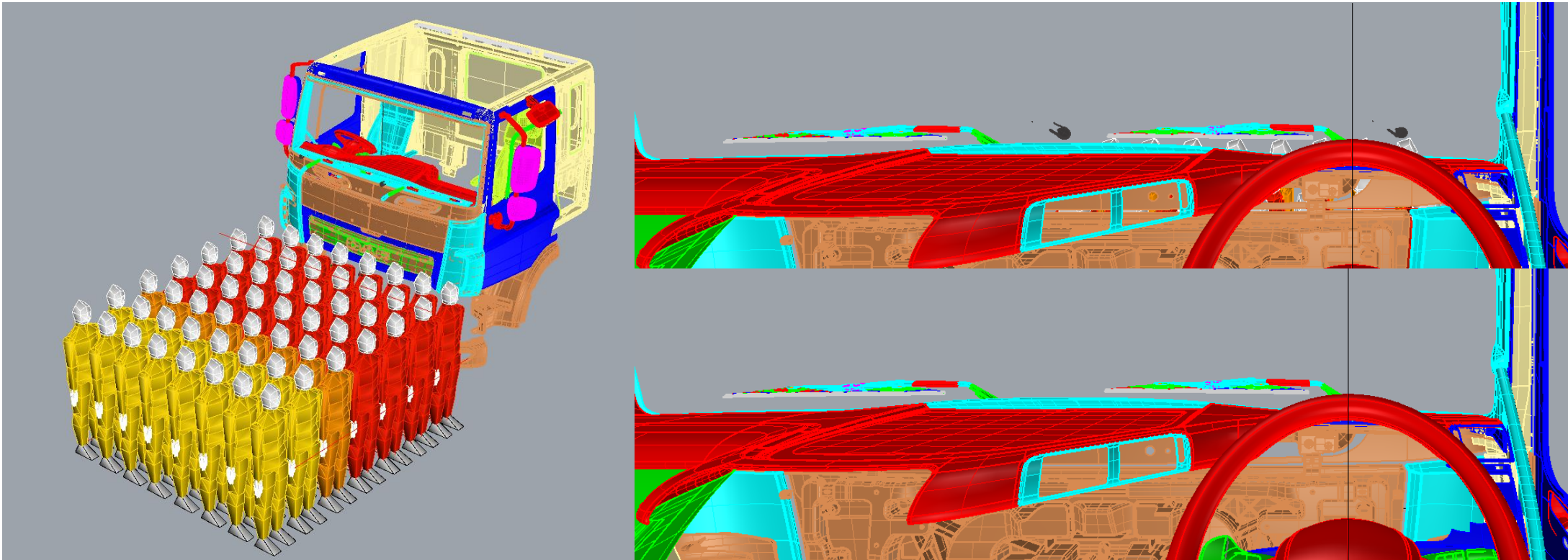


# The application of the TfL Direct Vision Standard in UNECE regulation – **Justification for T&E proposal VRU PROXI 19**

Loughborough University Design School (LDS): Design Ergonomics Research Group  
Research Sponsored by Transport for London and the UK Department for Transport

Dr. Steve Summerskill – Senior Lecturer in Industrial design and ergonomics



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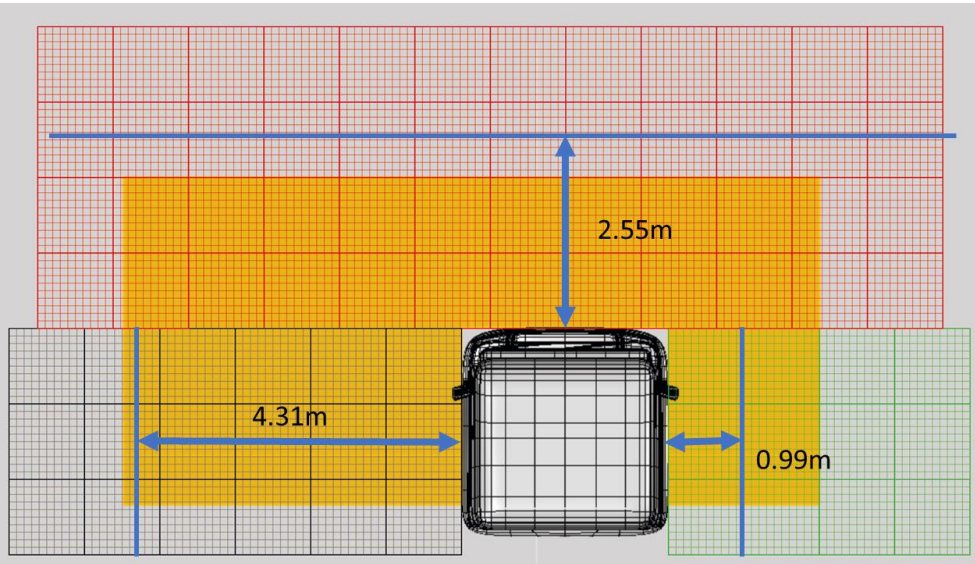
- Providing some context to the results shown in the Task Force presentation
- Previous evidence on the effects of the ACEA proposal
- Two examples of vehicle that would pass with large direct vision blind spots to the front
- Revisiting the 'Donald' Values
- What are the acceptable VRU distances to the CPs?

## Context for the Task Force presentation

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In the following slides we will show some of the implications of the VRU distances discussed in the Task force presentation.

