

# UN Regulation Development on Heavy-Vehicles Direct Vision

OICA/ACEA position

*VRU-PROXI 13*

## Overview of Contents

- OICA / ACEA General View
- Understanding the London Direct Vision Standard Approach
- Considerations for UN Direct Vision Regulation
- VRU Height and Visibility
- Eliminating the Blind Spot to the Greatest Possible Extent
- Potential Measures to Improve Direct Vision
- Arguments for Limitations to Lower Cab Heights
- Summary and Conclusions

# OICA/ACEA General View

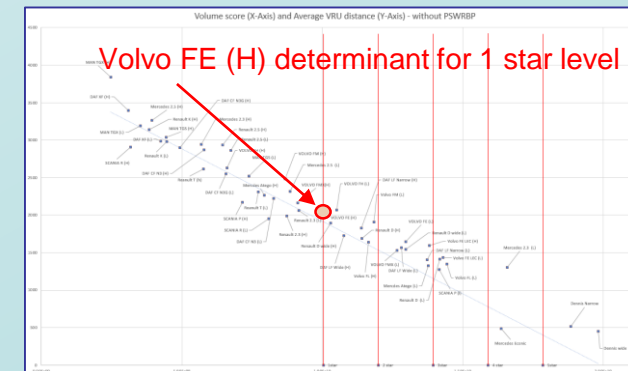
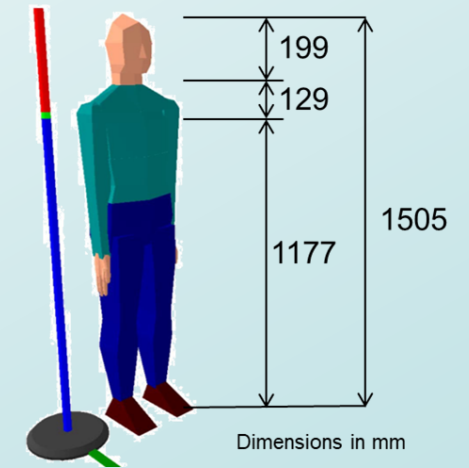


- OICA/ACEA supports:
  - ⇒ Safety improvement by increasing direct vision performance of heavy vehicles
  - ⇒ Technically and economically feasible regulation and adapted to technical progress (according UN 58 agreement)
  - ⇒ An objective methodology to evaluate direct vision performance with a feasible baseline level
  - ⇒ Type approval of vehicle / systems based on the worst case vehicle of the family (verified by simulation)
  - ⇒ Any use of a common database for setting parameters for evaluation of threshold values and pass/fail criteria's must be owned and maintained by a neutral party (authority).
  
- Active safety systems will be introduced in EU (2024) addressing VRUs, this will already improve the safety of heavy vehicles long before direct vision will be mandatory. These active safety systems will be further improved in the future.
  
- Focus of this presentation is on definition of the threshold for the Direct Vision regulation for N3 trucks

# Understanding the London Direct Vision Standard Approach

- Scope of Transport for London is trucks that are driving in the City of London (Greater London)
- Definition of 1 star on DVS scale:  
*1 star rating means an average distance of VRUs to be seen by the driver (head and shoulders) at a distance of 4.5m to near-side, 2m to the front and 0.6m to the off-side. The VRU chosen was a 5<sup>th</sup> %ile Italian female covering 99% of Europeans (Loughborough Design School, VRU-Proxi-10-07)*
- Height of 5<sup>th</sup> %ile Italian female 1177 mm up to shoulders by using a stick, VRU width not respected
- Determinant for 1 star level was existing vehicle (Volvo FE) meeting requirement at least on all sides, this 1 star vehicle fulfils visibility exactly on one side but performs better on the other two sides  
⇒ **This means 1 star on current DVS scale goes beyond the aim of eliminating the blind spot**
- 28 of 51 current in EU available vehicle models would be banned, therefore TfL allowed safety systems as alternative

