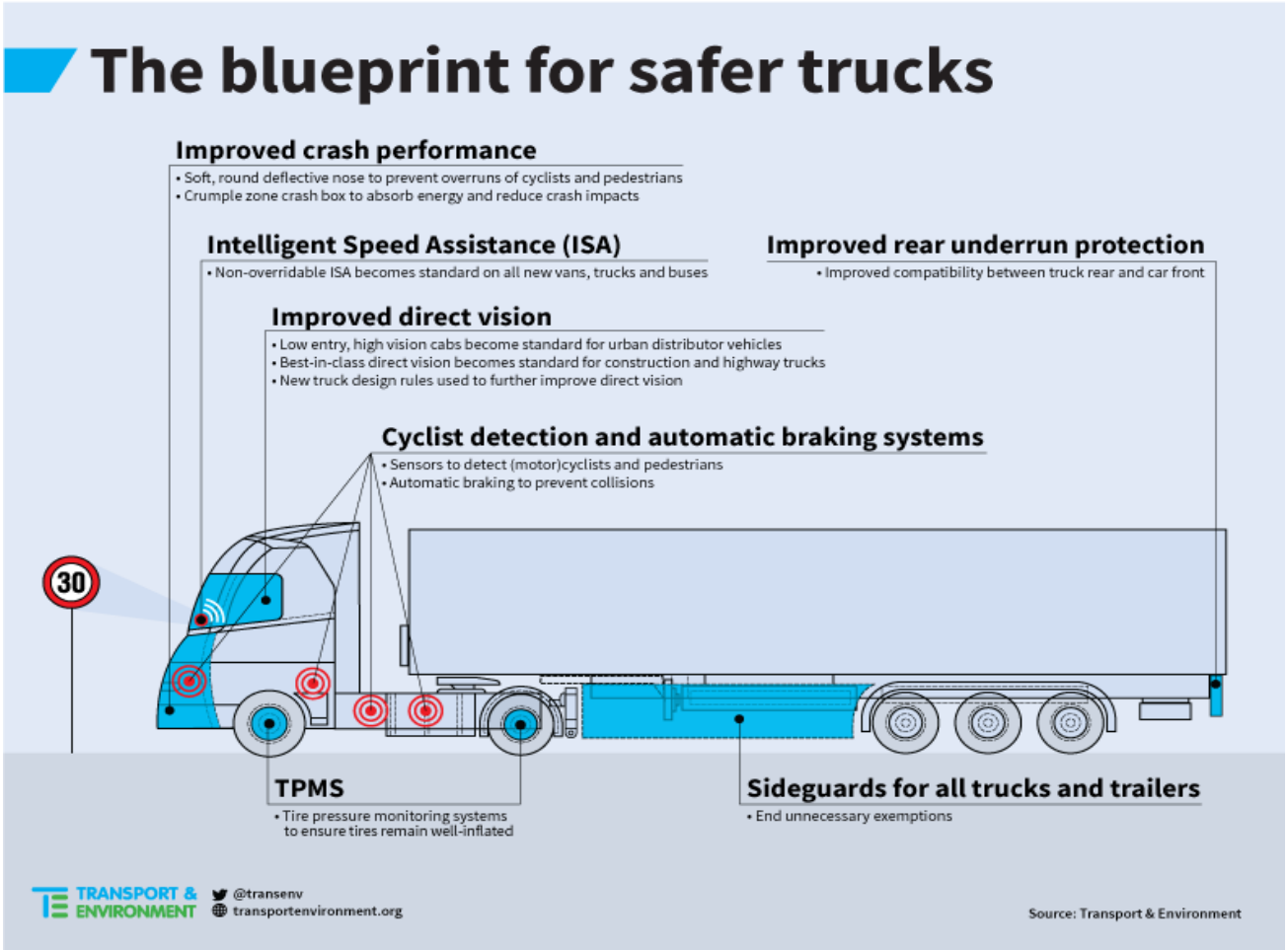
Road safety – time for Europe to shift gears

The number of people dying on Europe's roads nearly halved between 2000 and 2010. But this spectacular progress has now grinded to a halt. In 2014 and 2015 fatality numbers remained stable. Progress on reducing deaths amongst vulnerable road users (VRUs) such as cyclists and pedestrians has been particularly disappointing. The total number of cyclist and pedestrian fatalities decreases much slower than compared with other road deaths. Furthermore their share in the total number of road fatalities is increasing.[i] [ii]