## LEVEL 3 DETAILS: ACEA / OICA PROPOSAL (DVS LIMIT WITH ASSISTANCE SYSTEMS)

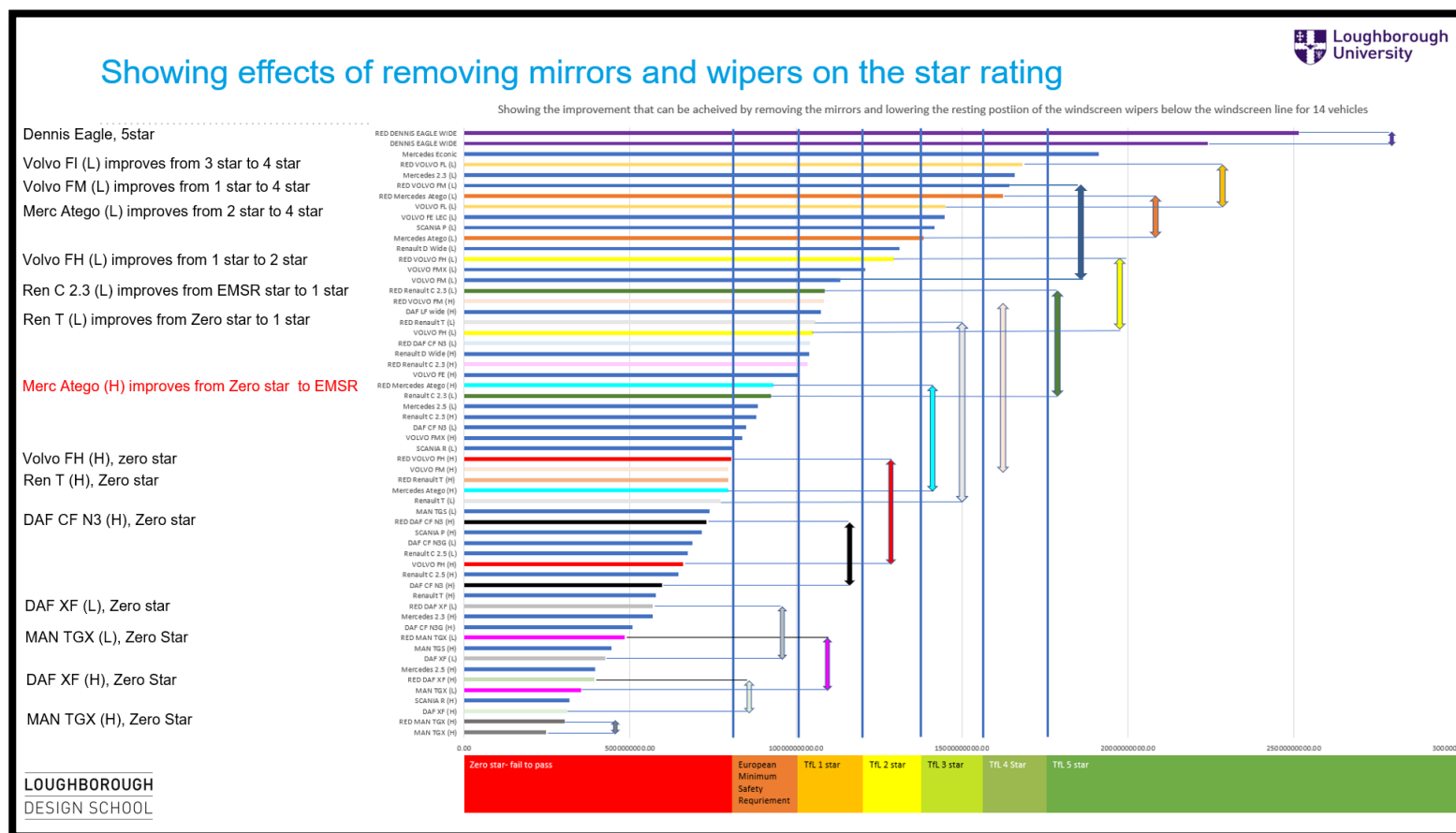


- LDS sample vehicle passing volume requirement by smallest margin with
  - $6.46\text{m}^3$  combined (pass - 6.0)
- Average VRU distance to the front = 2.55m
- Beyond the mirror coverage zone (2m)

- This example highlights how, with the ACEA combined approach (no specific volume value required to any side of the vehicle) that VRU distances beyond the assessment volume are possible and the vehicle can still pass. (2.55m to the front)

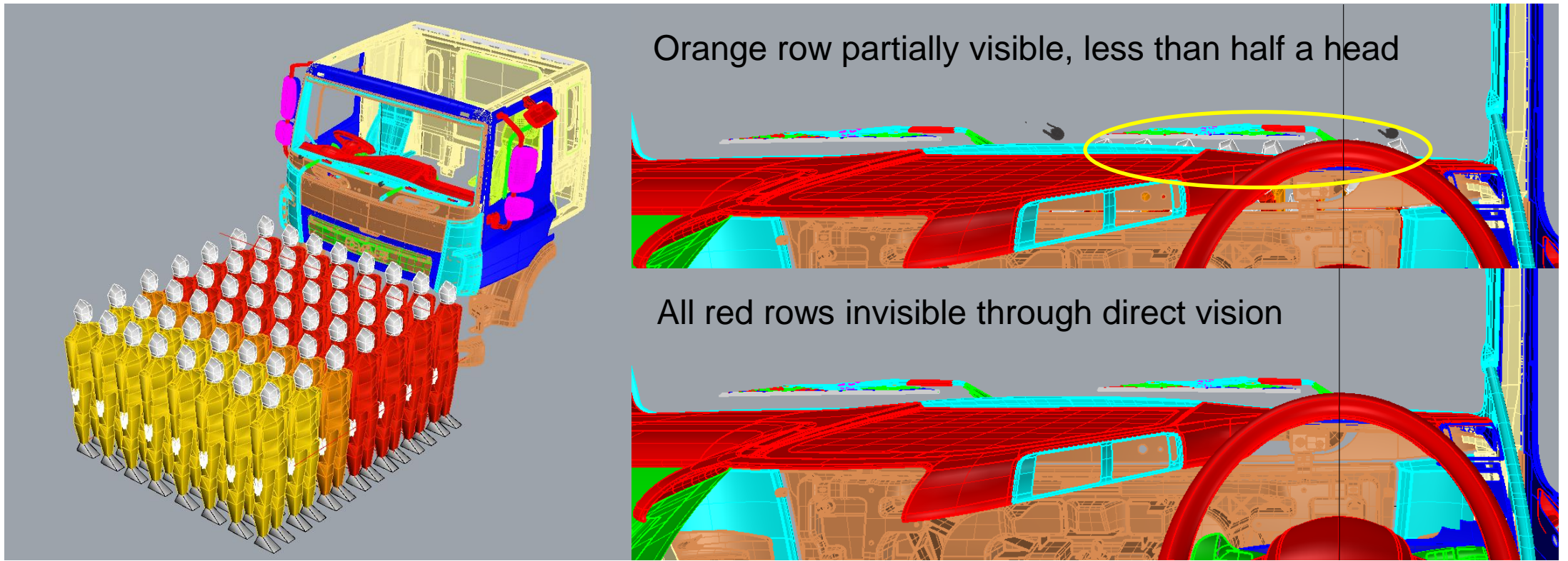
# 15<sup>th</sup> VRU PROXI meeting – evidence of benefits of removing physical mirrors