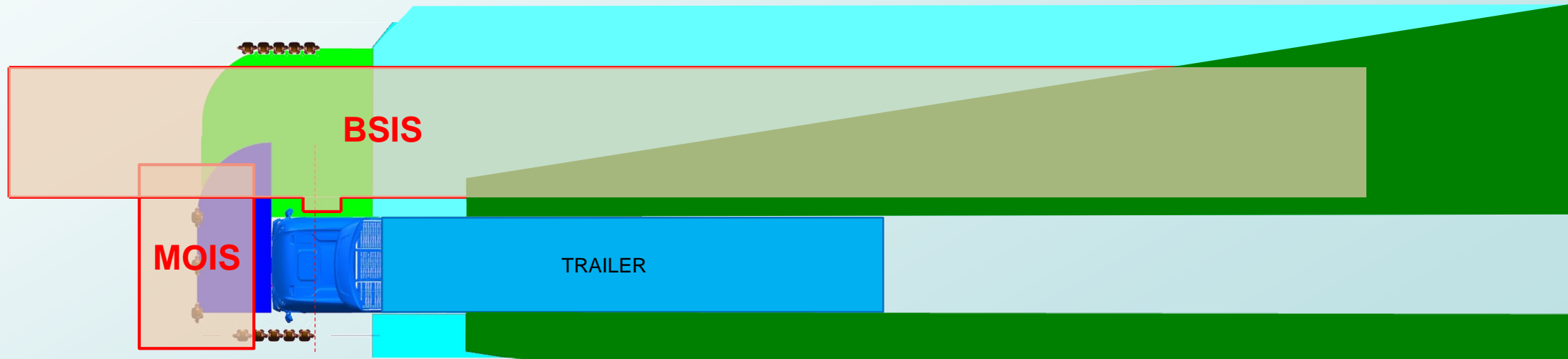
Stature of 5<sup>th</sup> %ile Italian female



# Considerations for UN Direct Vision Regulation

- Scope of UN Regulation is Type Approval for all trucks and buses driving on all roads (not in city only)
- At least in EU all trucks will have safety systems as from 2024 (MOIS & BSIS)
- Direct vision regulation will be the 3<sup>rd</sup> regulation addressing the close proximity area at the near side and off-side of the truck

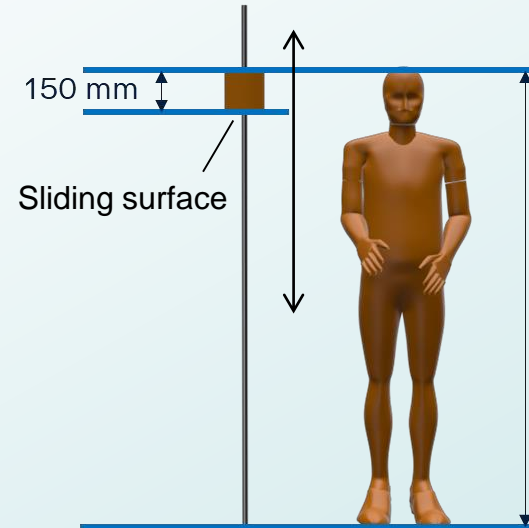
## MONITORING AREAS BSIS + MOIS (EU >2024)



BSIS = Blind Spot Information System (ECE R151)  
MOIS = Moving-Of Information System (ECE R xx)  
ECE R46 = Colored areas (in theory not blind spots)

# VRU Height and Visibility

## Proposal for UN regulation (part of head)



- VRUs and driver's head will move in real-life traffic
  - Lean stick is not representing width of VRU body
  - Any body part of VRU 150 x 150 mm to be considered for determining Direct Vision level
  - 150 x 150 mm also considered in regulation for Reversing Motion
  - Loughborough Design School is asked to investigate the effect of this proposal on the direct vision evaluation (DVS)
- } any body part of VRU (150 mm width) will be noticed by the driver