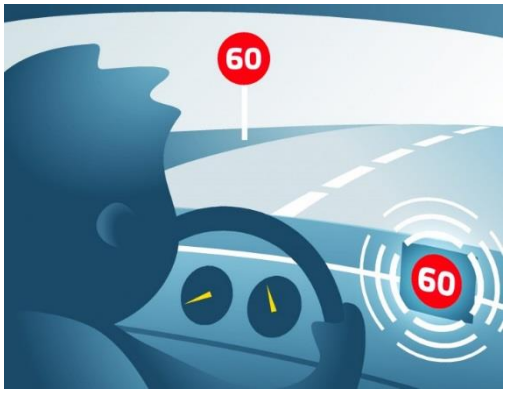
Only the EU can set mandatory safety standards for new cars, vans and trucks. However, the last time it has introduced new vehicle safety requirements was in 2009. This is especially problematic for vans and trucks where market pressure and labelling initiatives such as Euro NCAP are mostly lacking. The Commission has announced it will propose new safety standards for cars, vans and trucks in 2017. A communication outlining its plans is expected in autumn 2016 and a legislative proposal will come the year after.

Since the last GSR review in 2009 multiple new safety technologies have emerged or matured. Below we list the ones the Commission should prioritise in its new vehicle safety law.



Safety technologies for cars, trucks, vans and busses

ISA (Intelligent Speed Adaptation)



Speeding is a major problem that has a significant effect on traffic safety. According to the ETSC, drivers exceed the speed limits on all roads by 10 to 60%.[iii] It is estimated that for every 1km/h decrease in speed, collisions are reduced by 3%.[iv]

Intelligent Speed Adaptation is an in-vehicle technology that assists drivers in complying with different speed limits.[v] It communicates that information to drivers but can also be used to *actively limit* the speed of the vehicle.[vi] A study that combined research from several European countries estimates that a mandatory ISA for cars – where the driver cannot exceed the speed limit – would reduce fatal accidents by 37%.

A 2013 DG MOVE study predicts that a voluntary ISA could reduce fatal accidents with heavy commercial vehicles by 25%.[vii] Better speed compliance would also reduce CO_2 and NOx emissions. The cost for this technology is estimated to be around €400 per vehicle but research suggests that the safety and environmental benefits far outweigh the costs.[viii] Moreover, ISA is a stepping stone and precondition for vehicle automation. In that sense there could be significant industrial benefits in rolling out ISA in the EU at an accelerated pace.

Therefore we recommend that:

1. Non-overridable ISA should become compulsory for trucks, busses and vans.
2. Overridable ISA should become compulsory for new passenger cars.

Autonomous Emergency Breaking Systems (AEBS)

AEBS detect objects to the front of vehicle and automatically brakes to avoid a collision. So far AEBS has mainly been deployed to avoid front-to-rear crashes – this type of AEBS is now mandatory for commercial vehicles[ix] - but second generation technology is more accurate and can also detect pedestrians and cyclists. Mercedes recently presented Side Guard Assist[x], a system that can recognise pedestrians and automatically brake. Volvo too is developing a cyclist detection system[xi].

All available research suggests that mandating AEBS for all vehicles would have a major effect on reducing fatalities. Some studies show that AEBS on cars would have a reduction potential of 13.9% of all accidents and 2.2% of fatal accidents.[xiixiii] Providing all cars with AEBS with pedestrian detection could reduce serious injury and pedestrian fatalities by around 4% to 16%.[xiv] AEBS is mostly optional for passenger cars. Costs for AEBS on cars would be between €180 and €650. Pedestrian AEBS is more complex and therefore more costly but Volvo cars already fits pedestrian AEBS on seven of its models. Costs are expected to be comparable for other vehicles such as trucks.[xv] We therefore recommend that:

1. 2nd generation, more accurate, AEBS should become mandatory for all vehicles
2. AEBS with pedestrian and cyclist detection should become mandatory for commercial vehicles and in particular larger trucks and construction vehicles.