- In the 15<sup>th</sup> VRU Proxi meeting we showed examples of how vehicle direct vision performance can be improved by replacing physical mirrors with Camera monitoring systems
- This work showed that removing physical mirrors has very good benefits for direct vision results



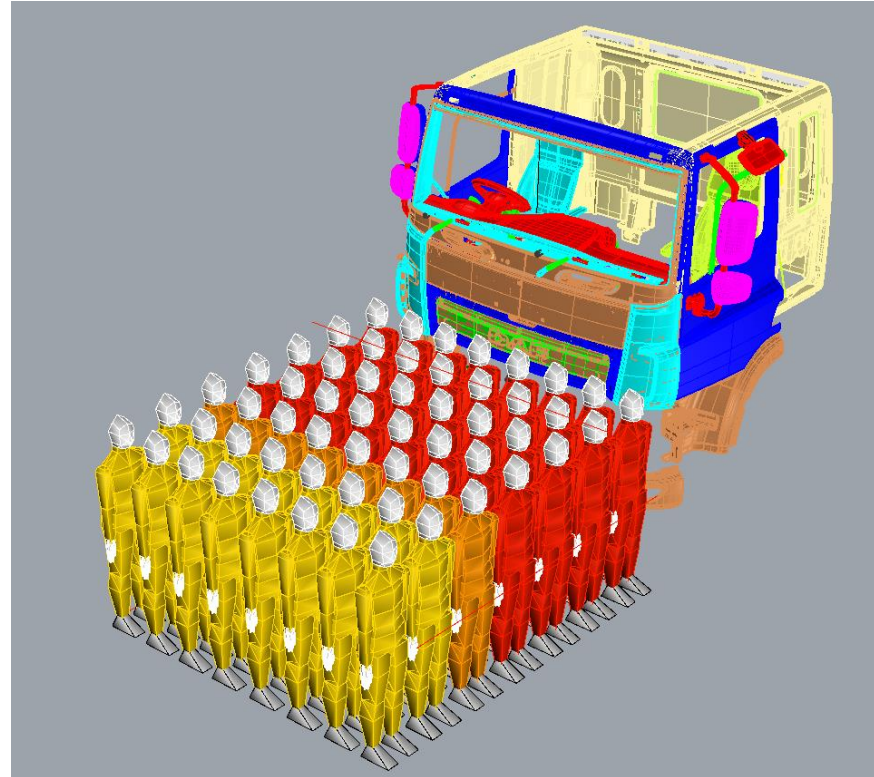
## ACEA proposal for level 3 leaves blind spots to the front of the vehicle

- In the 15<sup>th</sup> meeting a specific example was the DAF CF N3 at its maximum possible mounting height
- The volume score for this vehicle was **5.95m<sup>3</sup>**. This would therefore fail the ACEA minimum requirement for level 3 of 6m<sup>3</sup>
- After removing the mirrors, this volume improves to **7.47m<sup>3</sup>**
- However the DAF CF N3 in its highest possible configuration has a large **average VRU distance of 2.641m** to the front.
- Therefore the vehicle can be improved relatively easily and yet would have a blind spot to the front of the vehicle