# Eliminating the Blind Spot to the Greatest Possible Extent

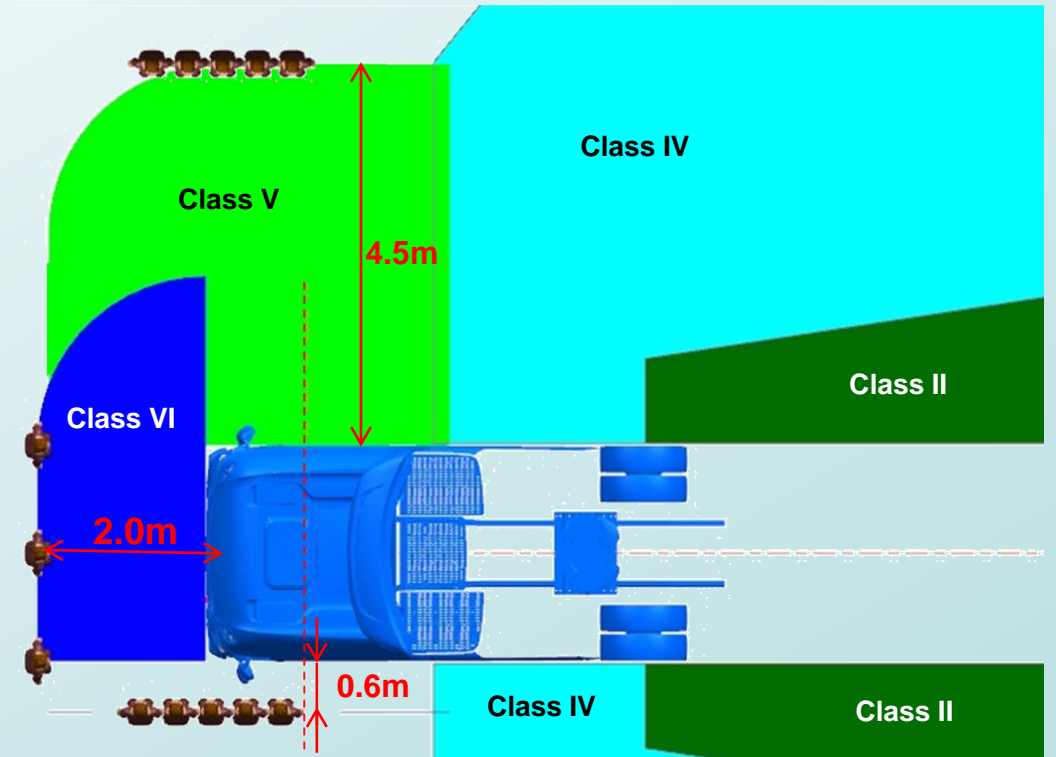
The blind spot is eliminated when the VRUs are visible while standing exactly on outer border of R46 indirect vision FoVs and 0.6 m at driver side:

- 5 VRUs at 4.5 m to the near-side
- 5 VRUs at 0.6 m to the off-side
- 3 VRUs at 2.0 m to the front

This means that blind spot will be exactly eliminated at an average VRU-distance of **~2400 mm**

