 24 percent of bus drivers and 30 percent of truck drivers stated that they had fallen asleep at the wheel at least once in the last 12 months. In addition, in the last 12 months 57 percent of bus drivers and 51 percent of truck drivers wanted to stop due to tiredness, but were unable to.

Studies show that a lack of sleep increases the risk of an accident 8-fold. Many drivers therefore compensate for their tiredness with medication or stimulants such as caffeine. According to a Japanese study from 2025, it appears that this might not be a good solution. Its findings reveal that consuming more than 400 mg of caffeine per day – which is roughly 4 to 5 cups of coffee or 5 to 6 espressi – can cause chronic physiological stimulation, which then promotes symptoms of sleeplessness. For this reason, it states that caffeine should be avoided in the four hours before going to bed. In the study, almost one in every five truck drivers consumed at least 400 mg of caffeine per day.

STATEMENT

Working in road traffic: the firefighters' perspective

Dimitri Pelletier
Representative Supplier
Euro NCAP at International Association of
Fire and Rescue Servicesn (CITF)

Firefighters and rescue teams intervene daily in unpredictable environments — high-speed roads, poor visibility, adverse weather, and heavy traffic —balancing two imperatives: saving lives and preserving their own safety. Responding to road traffic accidents exposes firefighters to numerous risks: secondary collisions from inattentive drivers, hazardous materials or alternative energy sources (electric, hydrogen, LNG), and the structural complexities of modern vehicles. The increasing diversity of propulsion systems and materials — high-strength steels, carbon composites, and large traction batteries — makes extrication and firefighting operations more difficult and time-sensitive.

Each second counts. Accessing the vehicle, disabling its energy systems, stabilizing it, and extricating trapped occupants must all be achieved quickly, safely, and under control. Any delay or misinformation can have fatal consequences for both victims and rescuers. Even before reaching the crash site, emergency response journeys pose a major risk. Collisions involving fire and rescue vehicles are still too frequent, often caused by other drivers' unpredictable behavior or insufficient road awareness. Training, harmonized driving regulations, and advanced driver-assistance systems could significantly reduce these incidents and better protect responders on the move. In the future, CTIF recommends that Vehicle-to-Everything (V2X) communication systems be used to automatically warn road users of approaching emergency vehicles, improving their access to intervention zones and reducing secondary accidents.

For nearly eight years, CTIF has actively participated in the Euro NCAP programme through its Extrication & New Technology Commission. This long-term collaboration has produced tangible progress in vehicle safety, notably within the "Rescue, Extrication, and Safety" protocol. Initiatives such as the Euro Rescue app — providing standardized rescue sheets based on ISO 17840, free of charge, and downloaded more than 1.5 million times worldwide — have become essential tools for firefighters across the globe. Through continuous dialogue with vehicle manufacturers and safety experts, CTIF has helped ensure that vehicle design increasingly considers post-crash intervention needs: automatic door unlocking, hazard light activation, propulsion system shut-off indicators, eCall data transmission, and standardized energy labeling.

- Looking forward, CTIF emphasizes several key developments to further improve responder and road-user safety:
- Mandatory FAD ISO-standard rescue sheets, initiated with Euro NCAP for Europe (available in 24 languages). CTIF calls for an international regulation requiring all vehicle manufacturers to provide these sheets in all relevant languages worldwide.
- Harmonization of vehicle securing protocols, ensuring consistent safety procedures regardless of manufacturer or propulsion system. Today, there are more than 70 different safety devices and procedures across manufacturers, creating confusion and slowing down critical rescue operations. A harmonized approach is urgently needed to make road rescues faster and safer. CTIF therefore advocates for the automatic deactivation of hazards (LV, HV, SRS) while maintaining power to systems that support rescue efforts (electric seats, windows, tailgates).
- Enhanced management of high-voltage battery risks, ensuring the permanent stability of traction batteries even in post-crash or immersion situations, and including an automatic thermal runaway alert to warn occupants and rescuers of any imminent danger.
- **For further informations: https://ctif.org**

The mental strain on the emergency services

The mental strain on the emergency services is significant. However, there are clear differences in the extent to which this impacts professional staff versus volunteers. The fire service in particular counts a very high number of volunteers among its ranks in some countries. For example, Germany has around 35,900 professional firefighters but over one million volunteer firefighters. Studies show that professional firefighters experience higher levels of mental strain due to the fact that they are continuously exposed to demanding working conditions and are regularly confronted with difficult deployment scenarios, whereas volunteer firefighters are only exposed to these in specific situations. Moreover, professional emergency personnel often have fewer "job resources" such as control, safety, or supportive feedback. In contrast, volunteers often assess their risk of injuries and health problems as lower and take a more optimistic view of prevention measures.

The increased level of strain is associated with a greater susceptibility to psychological illnesses. Around a third of firefighters report debilitating flashbacks after being deployed to extreme incidents. Overall, there are higher rates of post-traumatic stress disorders, depression, anxiety disorders, sleep problems, and problematic alcohol consumption. A lack of social support from friends, family, or comrades additionally increases the risk. The findings regarding suicidal tendencies are particularly alarming: in a survey in the USA, almost half of those surveyed stated that they had had suicidal thoughts, just under a fifth had made concrete plans, and around 15 percent reported at least one suicide attempt.

Other emergency services are also affected. Among police officers, around one in every six shows signs of emotional exhaustion, burnout, anxiety, or depression. In the rescue services, just under a quarter of employees exhibit behavior patterns that are damaging to their health or resemble burnout, characterized by over-engagement, an inability to distance themselves from the situation, and negative work-related emotions.

Key protective factors in this respect are social resources, feeling a sense of purpose as regards their work, and social recognition, which are linked to higher levels of job satisfaction. Personality traits also affect an individual's ability to deal with mental strain: a high level of conscientiousness tends to have a stabilizing effect, whereas a high level of neuroticism is associated with lower levels of satisfaction. Overall, the findings illustrate the need to provide the emergency services with targeted prevention measures, support, and measures to promote their mental health.

Staying fit and healthy improves road safety

Professional drivers have to sit for long periods of time, have few opportunities to exercise, have to deal with deadline pressure, and often find it difficult to eat a healthy diet. As a result, they are more at risk than most of suffering from back and joint problems, excess weight, cardiovascular diseases, and mental strain. If drivers' health suffers, this can also affect their driving behavior and the risk of accidents.

Many professional drivers are under high levels of pressure, which often goes hand in hand with unhealthy habits and encourages physical as well as psychological symptoms. In a survey in Germany in 2021, just 13 percent of all truck drivers surveyed stated that they did not suffer any work-related health issues. The problem is that behavior-based health interventions are difficult to implement on account of the specific working times, the need to work shifts, and the time spent away from the home. In addition, the ever-increasing amount of traffic on European freeways is making professional drivers' working conditions even more difficult as it increases stress factors such as time pressure, inadequate breaks, or trouble to find somewhere to park up and spend the night.

As a result, it is more important than ever to comply with the prescribed driving times and rest periods, in order to ensure road safety and prevent fatigue, excessive pressure, and work-related stress – and, in turn, protect the health of drivers.

A major factor in the difficult working conditions of drivers is the amount of money they earn. Professional experience rarely pays off and newcomers often earn barely more than 2,000 to 2,300 euros (approx. 2,300 to 2,600 U.S. dollars) a month. This makes driving a truck an unappealing profession and fuels the debate about the "gratification crisis" in this occupation group. The "professional gratification crisis" model was developed by medical sociologist Johannes Siegrist. It states that health risks can result if there is too big of an imbalance between the high amount of effort that workers put into their work (commitment, responsibility, pressure to perform) and the "rewards" they receive as a result (recognition, appreciation, job security). People who set high

Basic rules for driving time and rest periods in the EU

According to Regulation (EC) No. 561/2006 (and amendments, such as 2020/1054), the following standardized rules apply throughout the European Union for driving time and rest periods:

- Maximum daily driving time: 9 h (2 × per week: 10 h)
- Weekly driving time: maximum of 56 h, maximum of 90 h in 2 weeks
- Break: 45 min after 4.5 h (can be split into 15+30)
- Daily rest period: 11 h (can be reduced to 9 h)
- Weekly rest period: 45 h (can be reduced to 24 h).

However, there are sometimes still significant differences between EU countries due to the different ways they have implemented this in practice. The sanction mechanisms with fines, points, and penalties differ, as do the working time legislation and the rules on driving time. Since driving time forms part of working time, but working time also includes other tasks, these time regulations can mix with one another in different ways. In addition, some countries have taken into account their own specific geographical features and terrain (e.g. winding passes or busy cities). These types of topography require drivers to adjust their driving style, and possibly also their rest periods, in order to ensure safety.

Another factor is the different rates for checking the days worked. According to Article 2 of Directive 2006/22/EC (in conjunction with Regulation (EC) No. 561/2006), every member state must check at least 3 percent of days worked for all affected drivers. With a check rate of 6.5 percent, Germany is well ahead of the pack, as is Austria (7.7 percent). In contrast, Hungary (1.5 percent) and Ireland (just 0.7 percent) are well below the required level.

standards or find it difficult to switch off end up in a gratification crisis more easily. Numerous studies confirm the link between a gratification crisis and psychological consequences (burnout) or even cardiovascular diseases.

A study conducted many years ago by the German Federal Highway and Transport Research Institute (BASt) examined how work-related pressure and stress factors affect the behavior of professional drivers in traffic while transporting goods by road. More than 500 truck drivers were surveyed about their working conditions, main stress factors, approach to work-related stress, and driving behavior and traffic offenses. The main findings were that the general conditions defining the occupation of truck driver turn out to be key stress factors, including poor rest stop provision, the behavior of other road users, and high traffic volumes.

The study demonstrated clear correlations between truck drivers' stress experiences and management techniques and their behavior out on the road. An aggressive and confrontational approach to stress was identified as being problematic in terms of safe driving. In contrast, having a high level of hazard perception and taking a task-based stress management approach helped to improve safety. The study also identified different types of drivers, split into six subgroups. Two of these groups play a particular role in terms of endangering road safety: the "daredevil" type and the "stressed" type, which together make up between 30 and 40 percent of all drivers and include the youngest drivers. In particular, their way of managing stress is not very solution-oriented. At the same time, drivers who fall into these two groups are linked to an above-average number of driving mistakes and violations of traffic rules, and they are disproportionately involved in accidents on the road.

Risk and stress factors for truck drivers

Risk factors	Stress factors	Examples
Relating to workplace	• Long or unattractive working times • Actual task of driving plus additional tasks, high levels of environmental stress, poorly designed cabs • Handling dangerous goods	• Shift work • Overtime • Signs of fatigue due to constantly having to pay attention • Noise, exhaust emissions • Ergonomic problems
Relating to company	• Company performance arrangements • Staff selection • Staff deployment • Work atmosphere	• Inadequate route planning • Lack of appreciation for the profession
Relating to industry as a whole	• Hazards when out on the road • Restrictions on private life • Restrictions on social and cultural activities	• Increased willingness to take risks • Problems switching off from work

STATEMENT

Driving in cities: an everyday challenge

Rémi Vatinel
Coordinator
Projects and Tenders
VEHIPOSTE

Day in and day out, the drivers of Véhiposte's commercial vehicles navigate the main roads of our busy cities, right at the heart of an urban ecosystem that has become one of the most challenging environments they will encounter at work. Behind every successful door-to-door delivery lies a frequently misunderstood reality – a work pattern shaped by tiredness and the need to constantly pay attention and work with millimeter precision in complex situations. Given that they step in and out of their vehicles over a hundred times a day, stop every 20 to 50 meters, and constantly have to maneuver carefully on narrow roads, the human factor plays a vital role in how safe and effective these journeys are – now more than ever.

In addition to the physical strain on the drivers, they are also exposed to increasing levels of cognitive pressure. They simultaneously need to look at the traffic, the sat-nav system, and the delivery instructions; operate the digital terminal for tracking the package; and sometimes also make business calls. Consequences are inevitable when someone has to constantly attend to so many different things: a simple message retrieved too quickly, a terminal operated too fast – and soon the whole safety concept begins to totter.
In our ever-changing city environments, cognitive overload has become a key factor in accidents as drivers constantly need to stop and move off again, which opens the door to mistakes caused by them not paying attention.

Lastly, the ever-increasing amount of traffic – now exacerbated by the boom in e-commerce – is also redefining the role of a driver on public roads. Busy delivery zones, conflicts with pedestrians, cyclists, and e-scooters in the same road space, and increasing deadline pressure have turned delivery runs into real obstacle courses. Between tensions, unclear parking situations, and competition for every last inch of space on our roads, drivers now operate in an environment where safety must become a priority again.

Managing trauma after a serious accident

If we look at accidents and their potential health consequences, one factor that often plays a role is the fact that the person's fitness to drive was impaired by different things. This may include alcohol, narcotics, or traffic offenses by the party who caused the accident, as well as situational factors such as distraction, not concentrating or paying enough attention in traffic, and feeling uncertain behind the wheel due to the weather. Additionally, sub-optimal road infrastructure design (caused by things like work zones or obstacles on the road) can sometimes cause the driver to misjudge the situation. We also need to consider blows of fate, in conjunction with risk factors associated with the driver's personality.

Psychological stress in the aftermath of a traffic accident must never be trivialized.

Crash victims often have to endure great personal suffering depending on the physical and psychological consequences. They sometimes suffer these consequences for a long period of time, without knowing exactly where it will all end up. There is also always the chance that a whole complex of accident consequences will arise. When it comes to mental health, this could include a post-traumatic stress disorder (PTSD). This term refers to a situation where distressing recollections and traumatic experiences continue for longer than one month, accompanied by symptoms such as flashbacks, nightmares, or avoidance behaviors, as well as a state of "overdrive" in the nervous system together with symptoms such as inner anxiety, irritability, sleep problems, or jumpiness.

In order for people affected by PTSD to get their quality of life back, they need to receive professional psychotherapeutic care. This should focus on aspects such as stabilization, confronting the trauma, and reorientation. You could think of it like a house: the stabilization lays the foundations upon which the individual can process their trauma – similar to renovating a damaged room. Therefore, this process is not about making them "endure everything again", but about reclassifying and integrating their trauma. It is important to seek out help at an early stage, particularly in the case of ongoing symptoms.

Facts about PTSD

30 years ago, psychologist Heike Winter published a study that included the following empirical findings on post-traumatic stress disorder:

- traffic accidents can trigger PTSD
- PTSD can exist for many years
- the extent of the harm following the accident is also a predictor of how the symptoms will develop and the degree of impairment after three months
- a generally elevated level of agitation often persists for longer than the clinical symptoms; in contrast, the period shortly after the accident is often dominated by recollections and increased vigilance
- crash victims with PTSD often have higher depression scores and tend to be anxious
- the more severe the injury and intensity of the stressor, the more likely that PTSD will develop
- crash victims with PTSD exhibited stronger avoidance behaviors, ruminated more, and needed to talk about it

Generally speaking, we cannot assume that if someone has a severe, acute stress response immediately following a traumatic event, they will have sufficient cognitive capacities, orientation and concentration skills, decision-making capabilities, and resilience to safely drive on the road. If the PTSD was caused by an extreme event on the road, they may experience anxiety or distressing recollections and thoughts if they end up in a situation that reminds them of their accident, such as driving along the same or a similar route, or driving in comparable weather conditions. Linked to this is the risk that they misjudge distances and speeds, which in extreme cases can cause them to make mistakes while driving and, therefore, pose a hazard. Those affected attempt to counteract these anxieties by behaving in a safe manner, such as driving slowly and particularly attentively. If they cannot do this, this often leads to avoidance behaviors whereby they simply don't drive at all, or let someone else drive.

