DIRECT VISION

Proposal – Division Urban and Rural N3 Vehicles (Part 1)

VRU-PROXI 14TH SESSION
WebEx meeting

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VRU-Proxi-14-06

ACEA COMMERCIAL VEHICLE MEMBERS

ACEA European Automobile Manufacturers Association

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Direct Vision

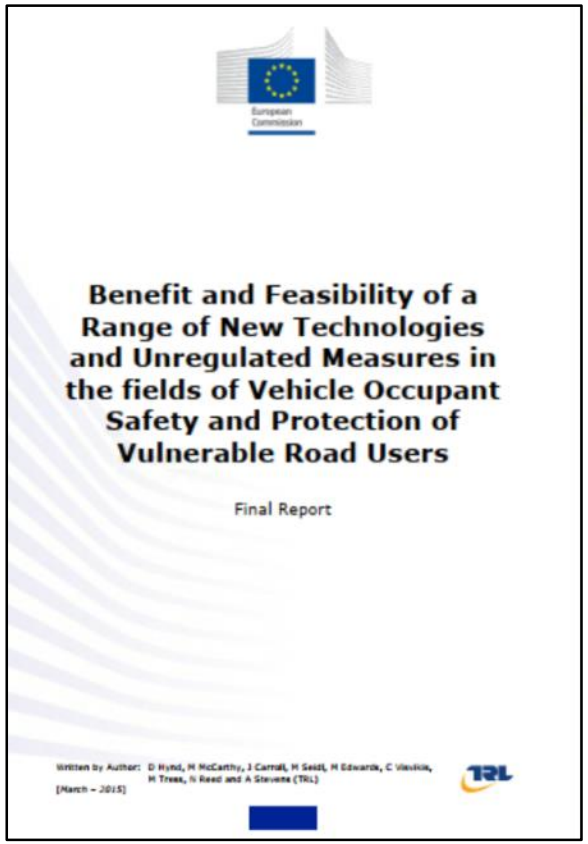
Background

DIRECT VISION - BACKGROUND

- Direct Vision will become a requirement in the EU under the General Safety Regulation, GSR and will apply for
  - new types 2026-01-07
  - all registrations 2029-01-07
- Regulation (EU) 2019/2144, specifies that *specificities of different categories of vehicles must be taken into account* in the Direct Vision requirement
- The Direct Vision Technical Requirements are now being developed within UN ECE VRU-Proxi

GSR – DIRECT VISION

Where do we come from?



VIS	Better field of vision in the close surroundings of the vehicle (e.g. Japanese requirements)	✓	?	Benefits similar to reversing cameras, but likely to involve high design cost that could affect safety in other ways and may not be as effective at preventing accidents compared with alerting systems or well-positioned cameras

Annex 2.5.8 Safer HGV Front End Design

T&E welcomed the study and the range of studies referenced, including the focus on VRUs in urban areas – specifically on direct vision, it would perhaps make a comparison with active safety measures

The Commission indicated the need to compare active systems and direct vision

Fatality Reductions by Improvements to Direct Vision

Research acknowledges that improved frontal and lateral direct vision is effective in preventing VRU casualties in accident scenarios such as run overs while the HGV is pulling away or turning, or while a VRU is crossing the road in front of the HGV (Summerskill, 2011; Welfers et al., 2011), (Volvo Trucks, 2013). However, **no study could be identified that quantified the effectiveness of improved direct vision**

- "Direct Vision may not be as effective at preventing accidents compared with alerting systems or well-positioned cameras"
- Initially, there was no scientific study available, that shows the benefit of improved direct vision

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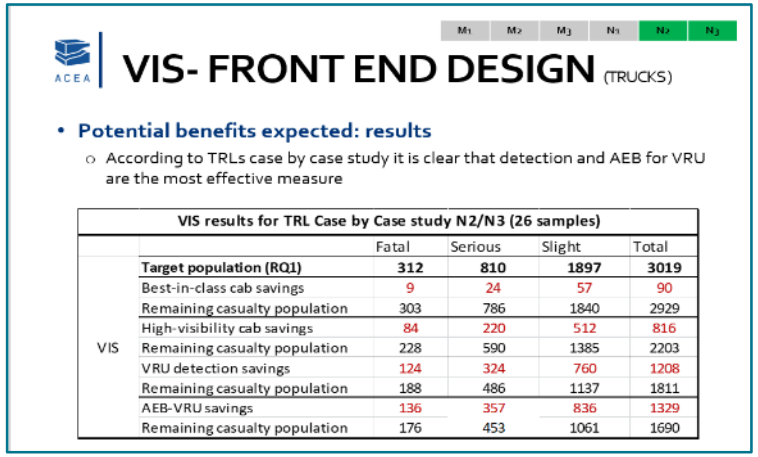
TRL analysis show limited benefit of Direct Vision