Improved direct vision for trucks

The weight, size and design of trucks make them particularly dangerous vehicles with blind spots around the cab remaining a grave concern. In 2013 more than 4,000 Europeans died in truck crashes leaving many more seriously injured. A quarter of truck fatalities were vulnerable road users.[xvi] Various solutions exist to improve truck vision (mirrors, camera's) but the most effective is to improve direct vision, i.e. what you can see with your own eyes. TRL 2015 estimates up to 550 blind spot deaths could be avoided through better direct vision. Given the high costs per fatality and the big potential of direct vision to reduce truck fatalities, requiring better direct vision is likely to be very cost-beneficial.[xvii]

Low entry, high vision cabs have superior direct vision and are commercially available today. They are ideally suited for urban distribution traffic and have little or no operational limitations. High vision trucks are more expensive but this is likely related to low sales volumes, not production costs.

Large distribution and construction vehicles generally have poorer direct vision than small trucks. However, there are big differences between comparable truck types and the new truck dimension rules enable further improvements. Setting a direct vision standard that requires at least best-in-class performance for larger trucks would therefore produce significant benefits at limited cost. In combination with cyclist and pedestrian detection systems improved direct vision could radically improve VRU safety. We therefore recommend:

1. That a direct vision standard should be adopted for urban distribution trucks that effectively mandates high vision, low entry cabs.
2. That at least best-in-class direct vision performance should become mandatory for large distribution vehicles and construction trucks.

Improved truck crash performance

The frontal design of trucks has a major impact on the outcome of collisions. The current flat front absorbs almost no energy in case of a crash and drags vulnerable road users under the wheels. Thanks to the new Weights and Dimensions Directive (2015/719) the front of trucks can now be redesigned. The brick designed front could be redesigned to have a more rounded front. Instead of being run over, cyclists and pedestrians would be deflected. Energy-absorbing material would also protect the vulnerable road user during the primary impact.[xviii]

In addition, redesign could also have a major impact on car-to-truck crashes. In the EU nearly 2,000 car occupants in 2013 were killed in a crash involving a truck. The current front underrun protection (FUP) has been found to be rather ineffective because of the high speeds of these crashes and the limited deformation space of the current FUPs.[xix] The new design rules allow a larger deformation zone with a so called crash box. Energy-absorbing frontal underrun protections have the potential to save up to 369 lives per year from car and HGV occupants in the EU27 and is likely to be cost-beneficial.[xx] In addition, the current rules for the FUP also limit truckmakers' design freedom and should be adapted to reflect the new design possibilities enabled by Directive 2015/719.

We therefore recommend:

1. A test should be adopted to assess the truck-to-VRU crash performance, in particular VRU overrun/roll-over and primary impacts.
2. That regulations UNECE R93 and EU Regulation 661/2009 are amended to:
    a. Fully enable new designs, e.g. by allowing curved FUP designs.
    b. Mandate energy absorbing front underrun protection systems for all new heavy goods vehicles.

Tyre pressure monitoring systems (TPMS)

Under-inflated tyres can lead to unsafe situations where the stability of the vehicle is affected. Furthermore badly inflated tyres increase the drag of the vehicle which leads to less fuel efficiency and more CO_2. TPMS addresses this problem by measuring the tyre pressure and warn the driver when the tyre is under-inflated.[xxi] This technology is mandatory for cars but not for trucks.

TPMS has the potential to reduce the number of speed and tyre related accidents of HDVs and LCVs by 4 to 20% and the total number of accidents by 0.8 to 4%. It is also proven to be technically feasible and cost-effective, costing €136 for long haul tractor-trailers while at the same time saving ca. €250 per year of fuel.[xxii] Therefore we recommend that TPMS should become mandatory for all new heavy duty vehicles.

Truck side guard systems and improved rear underrun protection

Collisions between trucks and vulnerable road users lead to cyclists, pedestrians or motorcyclists being overrun or ending up between the axles of the tractor or trailer. In principle trucks and trailers are currently required to be fitted with structures to reduce the open space ahead of the rear axle(s) to provide protection to pedestrians and cyclists in collision with the side of such vehicles. However, a large number of vehicles was exempted from the side-guard standard. Exempted types include construction vehicles, special purpose vehicles, certain trailers and tank vehicles.