When treating traffic accident victims with PTSD, a tailored therapy concept can be very helpful, particularly if it forms part of an overarching treatment plan that combines different methodological approaches. The psychological after-care should always be handled by traffic psychologists. In such cases, the primary aim is not just to look after the individual as a psychotherapy outpatient or inpatient, or to obtain compensation for pain and suffering due to PTSD as part of a legal dispute. Rather, we also need to focus on ensuring they are fit to drive again and can, therefore, head out on the road again and stay mobile. To succeed here, it is also essential that the person affected avoids any potentially negative ways of managing the physical, psychological, social, material, and professional consequences of the accident.

Case study of a post-traumatic stress disorder

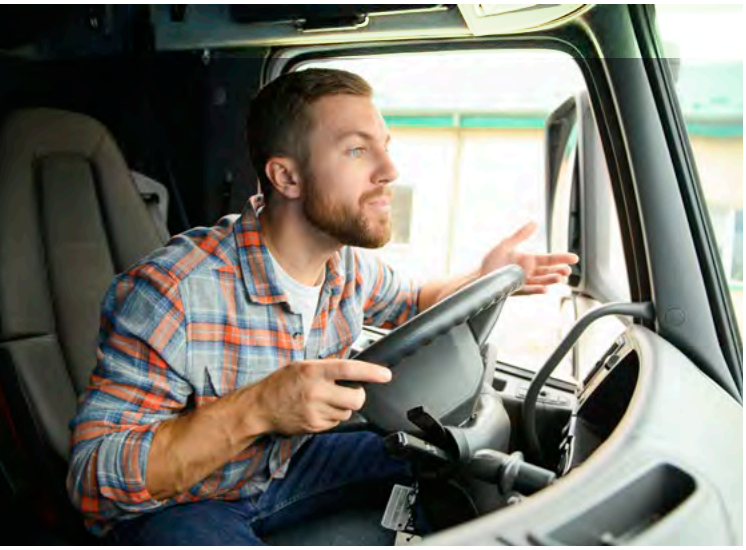
A taxi driver started his last journey of the day, heading back home from a hotel outside the city. While driving along a bend, a car suddenly and unexpectedly came toward him from the front. His only recollection of that moment was seeing two headlamps, after which he lost consciousness. After the impact, both cars skidded down a slope and overturned. Both vehicles were totaled. The taxi driver was seriously injured, the four young women in the other vehicle died – some of them directly at the scene. While the taxi driver was being rescued at the accident site, other events occurred that became deeply rooted in his memory of the event:

- Being rescued by two young first-aiders, who pulled the taxi driver out through the car window and set him down on the ground. He suffered severe pain as his left leg was trapped and he had suffered injuries to his shoulder and arm.
- Two other young people stepped toward him and allegedly threatened him with the words: "If our girls don't make it, you'll be in for a surprise."
- The rescue services and emergency doctors spoke in front of him, stating: "The second one also didn't make it."
- After first aid having been administered, the ambulance drove over the field to the road. The EMTs had fastened their seat belts but the taxi driver was not secured – so he was worried that he would fall off the stretcher.
- After being treated in hospital, two police officers appeared the next morning and announced that they would be opening an investigation into the taxi driver for four counts of negligent homicide.

Acute care in hospital and follow-up treatment in a rehabilitation clinic led to a relatively good physical recovery. Nevertheless, the taxi driver remained unable to work, avoided driving, and only ever went along as a passenger with his wife behind the wheel. There were further consequences: he could not sleep at night and instead became obsessed with computer games, he became depressed, he increasingly distanced himself from his family, and conflict within the family increased. The patient took antidepressants. He started to feel like he had not received any help as the response from the insurance company was also delayed. A psychologist in the rehabilitation clinic diagnosed him with PTSD for the first time and recommended specific trauma-based psychotherapy. The taxi driver took up the offer – albeit sceptically at first.

Increasing levels of aggression and conflicts on the road

A look at the media landscape in numerous countries fuels the suspicion that things are getting rougher and more reckless on our roads. This trend cannot be seen in official statistics such as accident statistics or criminal prosecution statistics, nor is it reflected in entries recorded in official registers such as Germany's Federal Central Register or Register of Driver Fitness. However, it is undeniable that drivers sometimes cause social conflicts on the road by behaving very recklessly and violating traffic rules. One cause is often the growing number of vehicles on our roads and, therefore, the increasingly dense traffic, which makes some people feel they are being held back by others.



Given their frequent and prolonged assignments on the road and the fact they cover huge mileages every year, professional drivers are particularly exposed to aggressive behavior out on the road. This is also suggested by a cross-sectional study published in 2025 by the German Insurers Accident Research (UDV) association. It was based on surveys conducted in 2016, 2019, and 2023 with representative samples of car drivers in Germany (N = 5,489 in total), whereby the respondents were asked to rate their own aggressive driving behavior and their perception of aggressive driving by other road users.

On a 5-level scale, the average scores for the respondents' own aggressive driving (as reported by them) were located toward the bottom, rising slightly over time. In contrast, the average scores for their observations of aggressive driving by others were located in the middle of the scale, again with a rising trend. The participants also believed that other road users drove much more aggressively than they themselves did, the difference being larger for women than for men.

Reckless behavior out on the road

- risky overtaking maneuvers
- speeding
- tailgating
- overtaking in the slower lane on freeways
- weaving through traffic, and
- honking the horn at traffic lights

Other "phenomena" include illegal car races, posers, likers, and people who block the emergency lane for the emergency services.

Tried-and-tested methods for reducing aggressive behavior on the road

- prevention initiatives already during driver training
- relaxation therapy
- technical support from driver information and driver assistance systems (recording the driver's condition and situation on the road, and potentially counteracting any driving actions that are inappropriate for the situation at hand)
- police and legal measures (more frequent monitoring of safe distances between vehicles, higher sanctions and harsher penalties for repeat offenders, use of new technologies for criminal prosecution, etc.)
- standardizing the traffic flow (speed restrictions, simplified lane changes, mechanisms to control traffic flows, etc.)

STATEMENT

Safer roads require safer jobs

Livia Spera
General Secretary
European Transport Workers' Federation (ETF)

Road safety is a core priority of the European Transport Workers' Federation (ETF), which represents more than five million transport workers across Europe. The European Union and its Member States have committed to achieving Vision Zero but progress towards this goal remains far too slow. If Europe is serious about safer roads, it must address the conditions under which professional drivers work.

The safety of Europe's roads is closely linked to the working and rest conditions of truck, bus, and coach drivers. Over recent years, the profession has become increasingly demanding and more dangerous. Roads are busier, logistics chains have become more complex, and operational schedules tighter. When drivers face sustained pressure and insufficient opportunities to rest, risks increase not only for drivers themselves, but also for passengers and road users.

The COVID-19 pandemic highlighted the vulnerabilities of the road transport sector. Professional drivers played a crucial role in keeping essential goods and passenger services moving across Europe. At the same time, the crisis exposed long-standing structural challenges, including access to facilities, predictability of working patterns, and the overall attractiveness of the profession. These challenges have contributed to persistent driver shortages, affecting operators and workers alike.

Fatigue remains a key road safety risk. An ETF study reveals that more than 60% of truck drivers and 66% of bus and coach drivers report regularly driving while fatigued. Alarmingly, one in four bus drivers and one in three truck drivers admit to having fallen asleep at the wheel. This safety risk is underlining the importance of realistic planning, compliance with social rules, and effective enforcement. Addressing fatigue requires a joint effort by employers, trade unions, policy makers and public authorities to ensure that existing rules are better enforced and respected.

In this context, ETF is organising an annual campaign on 21 June, the Driver Fatigue Action Day to raise awareness on the pressing issue of driver fatigue in the road transport sector. The ETF and its affiliates unite across Europe to address the critical problem of driver fatigue that professional drivers experience daily.

The European social partners in road transport, ETF and IRU, together with EU institutions and enforcement bodies, share a responsibility to improve safety outcomes while supporting a sustainable and competitive transport sector. ETF stands ready to work constructively with employers, policymakers, and all stakeholders to make Europe's roads safer for everyone.

However, what types of things can encourage aggressive driving in the first place? Specialist traffic psychology literature lists a number of factors here, such as:

- frustrating situations on the road (traffic jams, having to wait a long time at traffic lights)
- dense/tight traffic within a given space; other road users entering a driver's personal space
- lack of social controls due to the anonymity of traffic situations
- aggressive "prompts" by others
- restricted possibilities for communication and interaction
- lack of empathy
- stress/feeling overwhelmed as a result of traffic jams, noise, heat, air pollution, or time pressure
- social norms (e.g. young people holding an aggressive and, therefore, very "cool" and manly driving style in high esteem)
- aggressive underlying personality, or
- increased tension and agitation

In this context, more recent research has also delivered the following interesting findings:

- the highest levels of aggressive behavior can be seen in those aged 20 to 24
- women demonstrate lower potential for aggression on the road than men
- aggressive driving increases as the status of the vehicle increases
- risk-reducing influence of (female) passengers (= protective factor)
- young drivers tend to behave more dangerously in the presence of young passengers
- reckless and aggressive behavior is the main cause of around 85 percent of all traffic accidents
- significant correlation between aggression out on the road and the number of traffic accidents, warnings, fines, and points
- low likelihood of aggressive driving being detected and punished

Cooperating in a spirit of partnership is, and will remain, the main lever we can pull to prevent conflicts in complex traffic situations. That is why Section 1 of the German Road Traffic Act (*Straßenverkehrsordnung*), for example, states that when people head out on the road, they constantly need to take care and have mutual respect for one another, to ensure that nobody else is hindered oder endangered. As a result, responsible drivers are also expected to demonstrate empathy and self-control, in order to ensure they take part in traffic without causing conflicts. If they fail to do so, they will soon react in the wrong way, particularly in difficult or emotionally charged traffic situations, which can lead to hazards and even accidents.

Changing entry requirements for professional drivers in the EU

Many countries are desperately looking for professional drivers. There is a huge skills shortage in this sector of the economy, caused by factors including the still rather negative image of the profession with its high levels of stress and sub-par wages, as well as poor working conditions that frequently require drivers to spend long periods away from friends and family. However, demographic effects have also played a role – there are not enough young drivers to replace the aging driver population, as fewer and fewer young people are obtaining their driver's license at an early stage.

Delivery bottlenecks, increasing pressure on the logistics industry, and higher levels of stress on existing staff – these are just some of the many consequences of the shortage of drivers in the transportation industry, which has been a problem for many years. The European Commission is aiming to mitigate these issues with an amendment in the 4th EU Driving License Directive. The final version of this set of rules, which is binding for all 27 Member States, contains a proposal to lower the minimum age limit for obtaining a class C or CE driver's license from 21 to 18. A class C license entitles the driver to drive trucks heavier than 3,500 kilograms. A class CE license entitles the driver to drive truck–trailer combinations comprising a class C motor vehicle and a trailer or semitrailer, whereby the trailer may have a permissible total weight of more than 750 kilograms.

However, this ostensibly sensible and supposedly straightforward solution is casting a few negative shadows. Firstly, there are big differences in the entry requirements for obtaining this type of license. All 27 EU countries require potential drivers to undergo a medical examination in order to obtain a license in the C classes. However, according to a research report by the German Society for Traffic Psychology (DGVP), the type, scope, and content of these examinations vary significantly within the EU.

Individual countries such as Belgium, Italy, and Sweden require specific ophthalmological examinations. Some countries look more closely at certain areas. For example, Belgium, Germany and Luxembourg examine the cardiovascular system, disorders of the nervous system, metabolic disorders such as diabetes, motor disorders, and mobility impairments, as well as the use of medication and psychotropic substances such as alcohol and drugs. In a number of countries including Bulgaria, Poland, Portugal, Slovenia, Slovakia, and Spain, the medical examination explicitly also records the individual's psychological fitness to drive a vehicle from the C classes. In Germany, when someone under the age of 21 wants to obtain a class C or CE license, they currently have to prove their physical and mental fitness by submitting a medical-psychological report. As part of the diagnostics, this focuses on whether the applicant's physical and mental skills at this early stage (i.e. before they have reached the minimum age limit) are already sufficiently mature for them to drive on the road, including their willingness to fulfill their duty of care. The candidate also has to demonstrate sufficient capabilities in terms of their ability to react, concentrate, and pay attention, for example.

All EU countries impose mandatory medical examinations in order to obtain a driver's license in the C classes.

Numerous conditions and restrictions

In addition to indicative medical examinations, 25 EU countries impose a range of conditions and restrictions on anyone wanting to obtain a class C/CE license under the age of 21. For example, in 23 EU countries it is possible to drive a truck from class C/CE while aged under 21 provided the driver has a "Driver Certificate of Professional Competence" (or similar), or as part of training to become a professional truck driver. In Denmark, Estonia, Austria, Poland, Slovakia, and the Czech Republic, driving a class C/CE truck while aged under 21 is restricted to certain professions or purposes, such as the military, police, or fire service. In Germany, Latvia, and Hungary, drivers of a class C/CE truck who are aged under 21 are restricted to the country's national borders. Moreover, in Estonia and Romania professional drivers aged under 21 are only permitted to drive distances of up to 50 kilometers (~31 miles).

The content and scope of the training required to obtain a driver's license also differ. For example, the theory part ranges from ten teaching units or fewer to over 25 teaching units. In Germany, Finland, Latvia, and Austria, the scope of the theory part for obtaining class C is reduced if the driver already has a C1 license. In Ireland, candidates prepare for the theory exam through self-directed study. If they pass, they obtain a driver's license for learners. This license enables them to learn driving skills independently in preparation for the driving test. During this time, they must be accompanied by someone who has held a full driver's license for the relevant vehicle class for more than two years. However, it is recommended to take professional driving lessons from an approved driving instructor. In the countries with mandatory practical lessons, these range from 8 to 20 teaching units.

Measures to combat a higher risk of accidents

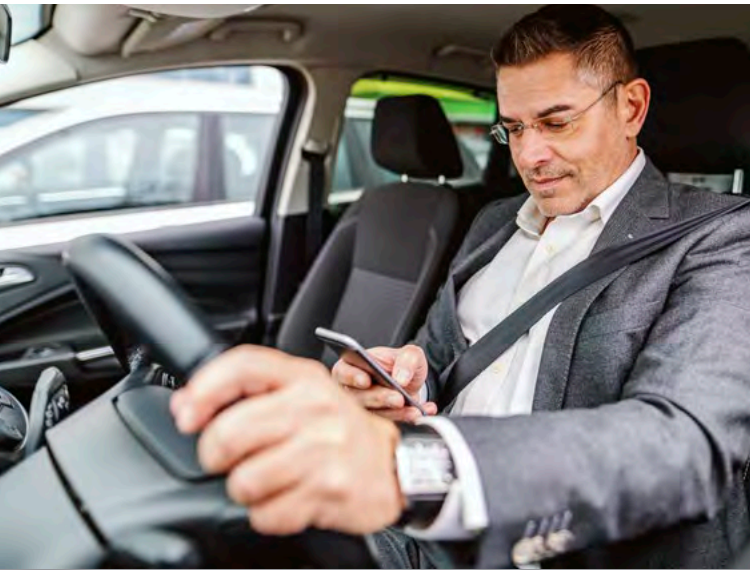
The aforementioned research report by the German Society for Traffic Psychology (DGVP) also analyzed how lowering the minimum age limit for obtaining a truck driver's license affects the potential trend in accident figures. In this context, the DGVP points to a significant lack of data in EU countries. Accident data for truck drivers aged under 21 could only be determined for Germany, Finland, Poland, and Spain. In Germany, roughly one in every 110 to 120 license holders in this age group was involved in an accident resulting in personal injury in 2019. In Finland, the age effect was similar, but less pronounced than in Germany. In Spain, however, the accident rate for this group is much higher than in Germany or Finland and involves almost one in every 20 drivers aged under 21. In Poland, it is not possible to differentiate the risk of accidents between those aged 18 to 20 and those aged 21 to 24 based on the available license holder data. However, like in the other EU countries analyzed, the youngest age group of 18 to 24 years contained the highest proportion of drivers who were involved in an accident resulting in personal injury.