## ACEA proposal for level 3 leaves blind spots to the front of the vehicle

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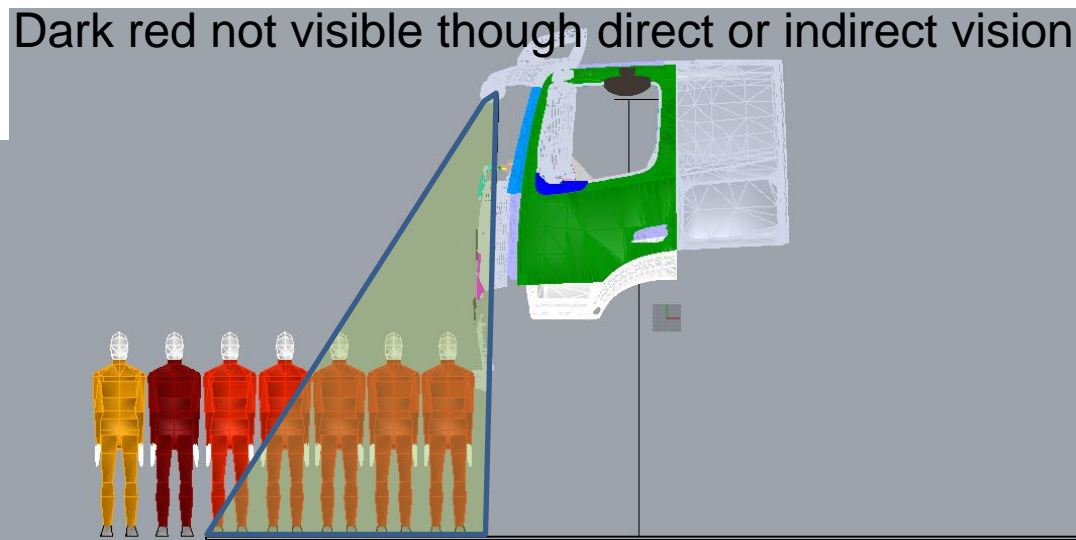
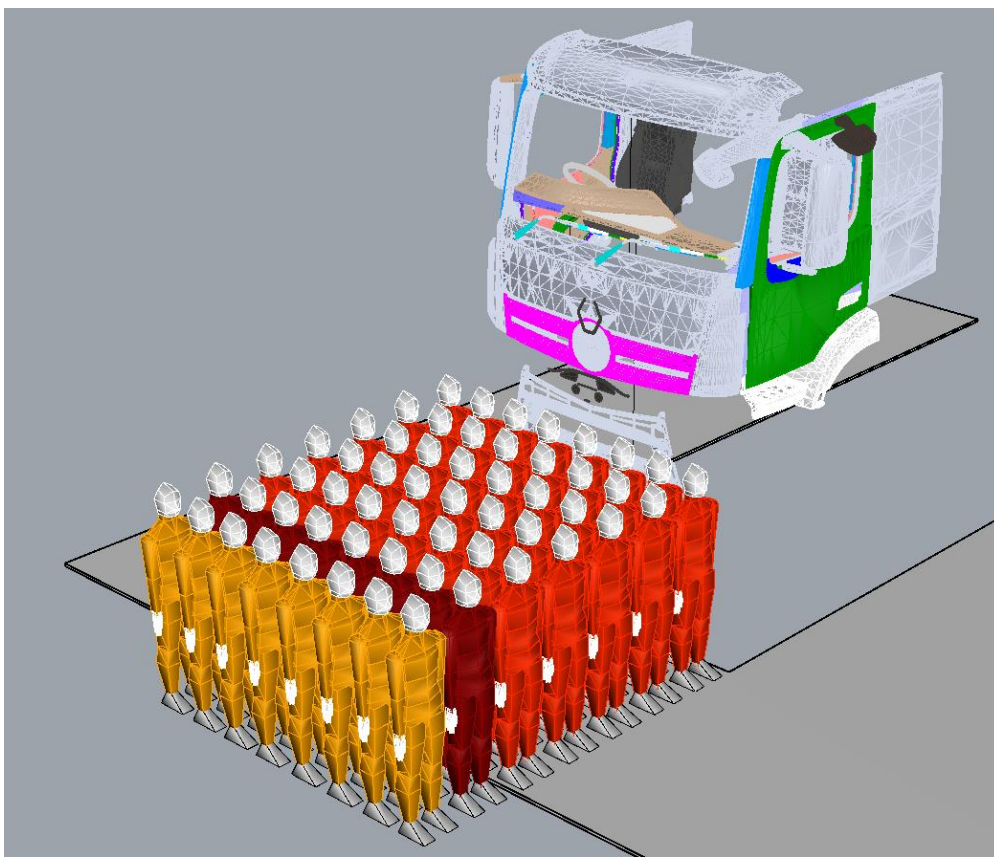


- If the driver does not use the proposed camera monitor system, or mirrors on standard version, ALL of the red VRUs would be not visible from the standardised DVS eye point.

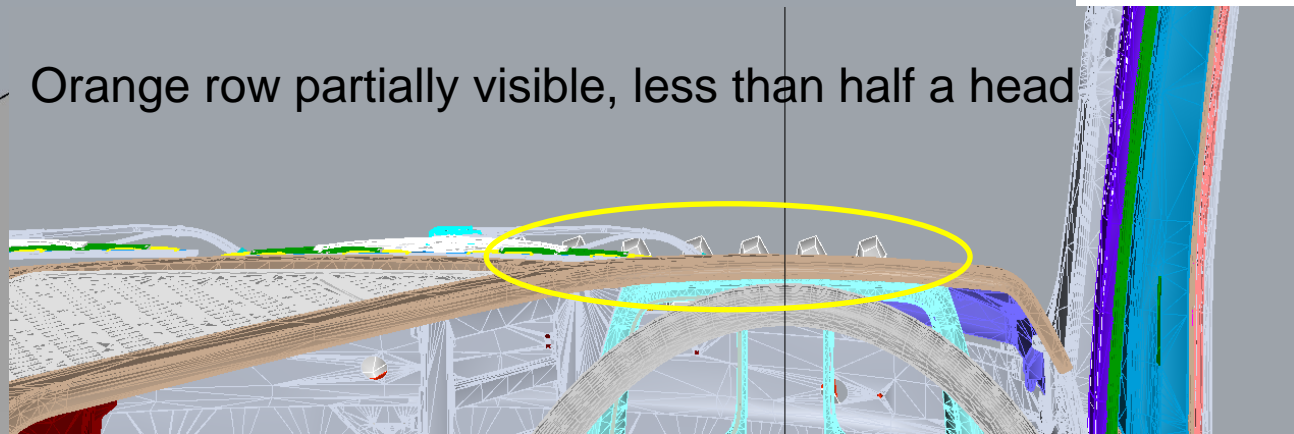
## ACEA proposal for level 3 leaves blind spots to the front of the vehicle

- Another example. The Mercedes 2.3m cab width (H)
- With mirrors this vehicle achieves a Volume of **5.7m<sup>3</sup>** and would therefore fail the ACEA level 3 minimum
- With the mirrors removed it achieves a Volume of **6.8m<sup>3</sup>** and therefore passes the ACEA level 3 minimum
- This vehicle has an average VRU distance to the front of 2.97m