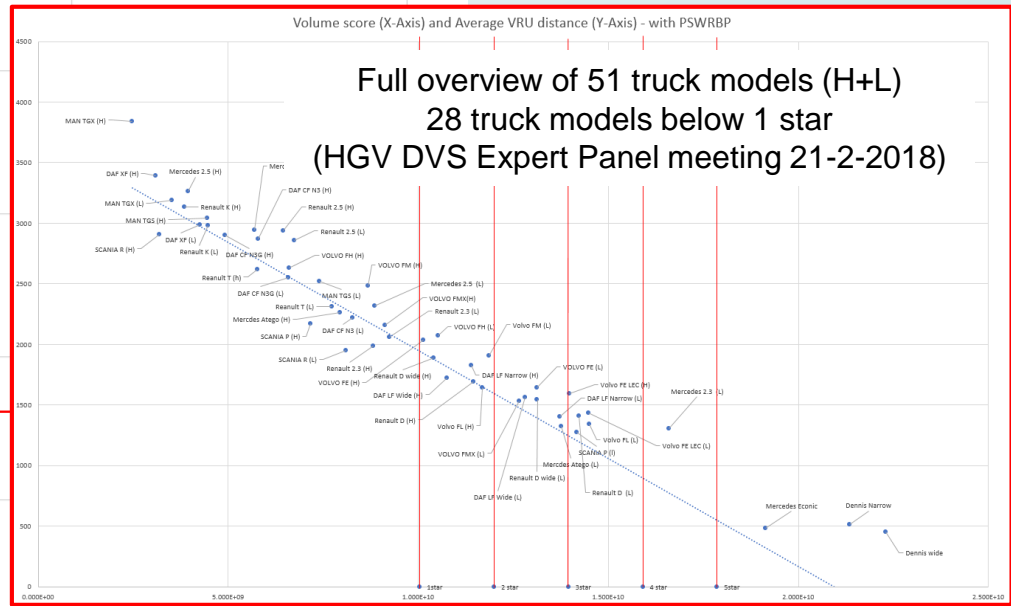
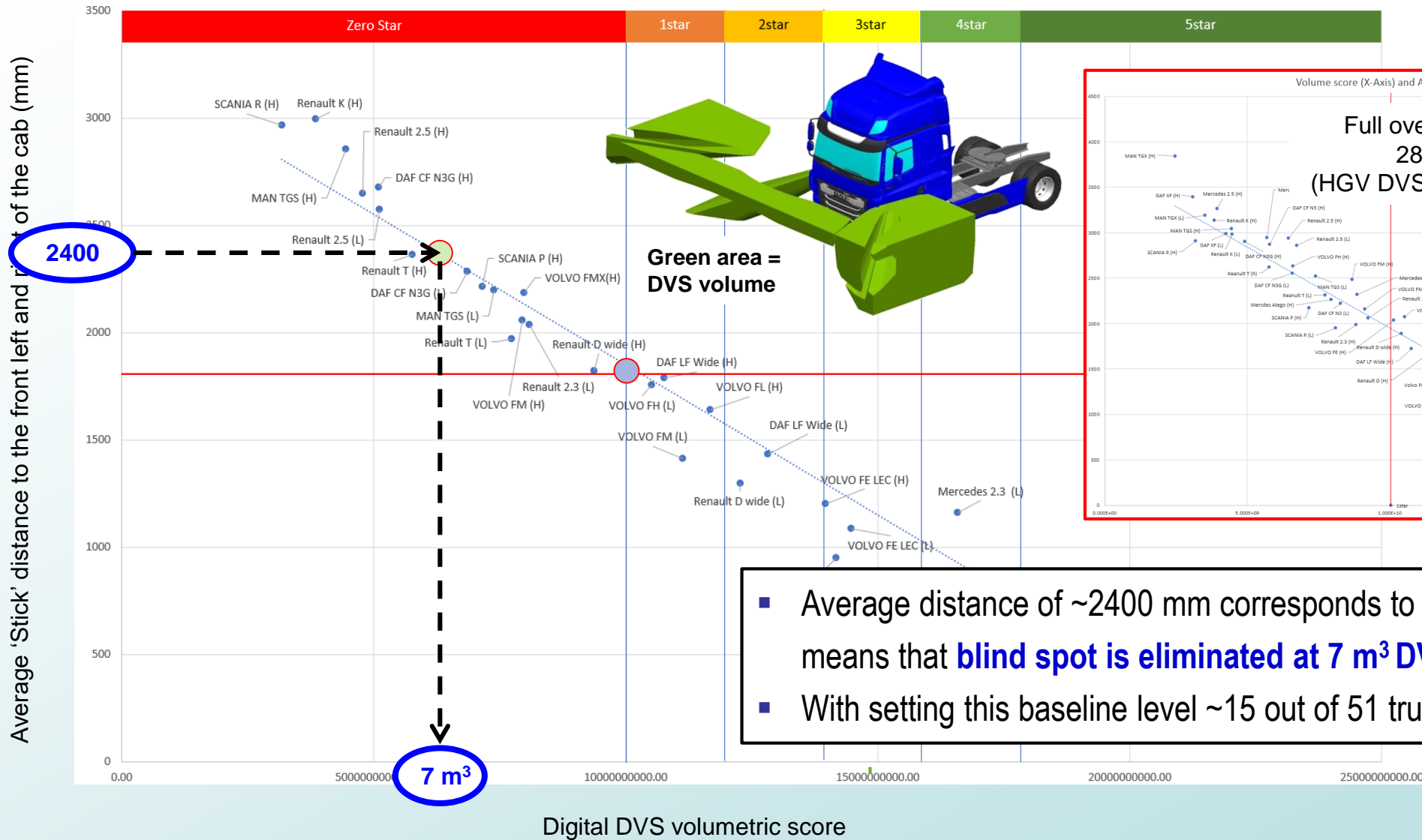
This corresponds to an equivalent direct vision performance of **more than 1 star** on current DVS scale based on 5<sup>th</sup> %ile Italian female (head and shoulder)