It is hard to say which risk factors play a role in these accident rates. At any rate, the specialist literature does not contain any studies that explicitly compare the potential hazards associated with truck drivers aged under 21 against those aged over 21. However, the difference between these age groups has been comprehensively investigated for passenger cars. The findings obtained there allow us to identify certain typical "youth-related risks" for young drivers, which we set out in detail in the DEKRA Road Safety Report 2022. Young men in particular have a more critical attitude to traffic and a higher willingness to take risks, which can also be reflected in riskier driving behavior and more frequent traffic offenses. Other risk factors that could lead to accidents among those aged under 25 include not paying attention, and driving under the influence of substances such as alcohol, cannabis, or illegal narcotics.

In principle, therefore, lowering the minimum age limit for obtaining a truck driver's license to 18 years of age, together with the higher applicant numbers that this will tend to cause, can be expected to increase the risk of accidents among truck drivers in this age group. For this reason, it seems advisable to take preventative steps to counteract this undesirable effect, using the following measures, among others:

- In order to select suitable potential license holders and exclude those at particular risk, mandatory psychological test methods could be developed and used.
- To compensate for a lack of practical car driving experience among 18-year-old license applicants, practical driving training elements could be added.
- To compensate for "youth-related risks", accompanying psychological elements could be integrated into driver training and tests.
- To reduce the risk of them making mistakes, conditions and/or restrictions on licenses for novice drivers aged under 21 could be used, such as limiting them to certain purposes or routes.

Highly automated driving and secondary tasks



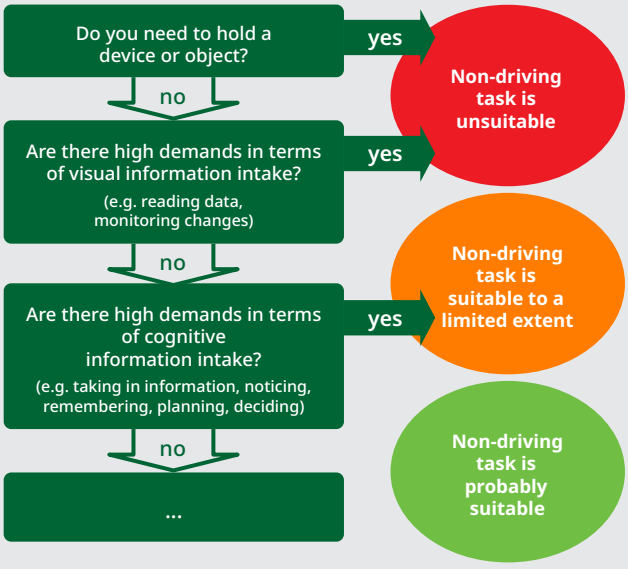
In terms of road safety, using a smartphone behind the wheel of a motor vehicle is not a good idea.

The introduction of highly and fully automated driving systems means that drivers can, in certain circumstances, turn their attention away from what is happening on the road and from driving the vehicle and instead focus on doing something else, as they no longer constantly need to monitor the system. However, the driver always has to "remain alert," to enable them to take control again within a few seconds at any moment if requested to do so by the vehicle system, or if they realize "that the situation no longer meets the requirements for the appropriate use of the highly or fully automated driving functions." The reasons why the system might request them to do this include a technical defect, unclear road markings, or if the system has problems detecting what is happening on the road due to environmental factors such as mist or snow.

While it might sound good in theory, putting it into practice appears rather paradoxical – turning your attention away from driving the vehicle on the one hand, while simultaneously remaining aware of what is happening on the other, appears to be an impossible dilemma. The human driver is "out of the loop" while they are focusing on the other task, meaning that if the system prompts them to take over control again, they will need some time to figure out what is happening on the road, physically resume control of the vehicle again, and carry out whatever driving maneuvers may be required. This change in status from being "out of the loop" to back "in the loop", i.e. changing from being a passive surveillant to an active operator when prompted by the system, takes time and poses a challenge.

For this reason, it would appear essential to categorize which secondary tasks could feasibly and safely be done. Here we mean secondary tasks for work-related journeys, such as those undertaken by field sales reps, service technicians, and truck drivers, where the time freed up by the automated system can be used for other duties such as documentation, orders, scheduling, or invoicing. A study on the driving simulator at the Institute for Work and Health (IAG) of the German Social Accident Insurance association (DGUV), conducted in collaboration with TUD Dresden University of Technology, looked at relevant specialist literature and suggested a way to classify secondary tasks using a traffic light system. As part of the study, the test subjects had to do a secondary task not related to driving – in this case planning a route – in an experiment on the driving simulator. The resulting traffic light classification categorizes the various task attributes based on the level of safety when taking over control of the vehicle during highly automated driving, as follows: unsuitable (red), suitable to a limited extent (amber), and probably suitable (green).

Traffic light classification for non-driving tasks behind the wheel



Source: German Social Accident Insurance (DGUV)

A starting point for assessing hazards

According to this system, all tasks that require the driver to hold a device or object in their hand are considered "unsuitable" because if they need to take over control of the vehicle, they first need to put down the device/object. As a result, they take longer to take over control and it increases the likelihood of a collision. Tasks that place high demands on the driver in terms of visual information intake, such as reading data or tracking changes in tables, are also considered "unsuitable." These types of tasks reduce the driver's ability to simultaneously monitor what is happening on the road, which likewise reduces safety when taking over control of the vehicle.

Tasks that place high demands on the driver's cognitive processing skills are considered "suitable to a limited extent." This includes things like making plans and taking decisions, or working on documents (albeit on a superficial level). Even though the findings for these types of tasks are less clear, with no evidence that the time required to take over control of the vehicle was adversely affected, they could compromise the driver's understanding of what is currently happening on the road. For this reason, they must be classified as potentially unsuitable. At any rate, when it comes to older drivers in particular, purely auditory, cognitively demanding tasks reduce the level of safety when taking over control of the vehicle.

Tasks that place low demands on both cognitive and visual processing skills and do not require the use of hand-held devices are considered "probably suitable." However, during the study it was not possible to find attributes of non-driving tasks that were suitable for Level 3 automated driving. Despite this, it cannot be ruled out that these types of task do exist. Overall, this classification is only an approximate ranking and further studies are required to identify specific tasks. Fundamentally, however, it does provide a starting point for assessing hazards in workplaces where highly automated driving functions are used.

STATEMENT

Public roads as workplaces, and road safety as an unavoidable challenge

Mar Cogollos
Director
Association for the Study of Spinal Medullary Lesions (AESLEME)

Our public roads have become our largest shared workplace. Hundreds of people work there: suppliers who move around using vans, bicycles, motorbikes, or even on foot; drivers of public transport vehicles; maintenance technicians; police officers; rescue services; municipal service providers, etc. All this needs to be managed carefully and well.

It is clear that working in road traffic means having to carry out your job in a dynamic, unpredictable environment shared with thousands of other users; an environment where your own safety depends on how others behave. That is why risk management – particularly for these kinds of professional fleets – cannot be regarded as optional; it is a necessary, binding measure.

As a result, road safety at work cannot just be considered a collective responsibility that depends on official regulations, it is also an individual responsibility. This means that all companies and organizations with vehicle fleets must develop mobility guidelines and measures covering not only training, awareness raising, and prevention, but also the use of technologies such as advanced driver assistance systems (ADAS).

Two of the biggest challenges in urban environments are distraction and the need to avoid blind spots (particularly for long vehicles). The use of ADAS doubtless plays a significant role in reducing accidents and collisions and facilitating harmony among pedestrians, cyclists, scooter riders, and motorcyclists as well as private and commercial vehicles. Moreover, company fleet managers can use telematics systems to monitor driver behavior in real time, identify dangerous driving habits, and improve training for individual drivers if required.

As part of my personal and professional experience, and through the campaigns that we at AESLEME have run to prevent workplace accidents on the road, I have seen that specific training on traffic risks at work makes a real difference. It's not just a question of knowing the rules, it's also about internalizing the need for peaceful interactions on our roads with no casualties, and a preventive mindset that anticipates mistakes by other road users and enables us to adapt our driving style to the respective urban environment.

Working in road traffic means being exposed to risks. Recognizing this fact is the first step to reducing the accident figures. A commitment to prevention, road safety education, and a responsible approach to distractions not only protects those whose workplace is our public roads, it also improves safety for all citizens. AESLEME's work and the dedication of its employees are a vital part of this journey.

New careers for the traffic of the future

As our vehicles and infrastructure become more and more interconnected, we will not only see changes to traffic flows, but also big changes to the types of jobs on the road. Automated and autonomous systems open up new careers where people no longer necessarily control vehicles themselves, but instead remotely monitor them, provide help, or intervene if required.

Whether it's a teleoperator sitting at a control station or a safety driver in the vehicle itself, these two roles represent how we are moving away from a traditional role of driver to a highly complex monitoring, decision-making, and intervention role that sets new requirements in terms of technology, ergonomics, and human capabilities. For example, teleoperators are intended as "troubleshooters" to help with acute problems in highly or fully automated or autonomous driving scenarios.

The term "teleoperation" denotes a system or a machine being operated remotely. We are already familiar with this concept from other areas of our lives, such as medicine, forestry work, at airports or in parking garages (shuttle services, parking up), and on short sections of public roads. A prototypical teleworkstation resembles the usual cockpit of a vehicle, but instead of a windshield, there are usually several screens for monitoring what is happening on the road. This should not be confused with "tele-assistance", which is when event-specific decision-making support, such as a recommendation or information, is provided by a technical agent. They sit at a remotely located control station and communicate with the vehicle from there when the vehicle is in autonomous mode and cannot solve a current problem by itself.

The individual sub-systems inside and outside the vehicle, such as the control station, teleoperation control unit, and sensors and actuators required for the automation function must all be interconnected using high-performance communication systems to form a single overall system. Ideally, a vehicle can travel in automated mode within its defined "Operational Design Domains" using "tele-driving", with the option to control it via teleoperation if the situation requires it. An example of this would be if the vehicle leaves its defined Operational Design Domain, or if an intervention is required because the system has reached its technical limits. In contrast, human "tele-assistance" is only allowed to release the maneuvers suggested by the automated driving function until the vehicle is traveling safely inside the defined Operational Design Domain again using the automated driving function. In addition to automated vehicles, typical applications here include car sharing vehicles, remote-controlled goods deliveries in the form of "hub-to-hub" traffic, and bus shuttle services.

Teleoperators are not physically involved in the actual traffic on the road

Teleoperation physically and mentally separates the person from the existing structures related to the task of driving. The teleoperator workstation acts as a "tool" for moving an object (the vehicle) – which they cannot see directly – within a specific situational context. Whereas someone sitting behind the wheel of a vehicle constantly receives and processes information about what is happening on the road, a teleoperator is provided with only selected information "on demand" – they do not have nearly as much information as an active driver, the information is of much lower quality, and how it changes over time also differs greatly. These differences between manual and teleoperated driving can be reflected in our subjective impressions and behavior in the following ways:

- The true speed of the vehicle itself is overestimated. This distorted perception could be facilitated by a lack of haptic feedback, the inability to sense the vehicle's own movement, and rapidly changing scenes caused by a "fast succession" of camera images.
- It becomes much more difficult to estimate the distances between objects on the road (road design, features of the infrastructure and at the side of the road) because we need to switch from a two-dimensional on-screen image to an unknown three-dimensional image.
- It becomes more difficult to judge the relative position of the teleoperated vehicle on the section of road in question, which can result in the vehicle being oriented toward the center of the road.
- Due to the physical responsiveness of the pedals and vehicle steering system, a higher level of force must be applied than with manual driving. Smooth, finely controlled steering and braking movements are not supported with the same degree of sensitivity as with manual driving. Moreover, the system operates with a slight delay, which can lead to things like oversteering.
- Due to the restricted range of the camera image, it seems almost impossible to predict the potential dangers posed by traffic environments located further away.

As a result, the fact that the teleoperator is decoupled from the task of driving the vehicle (as performed by the autonomous system) can lead to a variety of safety-critical follow-up problems. Firstly, there is the "vigilance problem", i.e. lower attentiveness and responsiveness. An activated teleoperator copes better with additional demands than one who is not busy and not being challenged enough. If their performance drops in quiet periods because they are not being challenged enough, they can subsequently feel overwhelmed if they suddenly need to step up when teleoperation is required in a specific situation – for example, if they need to handle multiple vehicles simultaneously or solve problems with different priority levels.

With teleoperation, there is also the risk that the teleoperator does not "feel" the significance of a given action, like in a computer game. This can generate a reduced sense of responsibility and, in particular, result in misunderstandings due to misjudging the significance of certain

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STATEMENT

Safety on the road begins with people

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When most people think of a road, they associate it with a destination and consider it a space that they have to negotiate in order to get to work, head home, or head out on vacation. However, only very few car drivers are aware of just how many people are responsible for the safety of road traffic as a whole: the engineers who design the infrastructure, roadworkers who look after the roads, EMTs, firefighters, and above all traffic police officers who monitor the behavior of all road users.

Anyone who works on our roads does one of the most demanding jobs in the context of protecting public safety. These workers are exposed to ever-changing conditions and risks: high speeds, heavy traffic, noise, difficult weather conditions, and night shifts in many cases. Police officers are deployed to the scenes of accidents, and the road then often becomes a place to watch dramatic events unfold.

The safety of Polish roads has significantly improved over the last ten years. The number of fatalities has fallen by over 43 percent, while the number of injured people fell by almost 38 percent. It is one of the best results across Europe, where the average decline in the number of fatalities is 17 percent. These figures did not happen by chance – among other things they are the result of systematic efforts day in, day out by the authorities, particularly the police, who play a special role in terms of traffic monitoring. Police officers focus on combating behaviors that directly cause tragic accidents and are socially unacceptable.

However, their duties are not limited to monitoring and controls – prevention measures and information campaigns are equally important. They enable us to build up an awareness that safety on the road isn't just a question of regulations, but also of responsible decisions that we all make every day.

Modern road traffic poses new challenges for the authorities. We constantly see new hazards, such as those linked to speeding or a failure to observe the right of way. We are increasingly also seeing factors that cause driver distraction, such as cell phones and driving under the influence of psychoactive substances. As a result, we need to take firm, systematic measures.

» information. For example, it is much more difficult to perceive movement because they are limited to visual information recorded by cameras as well as abstract parameters such as speed readings. Additionally, a lack of feedback about acoustic signals from the environment can cause them to overlook relevant information, similarly to the impact on someone in the vehicle if music is playing too loudly.