2014 research in London shows that between 10 and 26% of vehicles are not equipped with adequate lateral protection. Removing most of the exemptions and generalising side guards could reduce cyclist fatalities involved in truck collisions by ca. 5%. Retrofit side guards are estimated to cost €500-€1800 but standard fitting at the time of production brings costs down very significantly and likely make this measure cost beneficial. We therefore recommend that side guard exemptions should be reduced to an absolute minimum.

Several studies demonstrate rear underrun protection of trucks could be improved. Rear underrun protection (RUP) devices are fitted to the back of trucks and trailers to avoid cars ending up under the truck in case of a rear crash. The current RUP could be improved to provide better compatibility between the RUP and other vehicles, in particular cars. The Commission's consultants estimate that better rear underrun protection could save 43-94 lives every year. Because of the limited cost of improved RUP this measures is likely to be cost-effective.

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[i] http://europa.eu/rapid/press-release_MEMO-16-864_en.htm
[ii] CARE European Commission Database: http://ec.europa.eu/transport/road_safety/specialist/statistics/index_en.htm
[iii] ETSC, Revision of the General Safety Regulation 2009/661, 2015, p 1
[iv] TRL, Benefit and Feasibility of a Range of New Technologies and Unregulated Measures in the fields of Vehicle Occupant Safety and Protection of Vulnerable Road Users, 2015, p. 104
[v] http://ec.europa.eu/transport/road_safety/specialist/knowledge/speed/new_technologies_new_opportunities/intelligent_speed_adaptation_isa_en.htm
[vi] TRL, Benefit and Feasibility of a Range of New Technologies and Unregulated Measures in the fields of Vehicle Occupant Safety and Protection of Vulnerable Road Users, 2015, p. 104

[vii] DG MOVE (2013), Ex-post evaluation of Directive 92/6/EEC on the installation and use of speed limitation devices for certain categories of motor vehicles in the Community, as amended by Directive 2002/85/EC, p. 101.
[viii] TRL, Benefit and Feasibility of a Range of New Technologies and Unregulated Measures in the fields of Vehicle Occupant Safety and Protection of Vulnerable Road Users, 2015, p. 107
[ix] TRL, Benefit and Feasibility of a Range of New Technologies and Unregulated Measures in the fields of Vehicle Occupant Safety and Protection of Vulnerable Road Users, 2015, p. 93-94
[x] http://media.daimler.com/marsMediaSite/en/instance/ko/Mercedes-Benz-Trucks-Safety-New-assistance-systems-Active-Br.xhtml?oid=12367326
[xi] http://www.bigwheels.my/2016/10/volvo-pedestrian-and-cyclist-detection-system-for-bus-and-trucks/
[xii] FIA, Policy Position on the General Safety Regulation, 2015, p. 5
[xiii] TRL, Benefit and Feasibility of a Range of New Technologies and Unregulated Measures in the fields of Vehicle Occupant Safety and Protection of Vulnerable Road Users, 2015, p. 96
[xiv] Edwards, M. et al. (2014). Benefit estimate and assessment methodologies for pre-crash braking part of forward looking integrated pedestrian safety systems.
[xv] TRL, Benefit and Feasibility of a Range of New Technologies and Unregulated Measures in the fields of Vehicle Occupant Safety and Protection of Vulnerable Road Users, 2015, p. 97
[xvi] http://ec.europa.eu/transport/road_safety/pdf/statistics/dacota/bfs2015_hgvs.pdf
[xvii] TRL, Benefit and Feasibility of a Range of New Technologies and Unregulated Measures in the fields of Vehicle Occupant Safety and Protection of Vulnerable Road Users, 2015, p 347
[xviii] TRL (2015), Benefit and Feasibility of a Range of New Technologies and Unregulated Measures in the fields of Vehicle Occupant Safety and Protection of Vulnerable Road Users, p 322
xixKnight I (2016), Energy Absorbing Front Underrun Protection for Trucks: Developing a test procedure, p 3
xx TRL (2015), Benefit and Feasibility of a Range of New Technologies and Unregulated Measures in the fields of Vehicle Occupant Safety and Protection of Vulnerable Road Users, p 345-347
[xxi] TNO (2014), Study on some safety-related aspects of tyre use, p 78
[xxii] TNO (2013), Study on Tyre Pressure Monitoring Systems (TPMS) as a means to reduce Light Commercial and Heavy-Duty Vehicles fuel consumption and CO_2 emissions, p 31