See next slide



# Eliminating the Blind Spot to the Greatest Possible Extent

Plotting the DVS volumetric score against the results of the 'Sticks' based method (n=27 HGVs) 0.98 Correlation coefficient



- Average distance of ~2400 mm corresponds to ~7 m<sup>3</sup> DVS volume which means that **blind spot is eliminated at 7 m<sup>3</sup> DVS volume or more**
- With setting this baseline level ~15 out of 51 truck models would be banned



# Potential Measures to Improve Direct Vision

**FEASIBLE MEASURE**



Camera monitor systems (no mirror housings)

**FEASIBLE MEASURE**



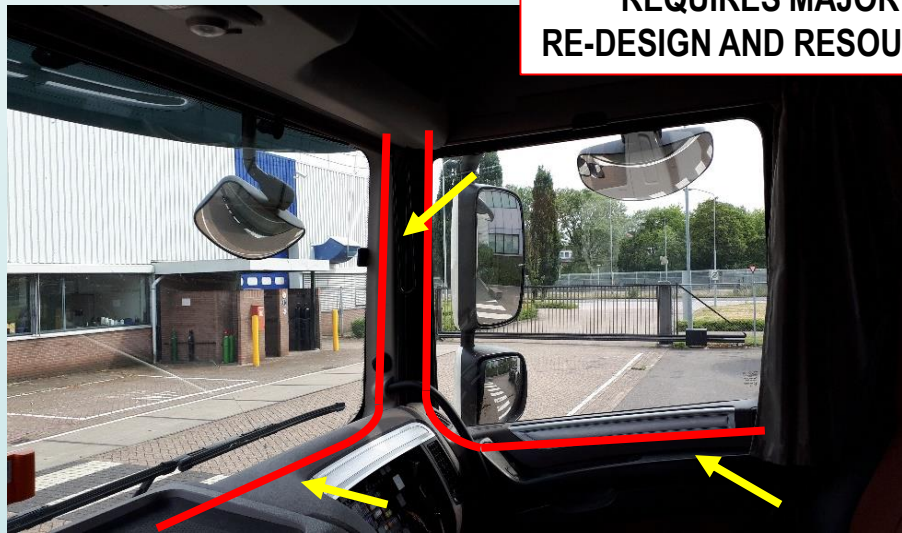
Lower door window

**FEASIBLE MEASURE**



Extended front

**REQUIRES MAJOR RE-DESIGN AND RESOURCES**



Lower dashboard and changed cab structure (A-Pillars / Freezeline / Beltline)

**Note:**  
A-pillars shall be compatible with requirements of R29.03

# Potential Measures to Improve Direct Vision

Direct vision performance

1 star equivalent (10 m<sup>3</sup> DVS volume)

Feasible level



Changed cab structure

Extended front (aero)

Lower dashboard

(Lower door window)

CMS- no mirror housings

Current level

Cab Height Range

Typical Long Haul vehicle

Feasible level



Changed cab structure

Extended front (no aero)