Comparison of teleoperation concepts

Within the context of providing cooperative assistance, different teleoperation concepts aim to relieve the burden on the teleoperator in specific ways (depending on the extent of the intervention) and help them take a decision by providing the information they need.

- Teleoperation or Remote Vehicle Operation can essentially be divided into **"Remote Driving"** and **"Remote Assistance"**. Both approaches predominantly differ in the level of direct vehicle control, the workload on the operator, and the resilience against network latency.
- With **"Remote Driving"**, the operator intervenes directly in the driving of the vehicle. In the case of "**Direct Control**", the operator controls the vehicle directly using the position of the gas pedal and brake pedal and the steering angle. They monitor the environment via video streams and additional sensor data. This approach is very effective and enables precise maneuvers. However, it is associated with high levels of mental and sensory pressure and depends heavily on the quality of the network connection.
- With "**Shared Control**", the operator is still in control but their inputs are first evaluated by the system and corrected or overwritten if required. This can increase the level of safety, but also requires the system's decisions to be made clear and transparent for the operator.
- Another version of Remote Driving is "**Trajectory Guidance**", which is when the operator specifies a "trajectory" (road guidance) including route and speed and the vehicle implements this instruction autonomously. This reduces the impact of network latency, but can mean any interventions take longer if unexpected situations arise.
- **"Remote Assistance"** is based on a supportive approach whereby the operator does not intervene directly in the control of the vehicle, but provides specific support to the vehicle instead. With "**Waypoint Guidance**" the operator defines certain waypoints, which the vehicle then uses to independently plan and drive a certain trajectory. This significantly reduces the operator's workload but can also mean that any interventions take longer.
- With "**Collaborative Planning**", the vehicle suggests possible trajectories and the operator then chooses a suitable one. This approach combines machine planning with human decision-making skills and further reduces the workload. However, it places additional demands on the human–machine interface.
- The lowest level of intervention is "**Perception Modification**", which is when the operator corrects perception errors made by the vehicle or helps the sensor system, e.g. by reclassifying objects. Their impact on the driving behavior is indirect in this case, but it makes a significant contribution to increasing the robustness and reliability of the system as a whole.

Strict requirements for the job

When it comes to finding people to work as teleoperators, a fundamental challenge will be identifying those with the "right" personality traits and capabilities. For example, spatial perception skills and a good working memory are important for quickly building up a solid understanding of the situation at hand, as teleoperators will be required to constantly compare different images of traffic situations.

They will also need an ergonomically designed workstation with the necessary cockpit instruments and displays to help bridge the aforementioned gaps in their processing of information. This raises the question of how teleoperators can be effectively supported by ergonomically designing their workstation with supplementary features. The information must be up to date, relevant, specific to the situation, adequate, and easy to understand, and naturally it must be accepted by the teleoperator driving the vehicle.

For example, a display showing the distance to the vehicle in front could be very useful; equally, so could additional information about the difference in speed between the vehicles currently involved in the traffic situation. Likewise, warnings about particularly vulnerable road users, such as pedestrians or cyclists, and regarding particular situations (e.g. exiting a parking space) would also be worth considering. Moreover, robust data transmission technology designed with redundancy, a very intuitive user interface, and a working environment free of distractions should all become standard. Systems for monitoring the attentiveness of teleoperators could help to detect fatigue or distraction at an early stage.

Safety drivers must be able to assess dangerous situations

When fully automated vehicle technologies are introduced, "safety drivers" will be present in the autonomous vehicle for technical, legal, and ethical reasons, but also as a way of building up trust to win over and foster loyalty among passengers. In an emergency, this person will take over control of the vehicle to maintain an adequate level of safety for vehicle occupants and the traffic environment. The duties, challenges, and necessary skill-sets of safety drivers form a vital part of the process of reviewing and validating the technology used in autonomous vehicles before they can be deployed without any human drivers.

In this context, we need to distinguish between three main types of task:

- Monitoring the behavior of the vehicle and the navigation: safety drivers will ensure that autonomous vehicles operate as intended, i.e. that they follow preset routes and avoid obstacles.
- Intervening if required: safety drivers will always have to be ready to take over control of the vehicle if unexpected problems occur, such as mechanical failures or software errors.
- Testing and providing feedback: safety drivers will also act as an important interface between driverless vehicles and their technical developers and engineers. They provide real-time insights into how the system is performing and establish a rapid feedback loop for identifying and solving problems.

A major challenge for the role of a safety driver is how they maintain the necessary balance between trust and attentiveness. The safety driver must focus on the traffic environment and on how the autonomous vehicle is driving. They must trust that the vehicle will do its job (not intervene too early) while still remaining attentive at all times and ready to intervene if something unexpected happens. To meet this challenge, skills like responsiveness, concentration, the ability to multi-task, and the ability to assess the dangers on the road will all be essential.

The Human Factor: the facts at a glance

- **Distraction, stress, health restrictions, and new jobs of the future (such as tele-operator or safety driver) are placing higher demands on our qualifications and how we structure our work.**
- **Distraction can be visual, acoustic, physical, or cognitive and often occurs as a combination of these, e.g. when using a cell phone. Studies show clear drops in performance, shorter safety distances, and a higher risk of accidents.**
- **In some cases, stressful working conditions cause drivers to consume alcohol or drugs to try and manage their stress or improve their performance. However, this significantly compromises road safety. Better general conditions could reduce this consumption.**
- **People whose workplace is out on the road are particularly affected by tiredness due to night shifts, high workloads, and stress. This reduces their attentiveness and responsiveness, often causes them to nod off momentarily, and significantly increases the risk of accidents – made worse by long working hours and drivers' attempts to compensate for their condition, such as by consuming a lot of caffeine.**
- **Compliance with driving times and rest periods and the use of targeted health promotion initiatives are tried-and-tested ways of reducing fatigue, stress, and excessive pressure.**
- **Aggressive behavior such as tailgating or risky overtaking maneuvers are often linked to stress, increased tension, and social norms. Preventative measures in the form of training, assistance systems, and systematic controls and sanctions can significantly reduce the risk of accidents.**
- **In addition to the physical harm, accidents can have long-term psychological consequences such as post-traumatic stress disorders. Supporting victims early on and providing professional guidance are important for ensuring they remain fit to drive for the long term.**
- **The skills shortage in the goods transportation industry is the result of high levels of stress, poor working conditions, and demographic changes. As a result, the EU is planning measures including lowering the minimum age limit for obtaining a truck driver's license, in order to get more young people joining the sector.**
- **For drivers of electric vehicles, the search for a charging station absorbs their attention and can lead to "inner distraction". The provision of readily available charging infrastructure, as well as higher battery capacities, are key to reducing range anxiety and, in turn, enabling safe and efficient journeys.**
- **Highly or fully automated systems enable drivers to perform secondary tasks, but they must be able to take over control of the vehicle again at any moment. In principle, only tasks that place low cognitive and visual demands on them can be considered "safe".**
- **Safety drivers monitor systems that are driving in automated mode and intervene if any issues arise. They need high levels of attentiveness, responsiveness, and judgment in order to identify dangerous situations as quickly as possible and safely take over control of the vehicle.**

Vans: why correctly distributing the cargo is essential

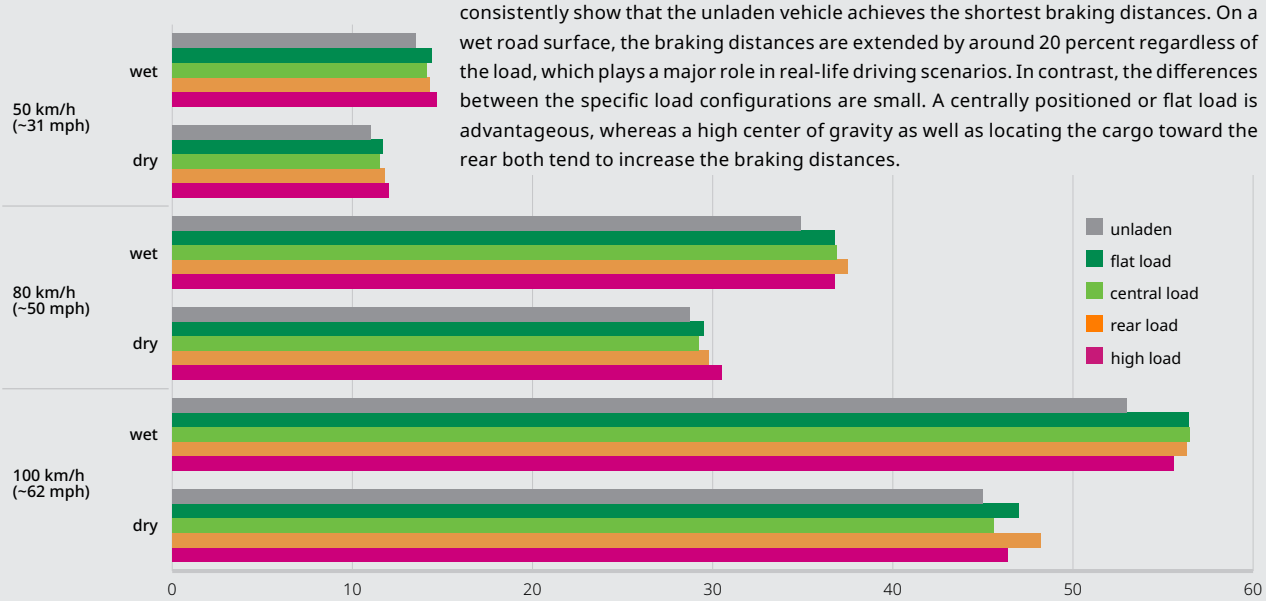
In numerous countries, the traffic risk posed by vans still forms a key part of public discourse about vehicle and road safety. Issues such as rising accident figures, poorly maintained brakes, inadequately secured cargo, inadequately trained drivers, time pressure, fatigue, and speeding are often mentioned in this context. However, if we take a closer look at the situation, we see that the increase in the number of accidents involving vans can largely be explained by the increase in registration figures and higher annual mileages. Nevertheless, as road tests conducted by DEKRA once again show, ensuring vans are correctly loaded plays a key role – also because the vehicles are often very powerful.

The driving dynamics of vans are not just affected by correct cargo securing measures, they are also heavily influenced by the type, weight, and position of the cargo itself. Changes to the position of the center of gravity can have a direct impact on stability, steering behavior, and the vehicle's handling in critical situations. To investigate these correlations under practical and reproducible conditions, several standardized road tests were conducted at DEKRA's Lausitzring test track. The test vehicle used was a Mercedes-Benz Sprinter from the 907 series, model year 2024. The vehicle was in perfect technical working order and came with the standard driver assistance systems fitted to this series, including ABS, ESP, and traction control. The vehicle was equipped with winter tires.

To run the tests, the van was loaded with cargo weighing 960 kilograms. The weight distribution was varied such that both the height and position of the center of gravity were altered in a targeted way. Four different load configurations – flat, central, at the rear, and high – were tested, as well as the unladen van.

Results of the DEKRA road tests in detail

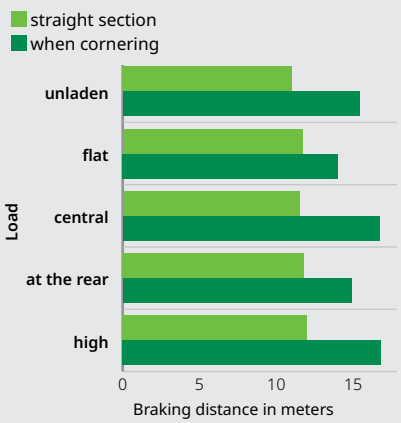
Braking distance tests:
To assess the braking behavior, emergency braking was performed from speeds of 50, 80, and 100 km/h (~31, 50, and 62 mph) on a dry and wet road surface. The results consistently show that the unladen vehicle achieves the shortest braking distances. On a wet road surface, the braking distances are extended by around 20 percent regardless of the load, which plays a major role in real-life driving scenarios. In contrast, the differences between the specific load configurations are small. A centrally positioned or flat load is advantageous, whereas a high center of gravity as well as locating the cargo toward the rear both tend to increase the braking distances.



Source: DEKRA

Braking while cornering:
Emergency braking from 50 km/h to 25 km/h (~31 to 16 mph) while cornering showed clear differences compared with braking on a straight section of road: the braking distances are extended by up to 45 percent depending on the specific load configuration. During braking, the vehicle predominantly turns toward the inside of the bend. Only locating the cargo toward the rear causes a slight increase in the radius. The road test clearly showed that the ABS and ESP assistance systems are very effective. Very good results are achieved, despite the sub-optimal load distribution.

Braking distance from 50 km/h (~31 mph)



Source: DEKRA

VDA lane change maneuver: The standardized VDA lane change maneuver ("moose test") showed that the unladen vehicle was the most stable. With this load configuration, the van can complete the lane change maneuver with a low roll angle of 3.1° and maximum lateral acceleration of 8.5 m/s². All four wheels consistently remain in contact with the road, meaning they can build up sufficient cornering force. The worst load configuration in terms of driving dynamics is the high load. During the test, the vehicle achieves lateral acceleration of only 7.0 m/s², but on the other hand has a maximum roll angle of 5.7°. At times only three wheels were in contact with the road. This adversely affects driving stability and increases the risk of the vehicle tipping over. If the cargo is located too far toward the rear, the van exhibits a clear tendency to oversteer and it can be difficult to control for inexperienced drivers.

	unladen	high load
Roll angle	3.1°	5.7°
Yaw angle	23.4°	22.7°

Source: DEKRA

Roll angle during circular driving: The circular driving tests with a radius of 60 meters show that a high center of gravity causes the vehicle to tilt significantly to the side. While the unladen van had a roll angle of 2.5°, this increased to 3.8° with a high load.

Summary:

In addition to correctly securing the cargo, correctly distributing the cargo itself in the van is vital for ensuring safety on the road. Positioning the cargo centrally and as low down as possible ensures stable braking distances, predictable cornering behavior, and good reserves when taking evasive action. Modern assistance systems can do a lot, but they cannot overcome the laws of physics. Similarly, they cannot fully compensate for a poorly positioned center of gravity in all situations. Moreover, it must be ensured that the permissible axle loads and the permissible overall weight are not exceeded, as overloading not only severely compromises driving stability, but also the tires, brakes, and chassis.

To ensure safety on the road, the vehicle must be correctly loaded

The road tests in the previous section clearly showed how much the distribution of weight and center of gravity affects the vehicle's handling. However, another vital aspect is that even an optimally distributed load must also always be properly secured.

For many professionals who spend their working days directly beside or on the road (such as road-based freight transportation, professional trades and service vehicles, express courier/parcel delivery services, and delivery cyclists), the act of securing cargo isn't just a technical requirement, but a cornerstone of their daily occupational safety routine.

In the working world in particular, numerous factors come together that make it essential to secure cargo properly: high time pressure, tightly scheduled workflows, frequent changes in the loads in the vehicles, and the wide variety of goods being transported. Express courier/parcel delivery vehicles are opened and reloaded or partially unloaded countless times over the course of a working day; professional trades vehicles carry a wide range of tools and materials either loose or in shelves; and road-based freight transportation sees huge variations in the type and nature of the load depending on the specific assignment. A sudden change in the load's center of gravity, e.g. because it slips or topples over in dynamic situations such as cornering or under heavy braking, can have an enormous impact on the driving dynamics.