Dark red not visible though direct or indirect vision

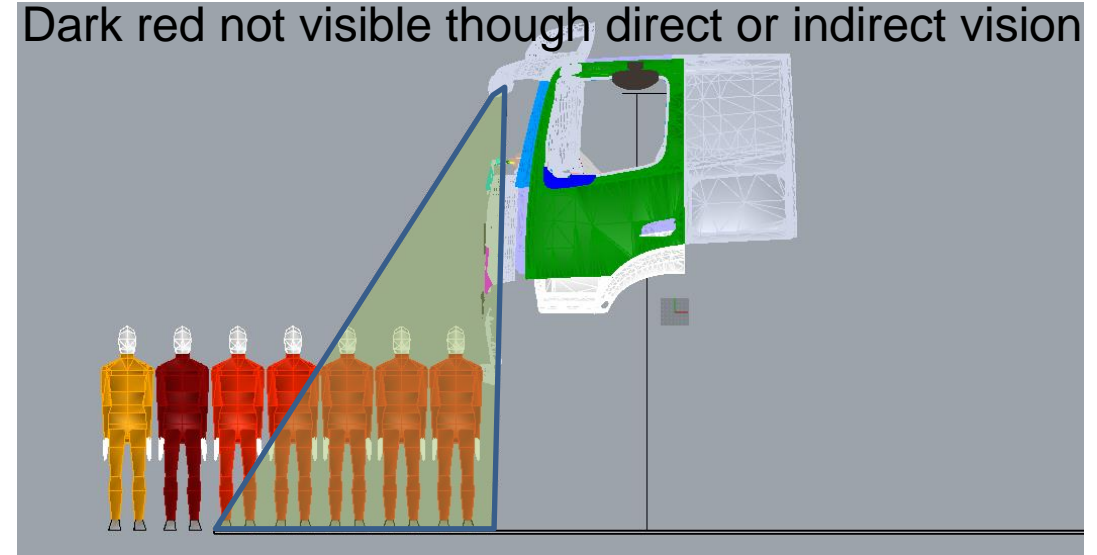
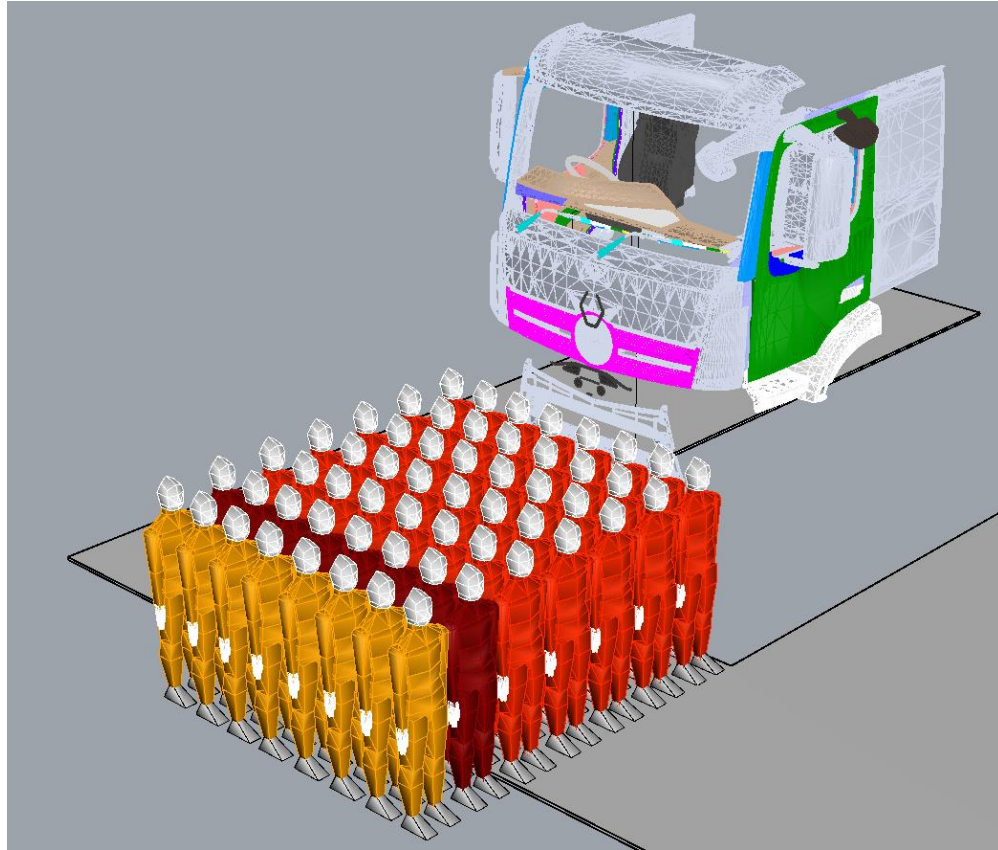


Orange row partially visible, less than half a head





## ACEA proposal for level 3 leaves blind spots to the front of the vehicle



- If the driver does not use the proposed camera monitor system, ALL of the red VRUs would be not visible from the standardised DVS eye point
- The dark red row cannot be seen using direct vision or indirect vision

## What does this mean?

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- The ACEA proposal suggests that camera monitor systems can replace direct vision to the front of the vehicles
- The ACEA proposal leaves large direct vision blind spots to the front of the vehicle for **at least 10** of the cab designs analysed (based upon front VRU distance)
- These blind spots are in the area of greatest risk for pedestrians. In the UK **38%** of collisions where a VRU is Killed or Seriously Injured occur when the vehicle moves away from stand still, e.g. at a pedestrian crossing
- In our opinion the ACEA proposal is not meeting the EU parliament's vision
  - “Vehicles of categories M2, M3, N2 and N3 shall be designed and constructed to enhance the direct visibility of vulnerable road users from the driver seat, **by reducing to the greatest possible extent the blind spots in front of and to the side of the driver**, while taking into account the specificities of different categories of vehicles.”