ACCIDENT ANALYSES SHOW MINOR BENEFIT OF IMPROVING DIRECT VISION



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VIS- FRONT END DESIGN (TRUCKS)

- **Potential benefits expected: results**
  - According to TRLs case by case study it is clear that detection and AEB for VRU are the most effective measure

VIS results for TRL Case by Case study N2/N3 (26 samples)

		Fatal	Serious	Slight	Total
	Target population (RQ1)	**312**	**810**	**1897**	**3019**
VIS	Best-in-class cab savings	9	24	57	90
	Remaining casualty population	303	786	1840	2929
	High-visibility cab savings	84	220	512	816
	Remaining casualty population	228	590	1385	2203
	VRU detection savings	124	324	760	1208
	Remaining casualty population	188	486	1137	1811
	AEB-VRU savings	136	357	836	1329
	Remaining casualty population	176	453	1061	1690

Results of a unique study of

TRL THE FUTURE OF TRANSPORT

Results from STATS19 (UK) as reduction of total number of fatalities, seriously and slightly injured, all road users

		Severity	Fatal	Serious	Slight
VIS Approach	Direct Visibility CAB design	Best-in-class cab savings	-0,10%	-0,02%	-0,01%
		High-visibility cab savings	-0,95%	-0,20%	-0,06%
	Driver Support / Active Safety	VRU detection savings	-1,40%	-0,29%	-0,09%
		AEB-VRU savings	-1,53%	-0,32%	-0,10%

THE PROBLEM IS REAL, BUT

- **Construction traffic** in cities remains high and **increasing bicycle traffic** results in a higher number of accident
- Active safety systems have no blind spots and are **always**…
  … **looking in the right direction**
  … **prepared to take correct action** to **avoid** or mitigate the **accident** and not dependent on driver actions
- Active safety benefits will be **available on all types** of trucks and buses
- **VRU detection mandatory as from 07/2024**, direct vision from 01/2029. - additional benefit of Direct Vision is therefore limited

- With permission of DG GROW, TRL worked on that issue and found a clear priority for VRU detection and VRU intervention
- Thus, it was the priority of ACEA to advocate for those assistance systems

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Active systems introduced before Direct Vision

LEGAL REGUIREMENT	CATEGORY	NEW TYPES	ALL TYPES
Advanced driver distraction warning	M, N	2024-07-07	2026-07-07
Driver drowsiness and attention warning	M, N	2022-07-06	2024-07-07
Intelligent Speed Assistance	M, N	2022-07-06	2024-07-07
Safety Belt Reminders	M, N	2022-07-06	2024-07-07
Emergency Stop Signal	M, N	2022-07-06	2024-07-07
Alcohol interlock installation facilitation	M, N	2022-07-06	2024-07-07
Tyre Pressure Monitoring	M, N, O_3, O_4	2022-07-06	2024-07-07
Reversing detection	M, N, O_3, O_4	2022-07-06	2024-07-07
Blind spot information system	M_2, M_3, N_2, N_3	2022-07-06	2024-07-07
Pedestrian and cyclist collision warning	M_2, M_3, N_2, N_3	2022-07-06	2024-07-07
Direct Vision Requirements	M_2, M_3, N_2, N_3	2026-01-07	2029-01-07
Autonomous vehicles; Driver availability monitoring system	M2, M3, N2, N3	2022-07-06	2024-07-07
Autonomous vehicles; EDR (also non-automated vehicles)	M2, M3, N2, N3	2026-01-07	2029-01-07
Autonomous vehicles; Systems to replace the driver's control of the vehicle, including signaling, steering, accelerating and braking	M2, M3, N2, N3	2022-07-06	2024-07-07
Autonomous vehicles; Systems to provide the vehicle with real-time information on the state of the vehicle and the surrounding area	M2, M3, N2, N3	2022-07-06	2024-07-07
Autonomous vehicles; Harmonised format for the exchange of data for instance for multi-brand vehicle platooning	M2, M3, N2, N3	2022-07-06	2024-07-07
Autonomous vehicles; Systems to provide safety information to other road users	M2, M3, N2, N3	2022-07-06	2024-07-07
New item; Hydrogen and Fuel cell vehicles	M_2, M_3, N_2, N_3	2022-07-06	2024-07-07
Protection of vehicle against cyberattacks	M_2, M_3, N_2, N_3	2022-07-06	2024-07-07
Already introduced: Updating lateral side guards (Amendm.01), Fire Safety for buses (Amendm.02), RUP (Amendm.03)			