As a result, the act of securing the cargo goes far beyond merely fulfilling a company or legal requirement – it protects the driving personnel, prevents material damage, and helps to avoid dangerous situations for other road users. It also has a positive effect on operational workflows: loads that are secured better cause less damage to the vehicle and cargo, reduce downtime, and help ensure that resources are deployed more efficiently.

However, the impact of proper cargo securing measures can only be understood if we consider the underlying laws of physics. Vehicles – no matter their size or how they are powered – are systems in motion. Every time the driver accelerates, brakes, or turns in a different direction, they generate forces which act directly on the load. The key factor in this respect isn't just the size of the load being transported, but above all where it is positioned in the vehicle and how it has been secured.

If the driver makes a sudden maneuver, a load which does not lie tightly against the surface with a form-fitting connection, or has not been secured with a friction-locked connection, will initially retain its existing speed and direction. The vehicle decelerates or changes its direction, but the load does not. Instead, it shifts further to the front

Correctly securing the cargo is an absolute must when transporting any kind of goods.

or to the side (relative to the vehicle) and generates forces that can far exceed its own weight. For the vehicle, this means additional moments of inertia that adversely affect stability. If the center of gravity has been poorly positioned, these cause pronounced pitching, rolling, or yawing movements. The road tests with the van showed how sensitively a vehicle reacts to changes in the position of the center of gravity – and it is precisely these correlations that apply accordingly for transportation processes in all industries.

Evolving requirements as we move around for work in increasingly different ways

However, the physical effects are not just confined to the driving behavior. If the vehicle decelerates sharply, loose or inadequately secured objects will not just retain their kinetic energy – they will also transfer it virtually unchecked to interior structures or people if the vehicle is involved in a collision. As a result, toolboxes, machinery, and parcels can become highly dynamic projectiles which put the driving personnel in considerable danger and compromise their control of the vehicle. The effect can also be seen clearly with micro-mobility solutions such as electric cargo bikes: even small shifts in weight or poorly stored parcels can severely upset the vehicle's balance.

The requirements for cargo securing measures are evolving as we move around for work in increasingly different ways. Whereas traditional freight transportation applications continue to use established restraint systems, lightweight commercial vehicles and urban logistics services are increasingly turning to new solutions. Modern shelving systems, modular cargo area structures, and lightweight restraint elements enable us to more effectively adapt to changing loads and frequent stops. At the same time, vehicle manufacturers are working on integrated fastening points and flexible interior fittings to make it easier to secure cargo in day-to-day operations.

Digitalization is also opening up new approaches: sensor-based monitoring of cargo areas, notifications about unsecured objects, and automated messages if the vehicle is overloaded are already available in the first applications. Moreover, cargo securing measures are becoming increasingly important in micro-mobility solutions. Concepts like reinforced box systems and standardized holders are being used in response to the growing prevalence of cargo bikes and lightweight electric vehicles in cities.

STATEMENT

Urban complexity and distraction: a dangerous combination for our world of mobility

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Road safety in urban areas is facing new challenges arising from disorderly growth of cities, the different kinds of mobility, and the increase in stimuli which battle for the attention of road users. Our top priority must be to effectively manage these risks, in order to reduce accidents in an environment where pedestrians, cyclists, motor-cyclists, public transport, and private vehicles all encounter one another.

Being distracted behind the wheel is one of the main causes of accidents in urban areas. The use of cell phones, even with hands-free systems, poses a significant risk as it distracts the attention of the driver – visually, manually, and cognitively. This is compounded by factors such as being overwhelmed by traffic signs, the use of sat-nav systems, interacting with passengers, stress caused by traffic jams, etc.

In addition, the increasing complexity of our urban environments – characterized by inadequate lines of sight/visibility, shared spaces, and the unpredictable behavior of certain vulnerable road users – means we need to take decisions quickly and precisely. This pressure increases the likelihood of human error, particularly if we are also distracted.

For today's world of urban mobility, which aims to promote sustainable means of transport such as cycling or local public transport, we also need to come up with new strategies for ensuring we share the space safely. However, many cities have not adapted their infrastructure accordingly or implemented measures that take into account the safety of all road users.

In light of this situation, there is an urgent need for comprehensive risk management that brings together road safety education, effective regulation, and redesigned urban spaces. Data management is also becoming a strategic tool. Integrated and updated systems for data acquisition, analysis, and visualization enable us to identify risky patterns, assess measures, and come up with effective strategies.

How truck safety systems can save lives

Severe and fatal accidents between trucks and vulnerable road users remain a key challenge for road safety. Based on the results of a study by Chalmers University of Technology in Sweden, the Accident Analysis team at Daimler Truck, the Traffic Accident Research team at TU Dresden, and DEKRA Accident Research collaborated in a joint project to investigate the potential of modern vehicle systems in preventing these types of accidents in Germany.

Many digital truck cockpits also show things like an active assistance system.

In 2025 Chalmers University of Technology published a study entitled "Potential of heavy goods vehicle countermeasures to reduce the number of fatalities in crashes with vulnerable road users in Sweden". This research project aimed to assess the potential offered by active and passive vehicle systems in the event of an accident between a truck and a vulnerable road user. This then led to the idea of transferring this approach to accident statistics in Germany. The project partners were the Accident Analysis team at Daimler Truck, the Traffic Accident Research team at TU Dresden (VUFO), and DEKRA Accident Research. Each project partner made traffic accident data available from their respective database. Together, these cases were then examined to investigate the potential for preventing accidents entirely or mitigating their consequences.

The project looked at 75 accidents from the years 2015 through 2024 that involved a truck from ECE class N2 or N3 and a vulnerable road user. In each of these accidents, at least one person traveling on foot, by bike, or by motorbike was fatally or severely injured. The accidents were selected on a random basis from three different sources:

- VUFO: the VUFO data is based on the German In-Depth Accident Study (GIDAS). It has recorded traffic accidents resulting in personal injury from the areas of Dresden, Hanover, and Munich since 1999. The accident data is collected according to a sampling plan. Therefore, despite being a partial survey, it allows representative statements to be made about German accident statistics.

- DEKRA: this accident database is based on analytical reports of accidents from all across Germany. They are drawn up by DEKRA experts, mainly on behalf of public prosecutors, the courts, or the police. The accident database is not representative of German accident statistics. However, due to the fact it contains particularly severe cases, it is especially useful for projects like this.

- Daimler Truck: the Daimler Truck Accident Analysis team has been investigating accidents involving Mercedes-Benz trucks since 1972. In addition, it has consistently been monitoring truck accidents out in the field in Germany across all brands since 2006. The data focuses on severe and fatal traffic accidents.

To investigate the accidents, a structured approach was taken. After preparing and harmonizing the relevant accident data, the cases were uniformly assessed based on a defined scheme in order to rate the potential contribution that each system could make in terms of preventing accidents entirely or mitigating their consequences. The subsequent analysis enables conclusions to be drawn about the effectiveness and importance of the system in the scenarios analyzed. The table on page 63 lists the systems investigated and their respective potential in terms of preventing severe or fatal injuries among the different groups of road users.

Results in detail

When it comes to protecting pedestrians, a good direct line of sight/visibility is particularly important for the truck driver. However, if a pedestrian does end up in the danger zone, the accident can potentially be prevented by a warning from the impact warning system or with assistance from a brake assist system or automated emergency braking system.

For accidents involving cyclists, it is above all systems that warn the truck driver of a cyclist in the danger zone that have a positive impact. It is also important to be able to spot the cyclist in good time/have a direct view of them. As a basic principle, the key thing with accidents involving cyclists is that they are not run over by the truck/articulated vehicle or the trailer/semitrailer on the back. This can be prevented or mitigated by prompt emergency braking and by a side underride guard or wheel guard.

For accidents involving motorcyclists, blind-spot information systems demonstrated the highest potential in this study. In addition, like the other groups analyzed, it is important that the truck driver can directly see and detect the motorcyclist in good time. Although accidents involving motorbikes frequently involve high speeds, passive systems such as an extended side underride guard and passive protection for vulnerable road users (VRU) according to UNECE R61 are crucial.

Potential of Safety Systems in Trucks for preventing severe and fatal injuries among vulnerable road users

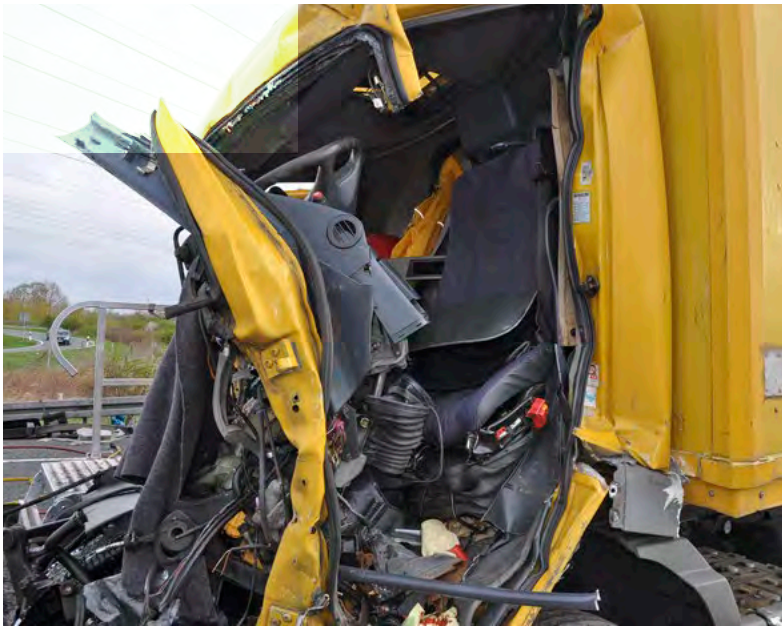
	Pedestrian n = 28	Cyclist n = 29	Motorcyclist n = 18
Active safety			
Direct view	93%	80%	50%
All-round view	75%	72%	6%
Automated emergency braking system (for pedestrian/cyclist only)	100%	81%	—
Impact warning system	94%	43%	0%
Automated emergency braking system (intersection)	45%	12%	—*
Blind-spot information system	20%	94%	83%
Brake assist system	89%	86%	53%
Alcohol interlock	0%	0%	0%
Intelligent speed adaptation	4%	4%	6%
Passive safety			
Wheel guard (protection against being run over)	57%	62%	8%
Side underride guard – extended	—*	78%	67%
Front underride guard – extended	52%	55%	11%
Side underride guard (current legislation), UNECE R73	—*	33%	0%
Passive protection of vulnerable road users (sharp corners and edges), UNECE R61	12%	27%	53%
Passive protection of vulnerable road users (energy-absorbing front)	20%	20%	13%
Outer airbag for vulnerable road users	19%	15%	13%

* Not enough cases for an assessment

Source: Daimler Truck, VUFO, DEKRA

When the interior becomes a potential hazard

The driver's cab on a goods vehicle is a workplace and a retreat – as well as a critical protected space if the worst should happen. However, this protected space reaches its limits in severe rear-end collisions in particular, meaning a collision can sometimes result in severe or even fatal injuries for the occupants.



Unfortunately, cabs are often completely destroyed in severe truck accidents.

In an accident, fractions of a second determine whether someone lives or dies. As with all forms of transport, just one small lapse in concentration, momentarily nodding off, or briefly being distracted can go on to cause an accident. For many years, rear-end collisions involving goods vehicles with a permissible total weight above 3.5 metric tons have been among the most serious events on our roads worldwide, and often cause severe or fatal injuries for the vehicle occupants. This is also shown by a master's thesis from 2020/2021 written at the DEKRA Accident Research department and the Institute for Engineering Design and Industrial Design at the University of Stuttgart, entitled "*Unfallgeschehen mit Güterkraftfahrzeugen – Analyse der Fahrzeuginnenraumgestaltung im Kontext der Insassensicherheit*" (Accident Statistics Involving Goods Vehicles – Analysis of Vehicle Interior Design in the Context of Occupant Safety).

An analysis of official accident statistics (DESTATIS) as part of this thesis revealed that rear-end collisions on freeways are the most common type of accident involving goods vehicles weighing over 3.5 metric tons. In 2019 there were 9,439 victims of accidents involving goods vehicles on freeways in Germany. The thesis aimed to identify typical deformation patterns and the main types of injury in truck cabs on the basis of real accident data, and identified potential design and ergonomic improvements for the interior.

The analysis was mainly based on the GIDAS database (German In-Depth Accident Study), which records roughly 2,000 accidents resulting in personal injury every year. The scope of the data documented in GIDAS covers more than 3,000 encoded parameters for each accident – including things like injury and deformation data. Due to the way the data is recorded and the regions covered, the database not only contains severe cases, but also many with more minor injuries among truck drivers. These, in particular, are very well-suited to this type of investigation as they enable the injury mechanisms to be effectively analyzed.

Ergonomic and safety aspects need to be integrated even more closely in the commercial vehicle development process

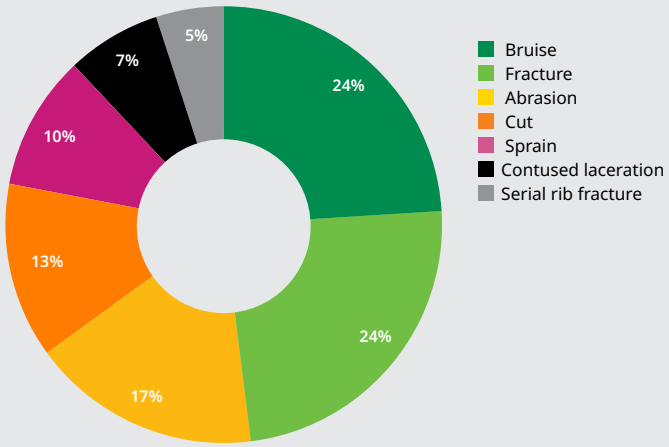
The analysis showed that bruises and fractures made up the lion's share of injuries, at 24 percent respectively. Abrasions, cuts, sprains, and serial rib fractures were also diagnosed. The lower leg (22 percent) and knee (20 percent) were the most affected areas of the body. The chest, abdomen, and head areas were often also affected. The severity of each individual injury was analyzed using the AIS classification (AIS = Abbreviated Injury Scale). Occupants may have suffered multiple injuries of different severities. The analysis of the vehicle technology, interior, and safety equipment showed that the steering wheel and parts of the dashboard are among the interior components most likely to contribute to an injury. When analyzing the vehicle deformation in the cases concerned, deformation with an average depth of 56 centimeters was identified on the front of the vehicle. Maximum penetration depths of up to 77 centimeters were even observed in the driver's area.

Frequent deformation in the footwell, on the steering column, or on the dashboard correlate significantly with injuries to the legs and rib cage. The risk of severe injury is additionally increased by the limited space available (due to the legal regulations on the maximum length of trucks) and the use of hard materials that do not absorb energy. The analysis revealed significant safety shortcomings – in particular on older vehicles that did not have airbags or modern restraint systems.

The results of the study highlight the need to integrate ergonomic and safety aspects even more closely in the commercial vehicle development process. It is also essential to raise driver awareness of the topic at regular intervals and promote their acceptance of restraint or assistance systems. This analysis also provides specific information about weaknesses in the interior design and suggests practical improvements for reducing injuries and, in turn, improving the safety of truck occupants.