Lower dashboard

Lower door window

CMS- no mirror housings

Current level

Cab Height Range

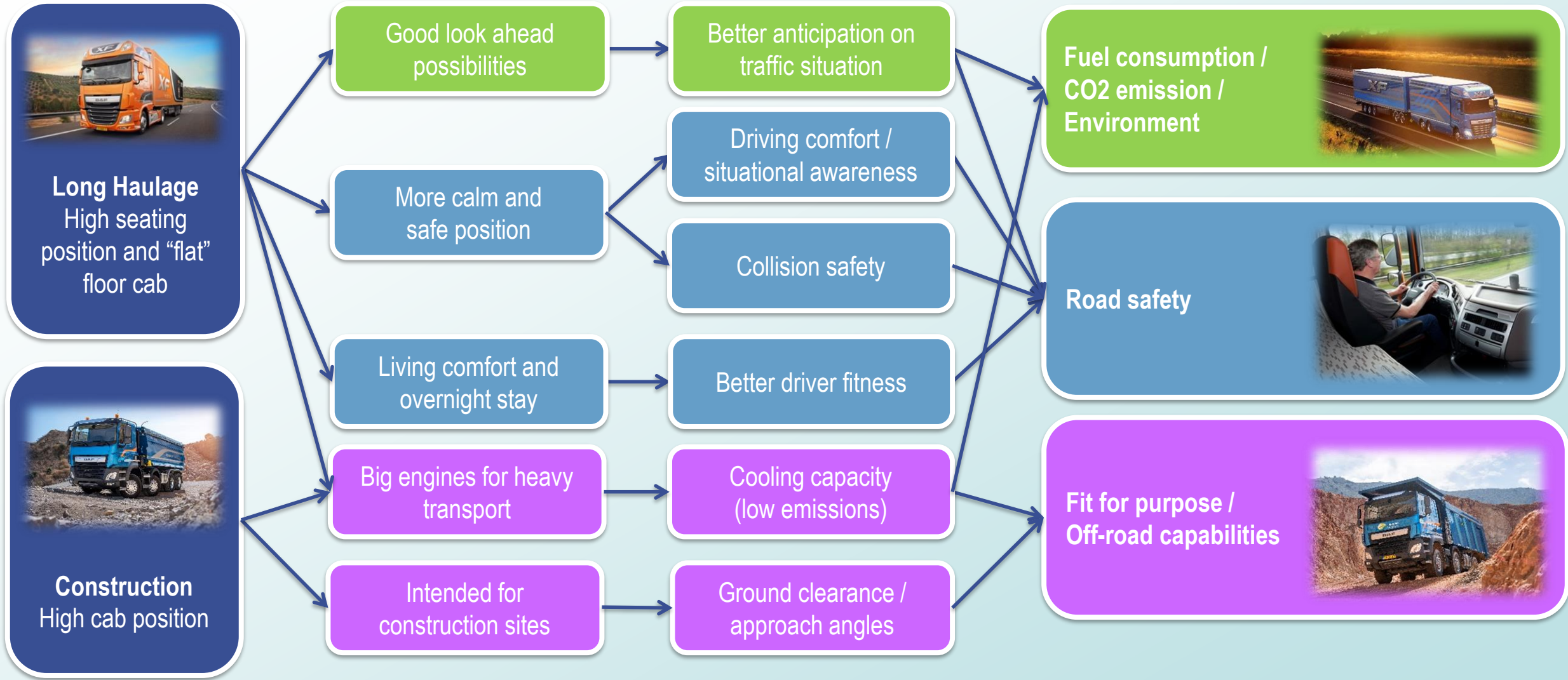
Typical Construction vehicle

Figure not on scale!

Baseline for direct vision performance

- Extended front is suitable for Long haul vehicles, less for Construction vehicles
- Lower door window is suitable for Construction vehicles, less for Long Haul
- Full operational cab height range must be taken into account for setting baseline direct vision level

# Arguments for Limitations to Lower Cab Heights



- Commercial vehicles are designed for purpose
- High cab position is crucial for driving safely, economically and effectively on highway and construction sites



# Summary and Conclusions

## OICA / ACEA Considerations:

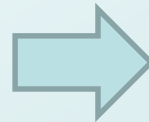
UN 58 agreement:  
**Regulations shall be technically and economically feasible and adapted to technical progress**

**Close proximity Direct Vision** interacting with  
**ECE R46 and Regulations for VRU-detection**  
BSIS & MOIS (EU GSR >2024)

Industry accepts **feasible measures to improve direct vision** like lower door window, extended front, CMS, reasonable cab re-design respecting ECE R29

Regulation shall **fit for all N2, N3, M2, M3** trucks and buses without unreasonable banning of vehicles

**Safety, economical and effective limitations to lower cab heights** (long haul & construction)



## OICA / ACEA Position:

- Regulation for direct vision shall be based on a sound direct vision performance that is a **well-balanced compromise between “eliminating the blind spot” versus other important aspects**, such as driver comfort, road safety, cab structural behavior, situational awareness, fit for purpose, etc.
- Direct Vision performance shall be evaluated by an objective methodology with a well-founded, **economical and societal justified and technical feasible baseline level**
- This level shall be at maximum **7 m<sup>3</sup> DVS volume (for N3\*)** on **current Direct Vision Standard rating scale**, this would eliminate the blind spot when taken a 5<sup>th</sup> %ile Italian female into account
- OICA/ACEA asks for a **sound Type Approval procedure**. Contracting parties should have a deep look into this..

*\* for other vehicle categories to be decided in later stage*