NEW TYPES - 2022

ALL TYPES - 2024

NEW TYPES - 2026

ALL TYPES - 2029

- By July 2024, all new vehicles have to be equipped with blind spot information and moving off information systems
- This means, by 2029 most vehicles in the then existing fleet have a "next to ultimate" VRU accident avoidance performance

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Different needs in different operation

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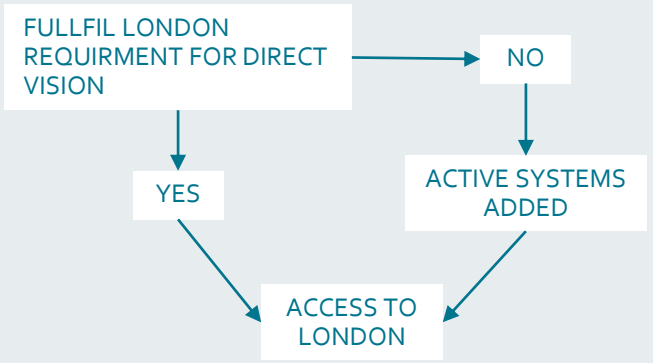
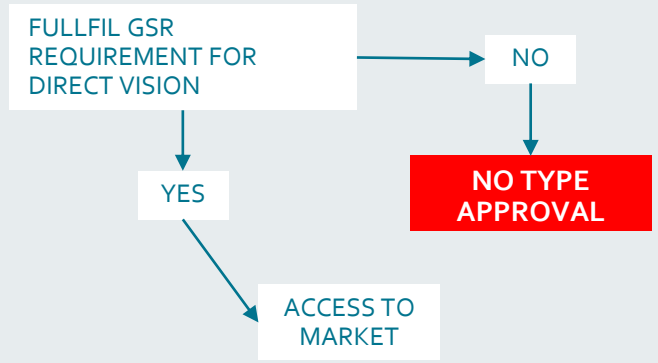
London method as drop-off for GSR Direct Vision

Pragmatic license to operate in London **Direct vision AND/OR advanced assistance systems**	**Dogmatic GSR Direct vision** **Direct vision WITHOUT advanced assistance systems**
Digital volumetric method for direct vision rating of each individual vehicle to get **access to London**	Digital volumetric/physical method for direct vision type approval of worst case vehicle of a vehicle family to get **access to the market**
LOCAL requirement 2020 1*/2024 3*: - Greater London/UK	**UNECE legislation (2026 NT and 2029 AT):** - Europe & 52 countries following UNECE (e.g. Australia, Russia, Japan …)
Rating of vehicles	Pass/Fail criteria
 	 

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Basic principles

Direct visibility through windows is essential and the important base for driver awareness of surrounding traffic.
<u>The need depends on the traffic situation:</u>

- **Driving at higher speeds on highways and rural roads and:** good overview, long distance forward visibility and a high eye position is beneficial

- **Driving at lower speeds in urban areas:** Close-up visibility forward and at both sides are more important

When insufficient, due to truck design for different context, visibility must be compensated by <u>detection</u> and <u>indirect vision</u>

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A use-specific approach

- Improvements in Direct Vision help the driver in different traffic situations in different ways
- **The need for Direct Vision differs** from different type of transports
  – Long range versus short range visibility
- **<u>The focus on the use of the vehicles should be taken into account</u>**
- To reach the **best effect for road safety,** Direct Vision need to be complemented **with active detection systems**
- **All aspects** in society must **be considered** when establishing a new requirement **<u>to achieve the best total effect on safety for vulnerable road users</u>,** safety and comfort for the driver, the environment / fuel consumption / transport efficiency and the logistic chain

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Safety benefits of specific trucks for urban traffic

Special segments operating in dense city conditions

Adopted for low average speed, high traffic density, many pick-ups and deliveries over short distances in good road conditions:

- Cab in low position
- Low instep and low floor for multi entry/leave
- Engine in/behind cab
- Low eye position adopted to other road users
- Additional windows to improve close up direct visibility

Less feasible for heavy construction in rough conditions

- Low ground clearance and too small approach angle

Not feasible for long haul

- High driver position with overview visibility needed/preferred on highway
- Soiling, glare and driving comfort
- Living comfort and overnight stay, i.e. space, flat floor and insulation

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Safety benefits of high cabs in long haulage

On highways and rural roads at a high driving speed (80 to 90 km/h) a good direct view of the road in front is needed to

- Drive safely and stop in time in case of

- Traffic jam,
- Accidents,
- Road work
- Wild animals on the road

- Plan the route

- A long vehicle combination can not easily change lanes or do other quick manoeuvres
- Read directional traffic signs

- Stop the truck, stopping distance for a loaded truck approx 95 m

High position

Low position

- Only a rested driver is a safe driver
- Drivers have to work and live in the cabin – shortage in the number of drives is **a main concern** of the transport sector