The conclusions and recommendations take the form of both design measures and ergonomic improvements, such as introducing defined crumple zones not just in the front area, and an extended cab mount to allow for a controlled backward movement in the event of a collision. Fundamentally, an interior design that includes energy-absorbing materials, fewer hard edges, optimized designs for the steering column and seats, and more space in the footwell can make a lasting contribution to minimizing any risk of injury.

Breakdown of the most common types of injury in the GIDAS analysis*



* One person can suffer several injuries

Source: German In-Depth Accident Study (GIDAS)

Vehicle & Technology: the facts at a glance

- **DEKRA's road tests with a van once again show that the distribution of the cargo in the vehicle plays a decisive role in determining stability, the braking distance, and cornering behavior.**
- **Even minor changes to the position of the center of gravity have a noticeable impact on handling. A higher center of gravity is particularly problematic as the vehicle is more likely to overturn when traveling at the same speed. Modern assistance systems such as ABS and ESP are helpful, but cannot fully compensate for a poorly positioned center of gravity.**
- **It is crucial to secure the cargo in the vehicle because sliding goods make the vehicle unstable and can become dangerous projectiles in an accident. Day-to-day work for express courier/parcel delivery services, professional trades, and the logistics industry involves dealing with frequent stops, ever-changing loads in the vehicle, and time pressure – all of which increase the risks for staff. For this reason, modern shelving systems, modular cargo area structures, and digital monitoring solutions are becoming increasingly important.**
- **A joint study by Daimler Truck, TU Dresden, and DEKRA shows that modern assistance systems offer significant potential for preventing severe accidents involving vulnerable road users. Pedestrians and cyclists in particular benefit from automated emergency braking systems and warning systems. For motorcyclists, it is predominantly blind-spot information systems and extended underride guard solutions that make a difference.**
- **Rear-end collisions involving heavy trucks frequently cause severe injuries to the driver. The GIDAS analysis shows that bruises and fractures are the main type of injury and that the legs, knees, and rib cage are particularly affected. Hard materials, restricted installation space, and a lack of airbags in older vehicles additionally increase the risk. For this reason, energy-absorbing interior structures, optimized steering columns, a larger footwell, and defined crumple zones are recommended in order to bring about lasting improvements to occupant safety.**

How innovative technologies can make mobile work sites safer

Although many countries are taking different approaches to securing work zones on our roads, the risk of accidents at these sites remains high. In Germany, for example, analyses by the Federal Highway and Transport Research Institute (BASt) show that the level of safety is stagnating. If we look at international solutions, we also see that additional measures such as technical protection systems have so far only been used to a limited extent.

For many years now, temporary work sites have been some of the most challenging and accident-critical areas of our roads. A comprehensive analysis on this topic was conducted on behalf of the German Federal Highway and Transport Research Institute and published in 2008 under the title "*Verbesserung der Sicherheit des Betriebspersonals in Arbeitsstellen kürzerer Dauer auf Bundesautobahnen*" (Improving the Safety of Personnel Working at Temporary Work Sites on Federal Freeways). It clearly shows that the safety of these sites in Germany has barely improved, despite numerous improvements in other areas of road safety. The 951 accident reports analyzed for the BASt study show that these temporary interventions in the traffic environment are still associated with a high level of risk.

One particularly noteworthy finding is the dominant role of heavy goods traffic: around 60 percent of the accidents investigated were caused by trucks, whereas cars made up around a third. The data also shows that two types of accident occur repeatedly: a rear-end collision, and colliding with the sides of a vehicle or safety equipment – both of which occur with virtually the same frequency. The level of kinetic energy in such cases is regularly so high that it often results in severe injury or death. This particularly affects the site workers themselves as in around 80 percent of cases, the injured employees were in their vehicle at the time of the accident.

The data in the BASt study also shows that a large proportion of the accidents were caused by typical behavioral mistakes. This mainly relates to the driver not paying attention or being distracted, often caused by monotonous traffic situations or by them doing a secondary task not related to driving. Drivers failing to adjust their speed is also a key factor. When it comes to heavy goods traffic in particular, this relates less to speeding in the traditional sense, and more to them approaching too fast for that particular traffic situation, often without braking.

Against this backdrop, improved safety measures and effective traffic management equipment – such as mobile warning trailers with energy-absorbing elements – play a particularly important role. International practice – such as the widespread use of truck-mounted attenuators in North America – shows other potential options which are becoming increasingly relevant for Europe, too. The fact that we need to intensify our efforts in this respect isn't just clear from international comparisons – for years, the German Road Safety Council (DVR) has been calling for improved safety measures for mobile and stationary work sites and a more systematic use of technical protection systems in order to significantly reduce the severe consequences of rear-end collisions. In addition, back in April 2023 the DVR as well as major German automobile club ADAC highlighted the importance of new technologies such as the C-ITS-based work zone warning system, which aims to improve the reliable and early detection of mobile work sites.

Work to further develop existing safety concepts is worthwhile and necessary

Different concepts and technical solutions are used worldwide to ensure the safety of (mobile) work sites. While all countries aim to ensure the safety of the road users and workers, the systems and methods they use sometimes differ greatly in terms of philosophy, technical implementation, and the underlying legal framework. Whereas some regions rely heavily on passive, energy-absorbing systems, other countries use visual guidance elements or automated information and warning systems as their principal methods. Many places also still have a worker acting as a safety look-out. The variety of different measures used reflects both national safety cultures and general infrastructure and traffic conditions.

In large parts of Europe – including Germany, France, Belgium, Denmark, and Switzerland – work site safety is mainly ensured by means of rule-based concepts that use standardized signs/warning trailers, delineator posts, markings, and speed reductions. There are also yellow traffic signs, road work routing beacons, mobile pre-warning trailers, and visual or acoustic warning systems. Several countries, such as the Netherlands and Belgium, also use haptic warning systems in specific locations, such as portable profiled markings known as "warning thresholds" to warn inattentive road users at an early stage.

In contrast, truck-mounted attenuators (TMAs) have been a standard fixture of mobile work zones in countries like the USA and Canada for decades. These systems comprise large energy absorbers which deform in a controlled way if a vehicle hits them, thereby absorbing a lot of the impact energy. These systems are often complemented by portable rumble strips – elements with horizontal corrugations that generate acoustic and haptic warning signals when the vehicle drives over them – and dynamic pre-warning systems that are easily recognizable for drivers and inform them of the upcoming work site at an early stage.

Similarly, Asian countries have their own solutions and protection philosophies as well. Japan and South Korea increasingly use automated and connected warning systems comprising variable lane signs, LED panels, and vehicle-based notification systems to make it easier for drivers to recognize work sites. In Japan in particular, compact vehicle-mounted impact absorbers and collision-resistant plastic barriers are also used, in some cases together with highly reflective or fluorescent materials. In China and Taiwan, vehicle-mounted LED warning boards are often supplemented by comprehensive overhead signaling systems to make the upcoming work site more visible, even in heavy traffic. They tend not to use haptic warnings systems – instead they favor visually conspicuous warning structures, often large in size.

Some countries, such as Australia and New Zealand, take a mixed approach that combines elements of the North American TMA concept with European visual guidance systems. As in other countries, the focus is on dynamic displays, remote-controlled barrier systems, and increasingly connected systems. The integration of Cooperative Intelligent Transport Systems is already gaining importance on the international stage – a trend which is being reinforced by both the European "Data for Road Safety" initiative and American safety programs.

Overall, it is becoming clear that the available systems constitute a broad spectrum of technical and organizational measures: from visual, rule-based concepts to large energy-absorbing systems and digitally connected warning solutions. The analysis of global approaches also illustrates that work to further develop existing safety concepts is worthwhile and necessary to bring about lasting improvements to the safety of mobile and stationary work sites.

Work site safety systems put to the test

Using crash tests, C-ITS warning scenarios, and tests involving automated emergency braking systems (AEBS), DEKRA has investigated how different safety and protection systems behave under realistic conditions. The findings show differences in their existing and future potential to provide protection, and make clear that energy-absorbing systems, connected warning technology, and modern sensor systems together open the door to a new level of safety.

The collision with the safety vehicle with the TMA (top photo) was much less severe than the collision with the vehicle that had a warning sign mounted on a trailer.

If we consider the very different strategies taken worldwide to secure mobile work sites, the question arises how different technical approaches actually behave under comparable conditions – in particular when it comes to the impact energy, occupant safety, and the protection of the workers on site. DEKRA therefore conducted its own comprehensive tests in order to obtain a sound, practical data basis in this respect. They included targeted crash tests with a traditional mobile warning trailer as well as a mobile impact protection system, additional tests of how well these systems were recognized by automated emergency braking systems in modern trucks, and tests of the functionality of C-ITS-based work zone warning systems.

Major differences between systems that do and do not absorb energy

Two crash tests were performed in order to assess the protection provided by different road safety systems under realistic conditions. In each case a van from the 3.5 metric ton class, configured for a test weight of 3.07 metric tons, collided with the rear of a safety vehicle weighing around 17.6 metric tons at a speed of around 80 km/h (~50 mph). In the first test this safety vehicle was fitted with a truck-mounted attenuator (TMA); in the second test it had a mobile warning sign fitted on a trailer. The tests were based on the CEN/TS 16786:2018 standard and were performed with identical impacts in terms of the angle and the amount of energy introduced. Hybrid III dummies equipped with measurement instruments were placed in the van and on the driver's seat of the safety vehicle to ensure that the loads on the occupants of both vehicles could be assessed directly.

On the test system with the TMA, clear and progressive energy dissipation was identified during the collision. The TMA deformed in a controlled manner, which effectively reduced the peak deceleration. The van was decelerated almost fully along the length of the deformation element, the structure of the passenger compartment remained largely intact, and the dummy moved within the envisaged areas. The load readings remained low overall: the head acceleration reached a maximum of around 17 g, the chest acceleration also remained low, and the loads on both the neck and legs were well below critical levels. In addition, the warning sign mounted on the rear of the safety vehicle remained functional, meaning its warning effect remained in place for the traffic behind, even after the impact. The safety vehicle itself was only pushed forward slightly – an important safety consideration for anyone working in the secured area in front of the vehicle in a real-life situation.

In contrast, the test with the warning sign mounted on a trailer was much more complex and had much harsher consequences. During the collision, the trailer drawbar initially buckled and the trailer was pushed underneath the safety vehicle. As the first stage, this did cause limited energy dissipation due to the deformation of the trailer. The van did not hit the rear of the truck directly until the second stage. The mounted warning sign was lifted up and onto the front of the van, meaning it provided a certain amount of protection. Nevertheless, the crash

was much harsher than the test with the TMA: the peak deceleration occurred over a much shorter period of time, which was clearly reflected in the load readings recorded by the dummy. The head acceleration reached around 25 g, and the forces measured in the neck area were also much higher. Similarly, the chest acceleration readings were well above those recorded in the test with the TMA, albeit the measured penetration of the rib cage was on the moderate side. The warning sign itself was destroyed in the collision, meaning its warning effect was lost entirely. Additionally, the safety vehicle was pushed much further toward the simulated work site than in the test with the TMA, which would significantly increase the risk for anyone working there in a real-life scenario, and for people in the safety vehicle.

Overall, the two tests show very clearly how big the differences are between systems that do and do not absorb energy. The TMA mitigates the collision in a controlled manner, reduces the loads on the occupants, and keeps the safety vehicle in position more reliably. However, the collision with a traditional trailer warning system causes abrupt peak loads, higher biomechanical readings, and a higher level of risk for work site personnel due to the vehicle being pushed further forward. The results therefore clearly demonstrate the potential safety offered by energy-absorbing impact protection systems and why they are already being used as standard in many countries.

C-ITS systems are very effective

The crash tests impressively demonstrate what level of safety can be achieved through the use of suitable safety measures – both for the occupants of a colliding vehicle and for the people working in the secured area. In particular, the comparison between the energy-absorbing TMA and the mobile warning sign mounted on a trailer shows just how effective controlled energy dissipation is at mitigating the consequences of an accident. However, the tests also showed that these systems are subject to the laws of physics. Even if high-performance impact absorption equipment is used, severe accident consequences must still be expected if a heavy commercial vehicle is involved in a high-speed collision. For this reason, additional active safety measures are required to ideally prevent a collision from happening in the first place. These include not only traditional warning principles – such as portable rumble strips – but also modern connected solutions like C-ITS-based close-range warning systems.

With this in mind, road tests with a C-ITS-enabled test vehicle were performed as part of the project. The aim was to investigate the effectiveness of road work warning messages under real-life conditions. The test vehicle was a VW ID.Buzz equipped with an ITS-G5-based Car-to-X module. A work zone trailer equipped with a roadside unit served as the infrastructure and sent out standard-compliant road work warning messages. The test drives were performed on straight sections of road as well as in bends, at speeds of 85 km/h and 130 km/h (~53 and 81 mph). The position of the trailer alternated between the left and right-hand sides of the road.

About C-ITS

C-ITS stands for "Cooperative Intelligent Transport System" and denotes cooperative technologies for overarching communication from one vehicle to other vehicles, the infrastructure, and non-motorized road users. C-ITS enables information and warnings about traffic situations and dangers to be exchanged directly and/or via a back end. You could say that the technology makes the various road users visible in digital form. When it comes to our roads, the technology could be used for things like sending warnings about work zones or the ends of traffic jams and displaying traffic signs in the vehicle.

The analysis shows that C-ITS systems are generally able to notify road users of mobile work sites reliably and at an early stage. The message was correctly triggered in around 81 percent of all test drives – almost always at 85 km/h (~53 mph), and with individual failures at 130 km/h (~81 mph). These failures could not be analyzed in detail due to missing log data. One particularly positive aspect is the long warning range in many scenarios: at a speed of 85 km/h (~53 mph) the warning was often issued in the range between around 240 and over 330 meters, and even earlier in individual cases. Long warning distances of over 350 meters were also achieved at a speed of 130 km/h (~81 mph). This gives drivers enough time to reduce their speed or change lanes at an early stage.

In the cockpit, the C-ITS system shows the distance to the work zone early on.

At the Lausitzring test track, DEKRA's experts also examined how effective C-ITS-based work zone warning systems were.

In most of the tests conducted with automated emergency braking systems, the systems reacted to work zones at an early stage with visual and acoustic warnings and automatic braking maneuvers.

At the same time, significant variation in the warning distances was seen in some cases. When driving at speeds typical of rural roads, consistent warning ranges were achieved for the most part. However, at freeway speeds the warnings ranged from very early (over 400 meters away) to quite late in individual cases (less than 70 meters). At high speeds, the latter scenario, by its very nature, leaves insufficient time for the driver to react. However, these cases occur much more rarely in the overall set of measurements. The tests did not identify that the vehicle position (approaching directly vs. in the next lane) had any clear impact. In contrast, the data indicates that at a speed of 130 km/h (~81 mph), positioning the work zone trailer on the left-hand side of the road more frequently resulted in a shorter warning distance or individual failures. However, due to the limited number of tests conducted, no authoritative general correlation can be derived yet. Similarly, at a speed of 130 km/h (~81 mph) the system tended to have more problems detecting the message when cornering as opposed to on straight sections. However, at a speed of 85 km/h (~53 mph) there were barely any differences between these two scenarios.