## How to move forward?

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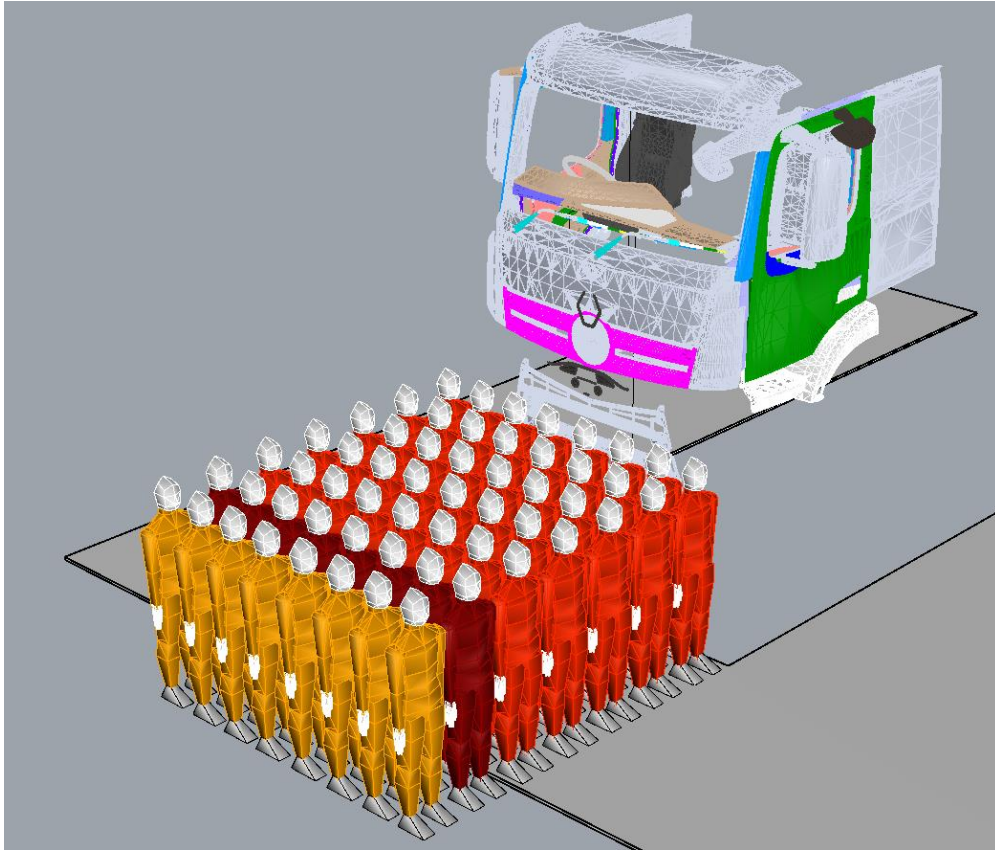
- At the 18<sup>th</sup> meeting it was decided that the **CPs would decide upon the VRU distances** at which the head can be seen from the driver's eye point.
- The ACEA proposal suggests that VRU distances beyond 2m to the front of the vehicle are acceptable, beyond the current mirror coverage zone
- It is our opinion that average VRU distances **must be below 2m** to the front, and considerably less than the 4.5m to the passenger side
- At the 13<sup>th</sup> meeting in Osaka the UK suggested the following, now famous, 'Donald' values
  - **1.7m** average VRU distance to the front
  - **2.5m** average VRU distance to the passenger side
  - **0.6m** average VRU distance to the passenger side
- The T&E proposal, and the Japanese proposal, advocate a **minimum volumetric requirement to the front of the vehicle** to avoid the blind spots highlighted earlier
- As the team that has defined the DVS methodology, we strong support this premise.
- **What are the acceptable VRU distances for other Contracting Parties?**

## How to move forward?

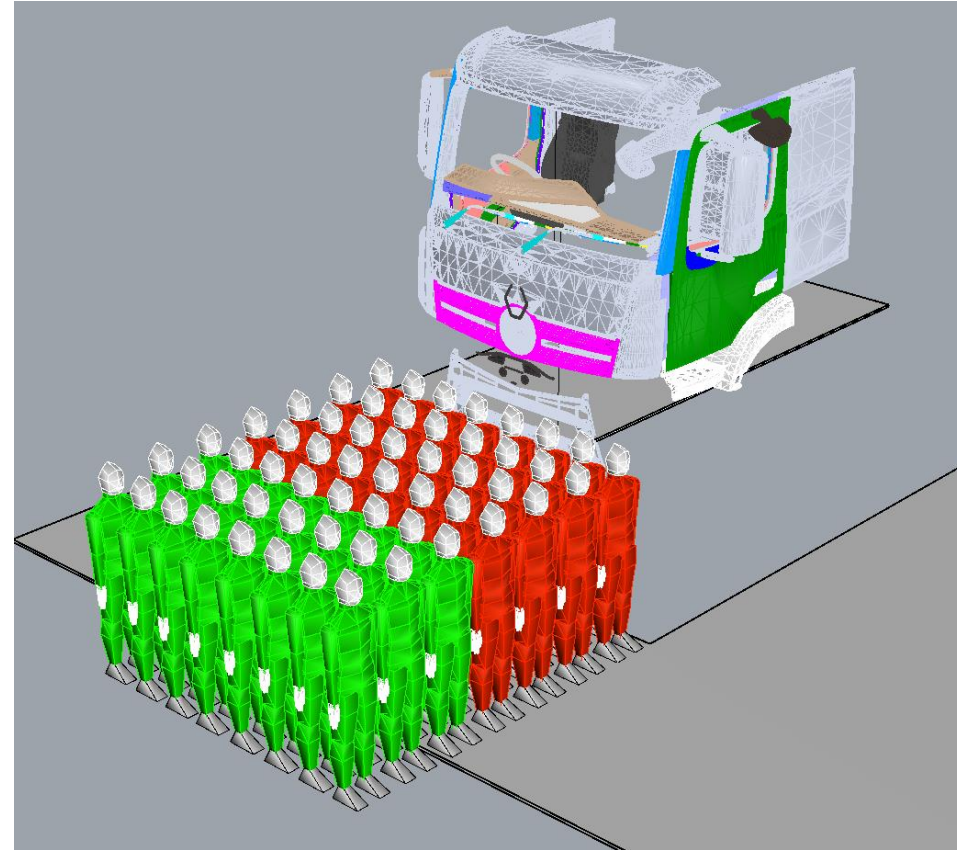
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## What are the acceptable VRU distances for CPs to the front?