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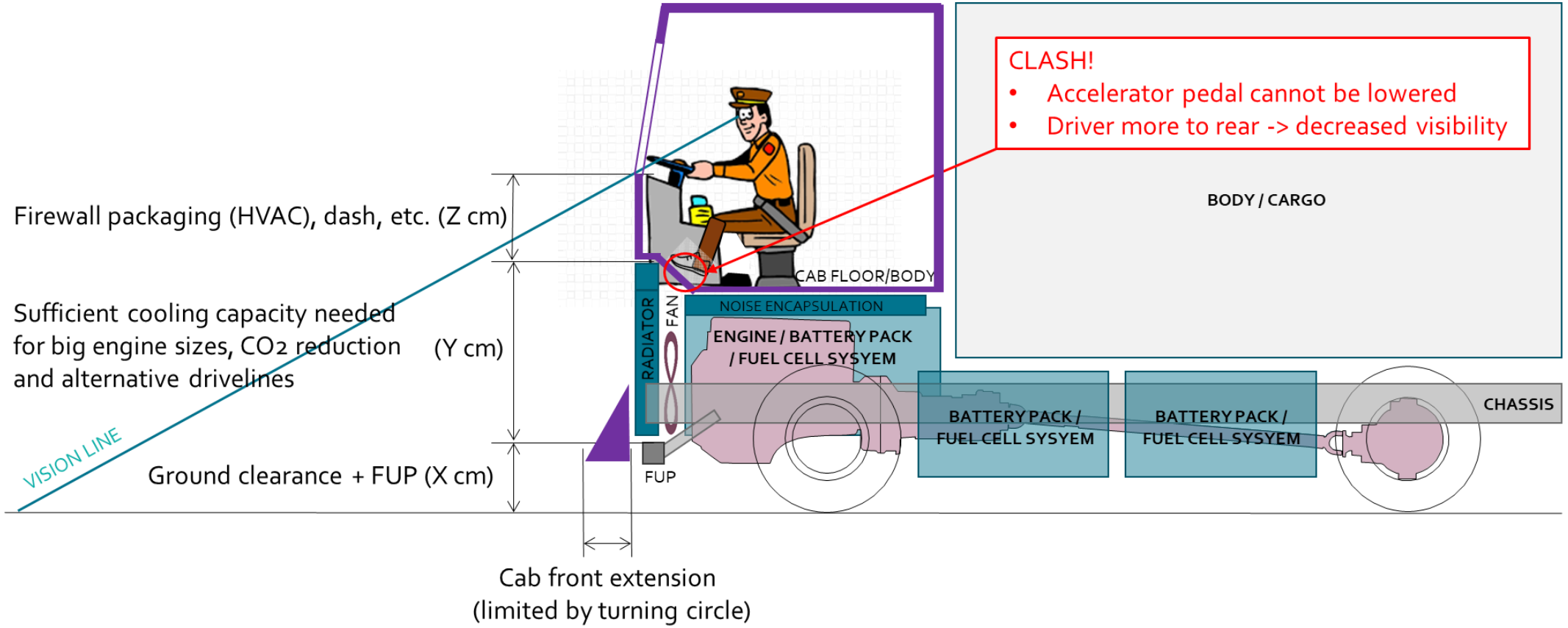
Redesign is limited due to technical conditions



- Driver eye-point cannot be lowered due to required cooling capacity
- To take a "direct vision city rating" and apply that to long haul vehicles neglects the optimization of those for highway application

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Challenge to comply with CO2 standards 2025/30

- A **low cab have higher drag** (CdxA) than a high cab, **resulting in a penalty of about 2%** in the certified CO_2 values (VECTO Long-haul cycle, G20N vs S20N)
- This will not only influence Energy consumption and CO_2, but also the **operating range of Battery Electric Vehicles** (low cab requires an additional 3kWh/100km vs high cab)

Highest cab – highest cooling capacity, best aerodynamic performance

Medium-high cab – medium cooling capacity, medium aerodynamic performance

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Two different levels needed

- **To be demanded a <u>Rural</u> Direct Vision Requirement**

- **To be demanded an <u>Urban</u> Direct Vision Requirement**

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Conclusion on need for differentiation

CONCLUSIONS:

- Heavy vehicle trucks consist of many different application with many different tasks
- The result is different chassis and cab heights due to the different needs
- Improved safety must be considered from urban to highway conditions
- Detection systems are under development and required in GSR with the purpose to protect VRU´s by 2024
- Cab and vehicle design will affect CO_2, already CO_2 approved vehicles may be changed with possible worse CO_2 figures as a result

The Direct Vision regulation must therefore include a certification method with <u>different requirements for different applications</u> and <u>taking active detection systems into account</u>