Overall, the tests show that C-ITS-based work zone warning systems offer high potential for improving road safety – especially if sensors on the vehicle, such as cameras or radar, cannot reliably detect the mobile warning trailer on account of the road geometry or lighting conditions, or if such systems have not been installed at all. In this case, C-ITS acts as an additional digital level of perception which informs drivers at an early stage, regardless of the external conditions. As such, the technology can play a key role in preventing rear-end collisions with mobile safety systems, or at the very least reducing how severe they are. The results also underline how important it is to continue expanding the use of these systems and standardize them: the more vehicles and pieces of infrastructure support C-ITS, the more stable, reliable, and effective the system as a whole will be – and the greater the boost in safety for road users and on-site workers alike.

Modern AEB systems can detect dangerous situations at an early stage

In addition to the C-ITS communications, DEKRA's experts also investigated advanced emergency braking systems (AEBS) fitted to heavy commercial vehicles. The aim was to evaluate their ability to detect and react to mobile warning trailers under realistic conditions. In the tests, an articulated vehicle without a semitrailer was driven toward a secured work zone at different speeds – including 60 km/h (~37 mph) on sections resembling a rural road and 85 km/h (~53 mph) in sections classed as freeways. The work zone comprised traffic beacons, a mobile warning trailer, and a preceding tractor vehicle in order to mirror the usual techniques used in Germany to secure temporary work sites.

Overall, the results show that modern AEB systems perform well. In most scenarios, visual and acoustic warnings were triggered at an early stage, as were automatic braking maneuvers. The system reacted reliably in all tests when traveling on straight sections of road at a speed of 60 km/h (~37 mph). Even at 85 km/h (~53 mph), there was a consistent response from the system with clear warnings and automatic braking in several test runs – particularly if the safety trailer was positioned on the right. The night-time tests confirmed the effectiveness of the sensors: their ability to detect the work zone was

comparable to during the day, and in some cases it was even more stable.

In individual tests where the window for spotting the object was heavily reduced – e.g. behind a bend or positioned in a concealed location at the side – the object did not appear in the sensor's detection range until late on. In these scenarios, the system only had a very short window of time to react. In some cases a brief braking intervention was triggered but then canceled again as the system continued its analysis. This is typical of scenarios with severely restricted lines of sight and reflects real challenges from accident statistics.

Overall, the tests performed confirm that modern advanced emergency braking systems are highly effective, even when confronted with complex work zone scenarios. At the same time, it is clear that the general physical conditions and road geometry play a key role if the system's line of sight is very short or the object is hidden from view. In such cases, cooperative systems such as C-ITS can play a meaningful complementary role by providing additional information regardless of whether there is a direct line of sight. If we bring together sensors on the vehicle, cooperative infrastructure communication systems, and an attentive driver, we end up with a robust overarching safety concept that offers significant potential for preventing or mitigating severe rear-end collisions at work zones.

Against this backdrop, there are a number of recommendations for how to proceed: equipping more vehicle fleets with C-ITS technology; equipping mobile warning trailers with wireless roadside unit technology or a permanently installed radio unit as standard; further developing the system design to more effectively cover complex scenarios; increasing the use of energy-absorbing safety systems; and harmonizing normative requirements across the globe.

STATEMENT

Our roads as workplaces: traffic accidents as an occupational hazard?

Michael Mertens
Deputy Chairman
German Police Union (GdP)

For this year's January issue of our members' magazine "DEUTSCHE POLIZEI" (GERMAN POLICE), we chose the title "*Arbeitsplatz in der Gefahrenzone*" (Working in Danger Zones) for good reason. Anyone with a bit of worldly wisdom will of course know that people who quite literally work "on the roads" as police traffic officers usually have direct experience of how assignments can often put people's lives in danger, and in some cases even have fatal consequences. Far too many emergency personnel have already had to bravely and suddenly jump out of the way of a rapidly approaching car or truck out on the road, for example when securing the scene of an accident.

The risks to life and limb are increased further by unclear danger zones, darkness, and adverse weather conditions, as well as vehicles traveling too fast for the conditions, a lack of comprehensive traffic management systems (ideally in digital form), and insufficient consideration of shoulders or safe areas in traffic infrastructure plans. When taken together, all this turns our roads into a high-risk workplace.

This is taken to extremes on Germany's freeways. Particularly on sections with no speed limit (which make up a large part of the roads), traffic police officers always need to consider everything that might affect the flow of traffic, including inexperienced, distracted, and – as a particularly high-risk group – unfocused and arrogant car drivers.

With over 210,000 members, we are the strong voice of the police. Our mission is to make our roads as workplaces much, much safer for the police officers who work on them. Naturally, the eminently sensible goal of "Vision Zero" has a direct impact on the risk of injury borne by the emergency services. Simply put, the safer our roads, the safer our workplace. As a trade union, we will therefore much more strongly urge politicians to do what is necessary and possible. Anyone who would rather wait will need a great deal of patience and, above all, a lot of luck to see improvements in practice before it's too late.

Of course, a lot of positive work can be done by the police as well, including more widespread and in-depth training on the correct ways to secure sites and protect oneself. This becomes even more effective when regular training sessions, in particular in realistic scenarios, help to build up confidence among emergency personnel and consolidate their skills in terms of taking the right action and their routine.

Annoyingly, the union's demands for sufficient and standardized safety gear across the country reminds us of a needle getting stuck in a repetitive loop on a vinyl. The need for high-visibility, highly reflective warning clothing and modern safety materials everywhere, with the same quality standard and availability, could not be clearer. Am I wrong to think this? However, consistent standards are still not in sight in Germany.

Our new, soon-to-be-published traffic policy provides a comprehensive overview of our demands to increase safety for our colleagues. These include: more driver assistance systems in heavy goods traffic; higher penalties if someone unlawfully turns off the automated emergency braking system; binding rules for how to behave when driving past the scene of an accident; the new criminal offense of "Incorrect, intentionally risky and dangerous driving at the scene of an incident"; the comprehensive expansion of digital traffic management systems; and the rapid establishment of digital traffic systems – particularly for detecting collisions with emergency vehicles at an early stage.

Ensuring effective protection for emergency services who work on our roads will require a systematic rethink in the worlds of politics and local authorities. This is where the overarching conditions can be established for finally giving emergency personnel a much safer working environment.

Finally, I'd like to stress that anyone who is intoxicated due to alcohol, cannabis, other drugs, or medication belongs in a taxi, the bus, on the sofa, or in bed – and certainly not behind the wheel of a vehicle.

Massive shortage of parking spaces and increasingly unsafe and insecure parking areas

The parking situation along German and European freeways has become much worse in recent years. Many rest stops are overcrowded, poorly lit, or have inadequate surveillance. Large-scale investments in infrastructure and safety and security are therefore essential.

Many rest stops have lines of trucks parked close to one another by the time the sun goes down. Searching for a parking space often becomes a game of patience.

Drivers spending a long time searching for a free space, dangerous evasive maneuvers, and increasing levels of crime – these are the findings of a survey of around 100 professional drivers from different countries that DEKRA conducted for this Road Safety Report. More than half of the participants have been working in the trucking industry for over ten years, which makes their assessments very reliable.

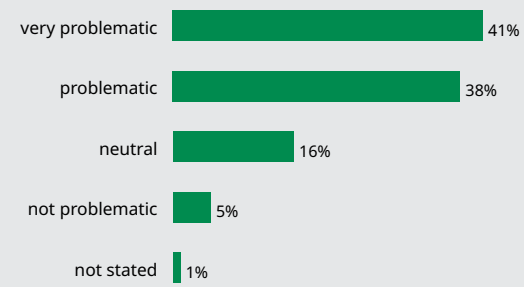
The data shows that searching for a suitable parking space has long been a daily bugbear for many drivers. Around 43 percent need an average of 30 to 60 minutes, and a further 24 percent even need more than an hour. The time period between 3 p.m. and 5 p.m. is particularly critical as this is when the problem worsens dramatically on many sections of freeway. The situation is challenging for drivers transporting dangerous goods, refrigerated products, and animals and those transporting cargo at risk of theft, as they are subject to additional requirements. The respondents rated Germany as the country where it was most difficult to find a parking space. Cars and other vehicles that block truck parking spaces are a further source of frustration, with this complaint being made repeatedly by the drivers.

The consequences of these bottlenecks are severe. Almost two thirds of those surveyed repeatedly had to park their trucks in a potentially dangerous location such as entry and exit roads or at the roadside. Many professional drivers have to keep on driving for a significant distance before finding a free space, with more than half of those surveyed stating that they usually had to drive more than 20 kilometers (~12.4 miles) extra. This additional driving not only increases the time pressure, it also makes it more difficult to comply with legally mandated rest periods.

Digital tools are playing an increasing role in the search for a parking space, with around two thirds of those surveyed using apps for this. However, when asked about their willingness to pay for a guaranteed

How do you rate the search for a parking space?

Drivers spend a long time searching for a space: most of the professional drivers need 30 minutes or more every day.



Source: DEKRA

space, the participants were split: 22 percent were prepared to pay up to five euros (just under six U.S. dollars) but 20 percent rejected any kind of charge. A third stated that their decision depended on the specific location.

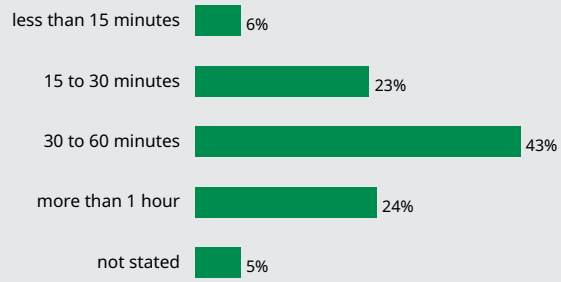
The safety and security of the parking spaces are also becoming more and more important. The DEKRA survey shows that 60 percent of the professional drivers consider a lack of video surveillance (which is often the case) to be the biggest risk to safety and security, followed by inadequate lighting. Just under a third of the drivers feel unsafe at the rest stops because there are no police officers or security personnel present. Additionally, almost 50 percent confirmed that they often avoided specific rest stops as they felt unsafe there. In 2025, around 20 percent of those surveyed experienced a security incident, including vehicle break-ins, theft of cargo, and vandalism. In isolated cases drivers were also physically assaulted. One driver reported six attacks within the space of three years; another of an attempt to break in to their vehicle.

Drivers have very different perceptions of the level of safety at European rest stops. While Germany is considered to be relatively safe, drivers from France, England, the Netherlands, and Belgium report attacks, thefts, and violent disputes. In France, for example, there were reports of armed groups attacking truck drivers. To protect themselves, many drivers turn to improvised measures such as blocking the radio signal from their vehicle key. Broken tank lids or slashed tanks are also common, particularly in remote parking areas. For these reasons, among others, the Benelux countries are rated as particularly problematic by numerous drivers as there are more incidents there involving migrants who attempt to jump onto the trucks.

Similarly, the cleanliness of the rest stops is important to many drivers and considered a basic prerequisite for dignified employment. Suggestions such as gym/fitness areas at rest stops also demonstrate the desire for more options to look after their health and recover during their breaks. The “typical ammonia smell” at rest stops was described as irksome. In addition, the drivers were dissatisfied with the costs. Many considered ten euros (around 11.50 U.S. dollars) for a shower to be excessive; likewise for the parking fees of up to 25 euros (around 29

How much time do you need to find a parking space?

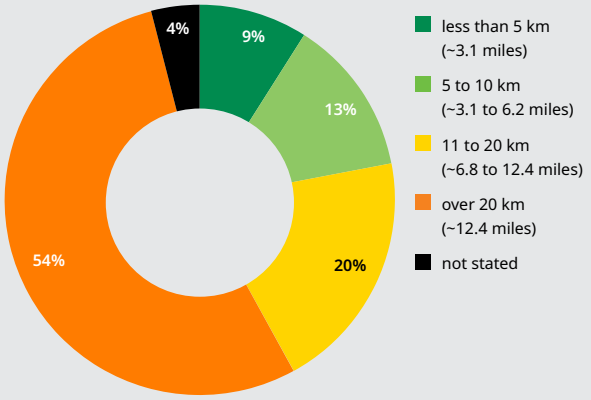
Germany is considered particularly critical compared with other countries: many drivers state it is very difficult to find a parking space here.



Source: DEKRA

Additional driving required

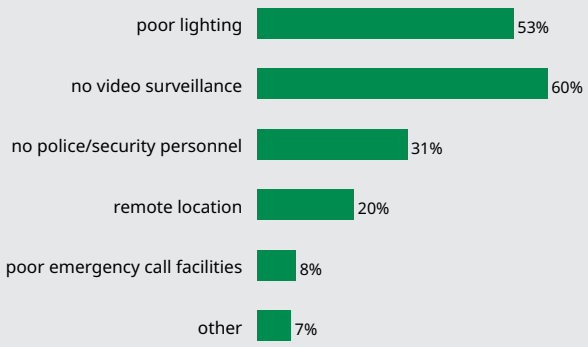
In the search for a free parking space, more than half regularly have to drive over 20 kilometers (~12.4 miles) extra.



Source: DEKRA

Biggest safety/security risks

Insufficient safety/security dominates the survey results: a lack of video surveillance and inadequate lighting, particularly in remote parking areas, are considered the biggest risks.

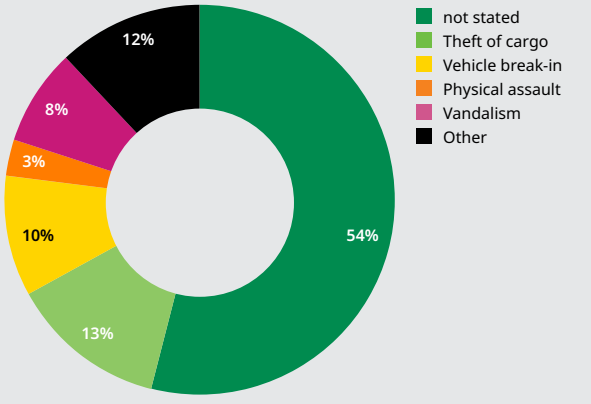


Multiple answers possible

Source: DEKRA

Types of incidents

Inconsistent level of safety/security throughout Europe: in parts of western Europe in particular, drivers report an increased risk of thefts and attacks.



Multiple answers possible

Source: DEKRA

U.S. dollars) per night. Whereas parking in Spain is often free, German rest stops often link their fees to a minimum spend – a model that many consider unfair.

Overall, the survey and the accompanying discussions clearly show that the professional drivers would like comprehensive improvements to their working environment. These include not only more and larger parking spaces, but also improved facilities: clean, free washrooms; good lighting; video surveillance; digital information provided in real time; and the option to make reservations. There was also a lot of discussion about the actual working conditions. Many of those surveyed want more respect in society, better remuneration, and a clear segregation of duties between drivers and customers – particularly when loading and unloading the vehicle.

More truck parking spaces are required

In Germany, although the federal government and states have been building new truck parking spaces for years, the increase in freight traffic has meant they have, so far, been unable to make up the shortfall. According to experts, another 40,000 or so parking spaces for trucks are required on German freeways alone. One challenge in this respect is the legally mandated driving time and rest periods. Truck drivers must always comply with these rules, otherwise they run the risk of severe penalties. Due to the lack of parking spaces, truck drivers therefore often park their vehicles at the entrance and exit roads of gas stations and rest areas or in breakdown lanes to ensure they do not breach the rules on driving time. This poses a high risk of accidents because the trucks often have insufficient safety measures.