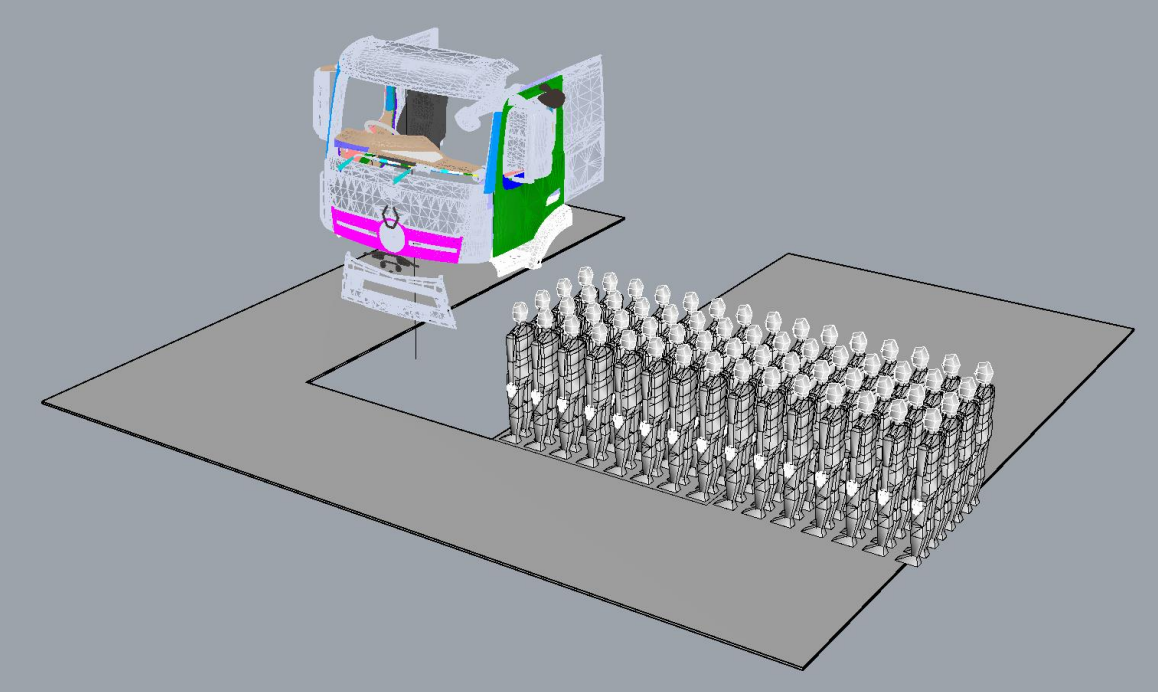


- To the front, how many of these VRUs is it acceptable for the driver NOT to be able to see through direct vision?

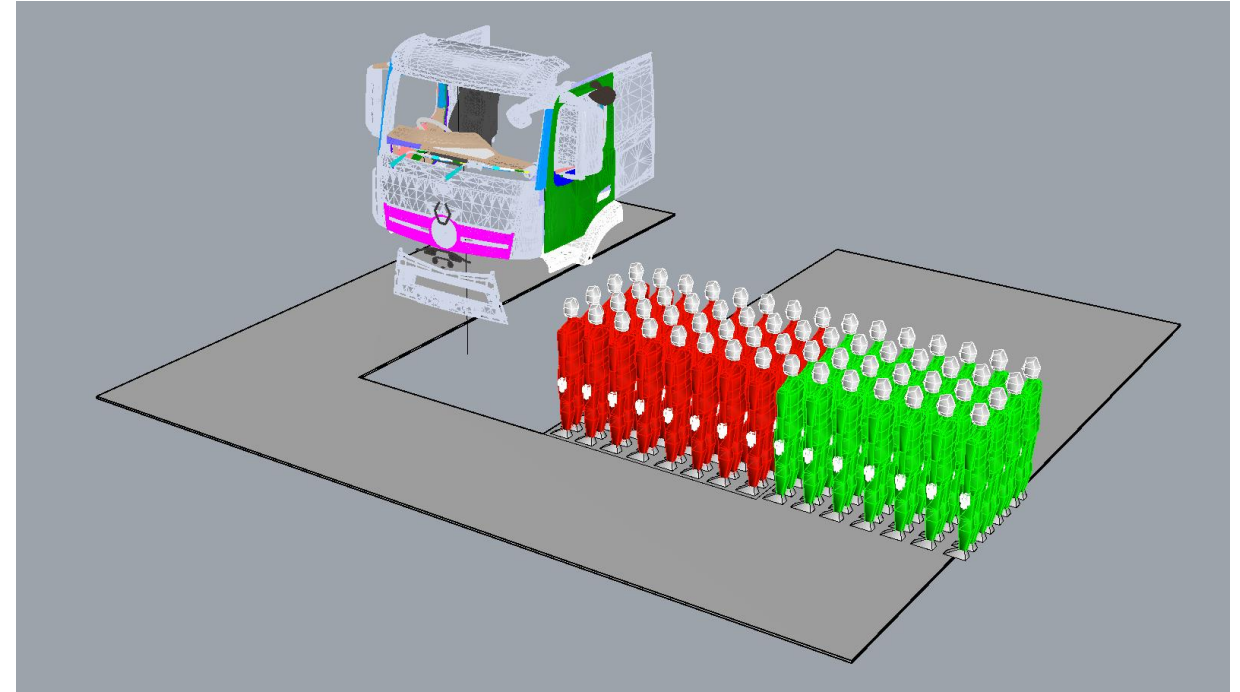


- The Donald values suggest that the green VRUS should be visible by direct vision (head visible). This still leaves more than half (RED) NOT visible by direct vision. Donald Value = 1.7m to the front