To help remedy this situation, Bosch Service Solutions GmbH, for example, has developed a "360 degree solution" to improve digitalization and safety at truck stops and rest areas with its "Secure Truck Parking" platform. By means of a booking platform and an app, it enables freight forwarders and truck drivers to reserve available parking spaces along their route while planning the route, and to view them in real time and book them online, thereby eliminating the time-consuming and stressful search for a parking space as they approach the end of their permitted driving time. More than 650 parking areas in twelve European countries with approx. 12,000 parking spaces have already been listed.

Once a parking space has been reserved, truck stop sites such as "Autohof Frechen" or "Break Autohof Hamburg-Nordheide" automatically record the truck's license plate using a camera when it drives in and compares it with the booking data. The barrier opens and the driver can then easily drive to their parking space. The freight forwarder makes the payment by means of a convenient monthly collective invoice. The Bosch concept also ties in with the "sharing economy" principles for opening up access to additional parking spaces – alongside parking spaces at truck stops, the booking platform also includes spaces available on the premises of companies located near to the freeway. This has the advantage of eliminating the need to pave over additional land, and ensures that we make full use of areas which already exist.

Again and again, there are calls for legislators to intervene in the situation. To date, the penalties for exceeding the permitted driving time have been much harsher than those for illegal parking. Making them consistent could dissuade some truck drivers from parking their vehicles at critical spots. However, this would only shift the problem elsewhere because the truck drivers would then have to continue driving until they found a free parking space – and fatigued and stressed drivers pose a higher risk of accidents.

STATEMENT

We must build more than 4,000 new truck parking areas by 2040

Dirk Penasse
General Manager
ESPORG (European Secure Parking Organisation)

Safe and Secure Truck Parking Areas (SSTPAs) are a cornerstone of road safety and well-being across Europe. They ensure that drivers can rest properly and with dignity, that valuable cargo remains secure, and that the entire supply chain can rely on the fact that both truck and driver are protected. A well-rested driver is a safer driver — and secure, well-managed parking facilities make that possible every day.

But modern parking areas are evolving. They are no longer just places to park and rest — they are becoming true service hubs for the transport and logistics sector. They combine the essential values of safety and security with a growing range of services, from comfortable rest amenities to digital connectivity, maintenance, and vehicle charging infrastructure. These facilities help drivers stay healthy and alert, operators stay informed, and goods stay on the move safely and efficiently.

ESPORG's commitment to road safety is firmly backed by evidence. As shown in our recent study for the European Commission, safe and secure parking areas contribute directly to reducing road incidents and fatalities. By ensuring that professional drivers have adequate conditions to rest and recover, we reinforce one of the key pillars of a safer European transport network.

However, the current shortage of SSTPAs remains a critical challenge. To meet the needs of Europe's transport system, we must build more than 4,000 new truck parking areas by 2040 and upgrade many existing ones to ensure they meet the highest quality and safety standards. This requires close collaboration between public authorities, industry partners, and service operators.

ESPORG is proud to work with DEKRA as a trusted partner on this journey. DEKRA is the first certification body authorized to certify parking areas under Delegated Regulation (EU) 2022/1012, and we deeply value our partnership in auditing the ESPORG Green Parking Standard. Together, we promote high-quality, secure, and sustainable rest areas that enhance road safety, protect the environment, and support drivers in their vital work.

At ESPORG, we believe that every safe rest is a life saved, every secure stop strengthens the supply chain, and every investment in parking quality moves Europe closer to its Vision Zero goal — safer roads for everyone.

Infrastructure: the facts at a glance

- **Despite many improvements to road safety, there is still a high risk of accidents at temporary work sites. These are mainly caused by heavy goods vehicles. Typical mistakes such as distraction or inappropriate speeds play a key role.**
- **International comparisons show that many countries make greater use of technical protection systems, such as energy-absorbing truck-mounted attenuators or connected warning technology. In contrast, Europe mainly uses visual, rule-based safety systems, while North America and parts of Asia use active and automated systems much more.**
- **DEKRA crash tests show that a truck-mounted attenuator dissipates the impact energy in a controlled way and significantly reduces the loads on the occupants. The passenger compartment remains stable, the peak deceleration is low, and the safety vehicle is barely pushed forward.**
- **Trailers with a mounted warning sign absorb virtually no impact energy and the load readings are much higher. The safety vehicle is also pushed far into the work area, significantly increasing the risk for the workers there.**
- **DEKRA road tests confirm that C-ITS is a valuable means of supplementing the sensor systems on vehicles, particularly if the line of sight is restricted or objects are concealed.**
- **In the DEKRA tests, modern advanced emergency braking systems (AEBS) react reliably for the most part to mobile warning trailers at speeds of both 60 km/h and 85 km/h (~37 and 53 mph). Their ability to detect the trailer also remains high at night. In scenarios with heavily restricted lines of sight/visibility – such as behind bends – the window of time to react is shortened significantly, which can result in delayed or canceled braking interventions. Here, the tests show that AEBS and C-ITS together enable a much more robust level of safety.**
- **The DEKRA survey of professional drivers shows that the search for a parking space has become a daily bugbear for many.**
- **Over half of those surveyed regularly need to park up in a dangerous location, and often have to drive further – more than 20 kilometers (~12.4 miles) – to find it. This makes it more difficult to comply with the legally mandated rest periods and significantly increases the risk of accidents.**
- **Around 60 percent of drivers consider a lack of video surveillance to be the biggest safety/security problem, followed by poor lighting. Almost a third feel unsafe because there are no police officers or security personnel, and around half deliberately avoid certain rest stops.**

DEKRA's demands to improve safety on the road as a workplace

The previous sections of this report impressively demonstrated that when people head out on our roads for their work, they are exposed to numerous safety risks. Despite major technical advancements and the existing regulations in force, severe accidents resulting in injuries and deaths still occur. A range of measures can be taken to improve the situation.

Record work-related traffic accidents separately and in full

Existing statistics do not record a large part of work-related travel separately, e.g. journeys made by car, van, or bicycle. As a result, a significant proportion of the actual accident statistics remains invisible, hidden among the rest of the data. For this reason, the data needs to be recorded more precisely so that we can better assess the real hazards on the road and develop appropriate preventative measures.

Systematically protect work sites on the road

Workers at work zones and in secured areas are exposed to a particularly high level of risk. Accidents are frequently caused by vehicles driving into cordoned-off areas or workers being struck by vehicles. Clear safety measures are therefore required, such as physical separation, speed management, and clear traffic routing. Moreover, the applicable regulations and guidelines need to be implemented more consistently.

Use energy-absorbing impact protection systems at mobile work sites

DEKRA crash tests show that energy-absorbing systems such as truck-mounted attenuators (TMA) dissipate the impact energy in a controlled way and significantly reduce the loads on the vehicle occupants. The safety vehicle also remains more firmly in its position, considerably reducing the risk for workers at the work site. In contrast, traditional warning and safety systems mounted on trailers cause much higher loads on the occupants during a collision and can cause additional hazards. As a result, energy-absorbing systems must become much more widespread, together with other safety measures.

Comprehensively integrate connected warning systems (C-ITS) into safety and work zone concepts

DEKRA road tests show that cooperative warning systems (C-ITS) are a valuable means of supplementing the sensor systems on the vehicle, in that they connect vehicles with the infrastructure (V2X) and provide additional safety, particularly if the line of sight/visibility is restricted or

objects are concealed. It has also been shown that combining automated emergency braking systems with connected warning systems provides a much more robust level of safety than individual systems by themselves. Therefore, consistent standards need to be established and connected warning technology needs to be systematically integrated into existing safety strategies and rolled out in vehicles.

Consistently tighten up and monitor the regulations governing how cargo is secured
DEKRA road tests with a van show that even minor changes to how the cargo is distributed in the vehicle can have a significant impact on how the vehicle behaves. A high center of gravity amplifies rolling movements, adversely affects driving stability, and makes the vehicle more likely to overturn, while the braking distance can be extended by up to 45 percent on bends, depending on the specific load. These results illustrate that we need better technical support for, comprehensive training on, and strict checks on the correct loading of vehicles of all kinds, including how the cargo is secured.

Implement mandatory minimum standards for the training and qualifications of drivers who drive under blue lights
When members of the police, fire service, or rescue services drive under blue lights, they are exposed to a high risk of accidents. There are extreme differences between countries in terms of the qualifications that these drivers are required to have. As such, we need legally mandated minimum qualifications for theory and practice as well as regular refresher courses that go beyond simply holding the relevant license for the class of vehicle in question.

Systematically reduce the risks when driving under blue lights
Time pressure, the need to take decisions, and highly dynamic driving significantly increase the risk of accidents when driving under blue lights. Additional duties such as communicating by radio or having to search for the destination also make it more difficult to drive the vehicle safely. Targeted organizational and technical measures must be taken to reduce these structural risks for the long term and eliminate the need for the person behind the wheel to do secondary tasks.

Introduce fundamental improvements to restraint systems in rescue service vehicles
Studies show that emergency personnel often do not fasten their seat belt while attending to the patient in the vehicle, as the existing belt systems can restrict them in providing the necessary medical assistance. This results in a high risk of injury for both the staff and patient due to the vehicle's movements and in the event of an accident. For this reason, we need special ergonomic restraint systems that enable the staff to provide the necessary medical assistance while also keeping them safe.

Service agricultural machinery and keep it clean
A significant proportion of fatal accidents involving tractors is caused by problems with the lighting systems. It must be ensured that they are serviced and kept clean.

Comply with and further develop the regulations for the transportation of dangerous goods
Although accidents involving dangerous goods are rare, they can have severe consequences for people and the environment. The existing regulations have proven to be effective, but still need to be updated on a continuous basis. It must be ensured that training and checks are carried out consistently.

Bring about lasting improvements to the working conditions in the transportation industry
Time pressure, long working hours, and a lack of breaks increase stress and the risk of accidents. These burdens have a direct impact on driving behavior, regardless of whether the vehicle is a bicycle, van, or heavy goods vehicle. Work schedulers and planners must take this into account to keep drivers safe and healthy.

Ensure strict checks of and compliance with legally mandated driving times and rest periods
Fatigue and monotony are key risk factors in traffic accidents. While the existing regulations are effective, they are checked in different ways. Checks must be carried out comprehensively and consistently in order to ensure that these regulations are being followed. The checks also need to cover the working time regulations for drivers of vehicle classes that do not fall under the applicable rules for driving time and rest periods.

Build more safe and secure, well-lit truck parking spaces with video surveillance
All across Europe, more safe and secure, well-lit truck parking spaces with video surveillance and real-time availability information must be built. A lack of safe and secure parking causes drivers to take risks by improvising and breaking the rules, which increases the risk of accidents. Safe and secure parking spaces improve not only road safety, but also the drivers' working conditions.

Mandate the introduction of health promotion programs for professional drivers
Health problems like a lack of exercise, stress, or a lack of sleep have a direct impact on driving safety. Prevention programs can demonstrably help to improve drivers' health and safety. These programs must become a permanent part of company safety concepts.

Continue expanding medical care networks for drivers
Initiatives such as DocStop show that a structured network for the provision of medical care along main traffic routes can make an important contribution to improved road safety. Rapid medical assistance reduces the risk of accidents caused by illness. Efforts must be made to drive forward the expansion of these systems across Europe.

Consistently reduce distraction
Distraction caused by smartphones, sat-nav devices, or other tasks significantly increases the likelihood of an accident. Studies show a clear link between distraction and critical traffic situations. Mandatory measures to minimize distraction must be taken.

Only allow highly automated driving under clearly defined safety conditions
The changeover from passive to active control of the vehicle places high demands on how attentive the person driving the vehicle is. Studies show that it takes time to take over control of the vehicle and that this process can be prone to errors – especially if the person behind the wheel has not familiarized themselves with the system. Clear rules must be defined for suitable secondary tasks, takeover times, and system limits.

Introduce a mandatory offer of psychological aftercare after a serious traffic accident
Serious traffic accidents can have long-term psychological consequences which also compromise the person's fitness to drive. Early psychological support can help to reduce the negative consequences. It must be ensured that those affected receive professional help promptly.

Any questions?

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Our services for more safety

DEKRA ensures the safety and performance of all kinds of vehicles in road traffic. The company offers comprehensive inspection services for cars and motorbikes through to trucks and buses.

DEKRA inspects and certifies products to ensure they operate safely and comply with the relevant standards and regulations for access to global markets.

DEKRA offers comprehensive safety inspections and assessments all over the world for buildings, infrastructure, and industrial facilities.

DEKRA offers compliance, performance improvement, and supply chain services relating to safety and sustainability standards.

LEGAL NOTICE – DEKRA Road Safety Report 2026 "Working in Road Traffic"

Publisher:
DEKRA Automobil GmbH
Handwerkstrasse 15
70565 Stuttgart, Germany
Tel.: +49 7 11 78 61-0
Fax: +49 7 11 78 61-22 40
www.dekra.com
May 2026

Responsible for the publisher:
Uta Leitner

Project management:
Wolfgang Sigloch

Editing:
Matthias Gaul

Susanne Spotz (ETMcp)
Monika Roller (ETMcp)

Layout:
Florence Frieser
Marion Reuther

Realization:
EuroTransportMedia Verlags- und Veranstaltungs-GmbH
Corporate Publishing
Handwerkstrasse 15
70565 Stuttgart
Germany
www.etm.de

Management:
Bert Brandenburg
Oliver Trost

Picture credits:
Adobe Stock: Eduardo Barraza 16; benjaminnolte 22; Beton Studio 46; Horst Bingemer 60; Davor 44; DC Studio 50; ifeelstock 6; Dusan Petkovic 52; Marko Geber 47; Gorodenkoff 58; Andreas Gruhl 5, 14; Kara 38; littlewolf1989 42; maxbelchenko787 80; Mediteraneo 40; PRILL Mediendesign 10; Ronald Rampsch 8, 72; Dietmar Schäfer 5, 66; Tobias Seeliger 20; Gerhard Seybert 24; Serhii 48; stgrafix 26; Vlad 11. Alamy Stock Photos: Stamp Collection 6; Heritage Image Partnership Ltd 6. Antonio Avenoso 19; BMV/picture alliance/ImageBROKER Sylvio Dittrich 12; Bosch 74; Road Traffic Bureau of the Polish National Police Headquarters 55; CTIF 43; Eloy Comabella/IRU 11; Daimler Truck AG 9, 62; DEKRA 1, 13, 23, 30, 31, 32, 33, 34, 35, 36, 37, 54, 59, 64, 68, 69, 70, 74, 76, 78; DG Move/EU Commission 7; DISR 28; DRK LV Westfalen Lippe 10; ESPORG 75; European Commission 11; GM Media Archive 8; Verena Günther 49; Julian Hoffmann 10; Hagen Immel 71; IRU 12; Ital Communications 13; Kirschbaum Verlag 13; Martin Lukas Kim / DVR 9; Knorr-Bremse 8; Tobias Koch / tobiaskoch.net 4; Thomas Küppers 3; Andrea Möller 18; Mercedes-Benz Classic 6, 8; National Safety Council 15; Olaf Ostermann for LVR-Archaeological Park Xanten 6; Imperial Law Gazette 1884 p. 69 6; Technik Archiv Hahn 8; picture alliance/Fotostand Freitag 13; Prevenção Rodoviária Portuguesa 39; Henk Swarttouw 41; Private 53; Rémi Vatinel 45; Kurt Vollmacher 21; WHO 13.

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