# What are the acceptable VRU distances for CPs to the passenger side?

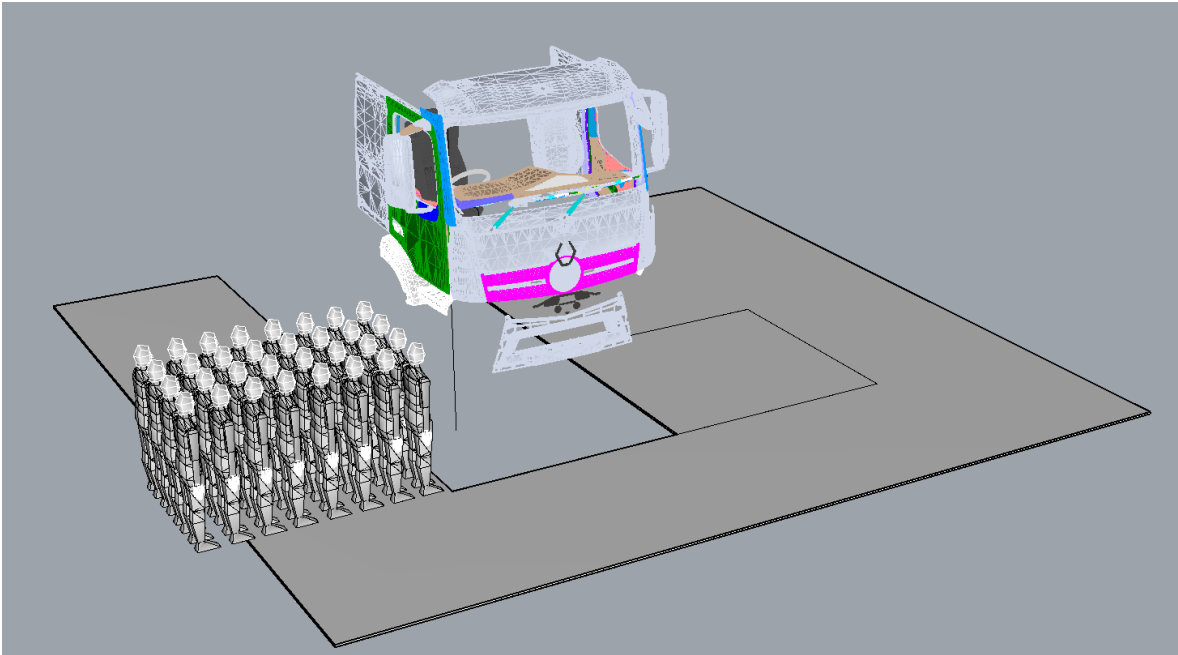


- To the passenger side, how many of these VRUs is it acceptable for the driver NOT to be able to see through direct vision?

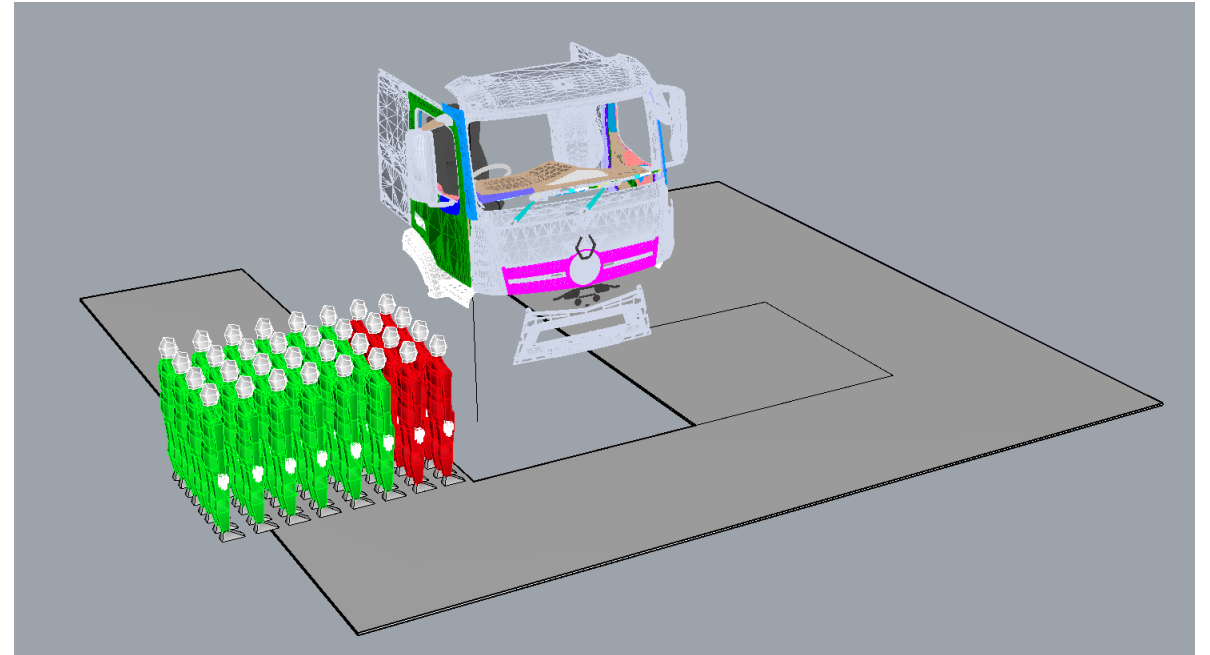


- The Donald values suggest that the green VRUS should be visible (head visible). This still leaves more than half NOT visible through direct vision. Donald value = 2.5m to the passenger side

## What are the acceptable VRU distances for CPs to the driver's side?



- To the driver's side, how many of these VRUs is it acceptable for the driver NOT to be able to see through direct vision?



- The Donald values suggest that the green VRUS should be visible through direct vision (head visible). Donald Value = 0.6m to the passenger side

# Summary

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- The aim was to highlight that the ACEA proposal allows blind spots between direct vision and indirect vision
- The T&E and Japan proposals require a minimum volume to the front to avoid this problem
- Currently the ACEA proposal simply replaces mirrors with a Camera Monitor System
- The EU parliament statement is highlighted to emphasise the risk of moving too far away from the parliaments vision
- The last three slides provide a mechanism to discuss the size of the direct vision blind spots to each side of the vehicle that is acceptable to CPs.