Leading UK Logistics

First Steps to Autonomy – Maintaining New Systems

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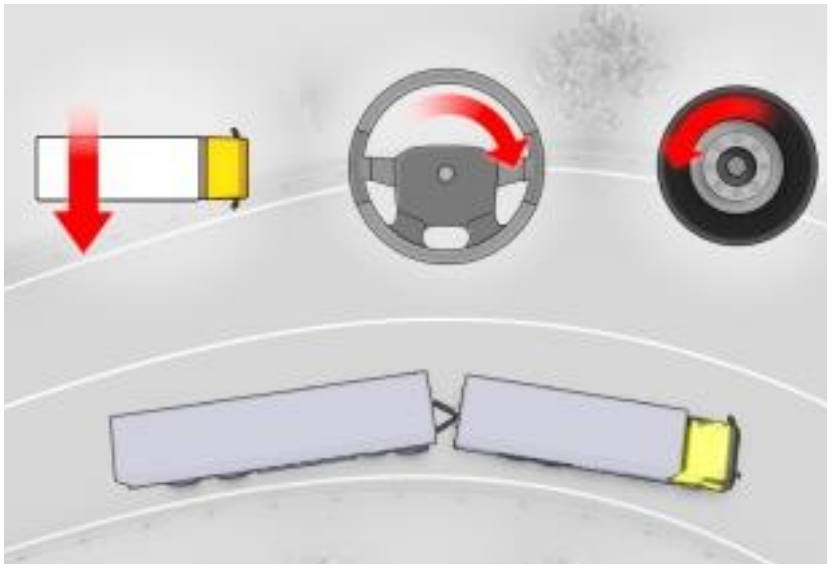
Head of Product Management
Volvo Trucks

June 2019

Basic vehicle needs

See
Visibility



Steer
Handling

Stop
Braking

Passive Safety - Protection

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Cab tested to Swedish BOF10 the toughest legal demand in the world

Roof Escape Hatch

Seat belt pre-tensioner option

Front underrun protection

SRS Airbag

Day time running lamps front and rear

Smoke alarm in sleeper cabs

New A post and slim mirror design

Electric Park brake

Inertia reel seatbelts

High visibility red seat belts

Electronically controlled disc brakes

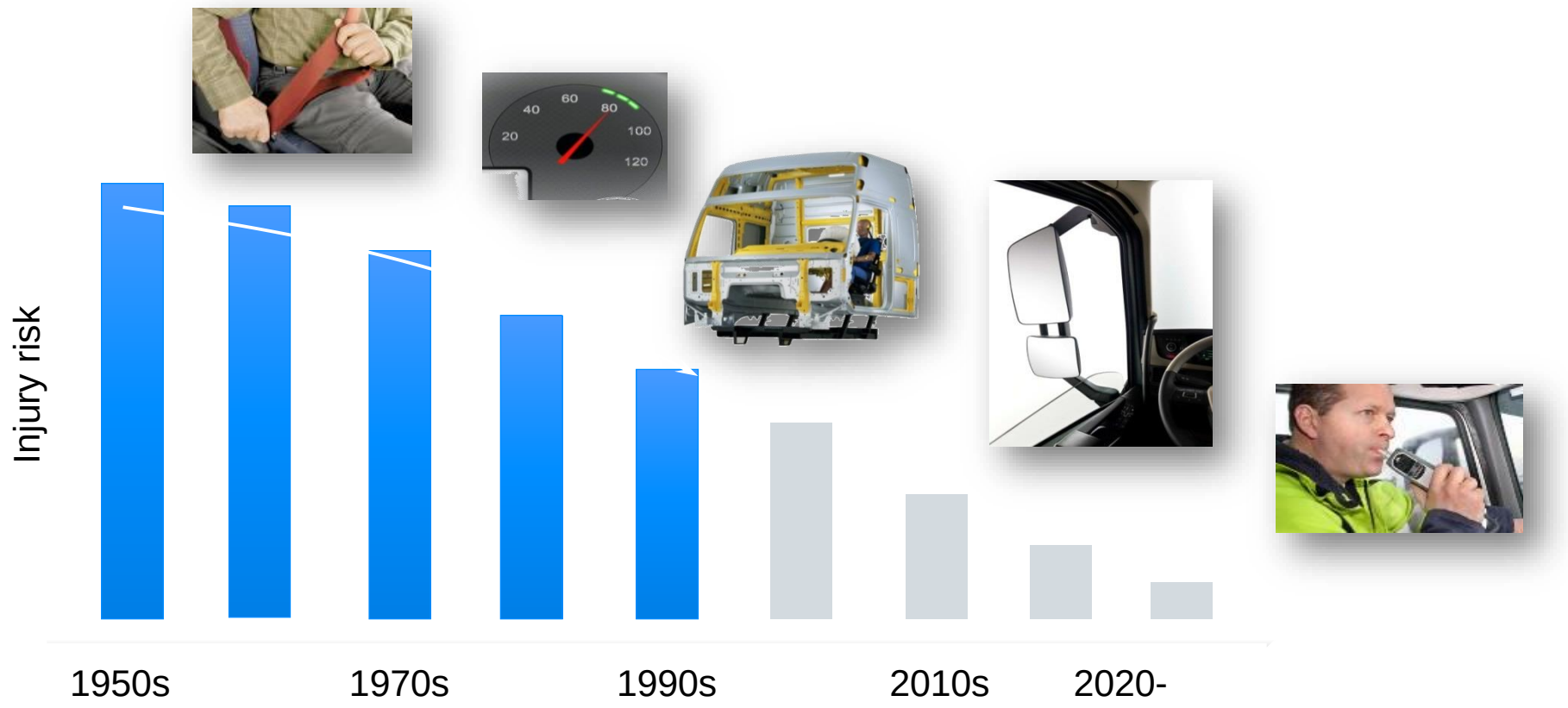
Brake Blending

Volvo unique barrier crash test

Laminated Side window option

Bonded Windscreen

Passive Safety Phase

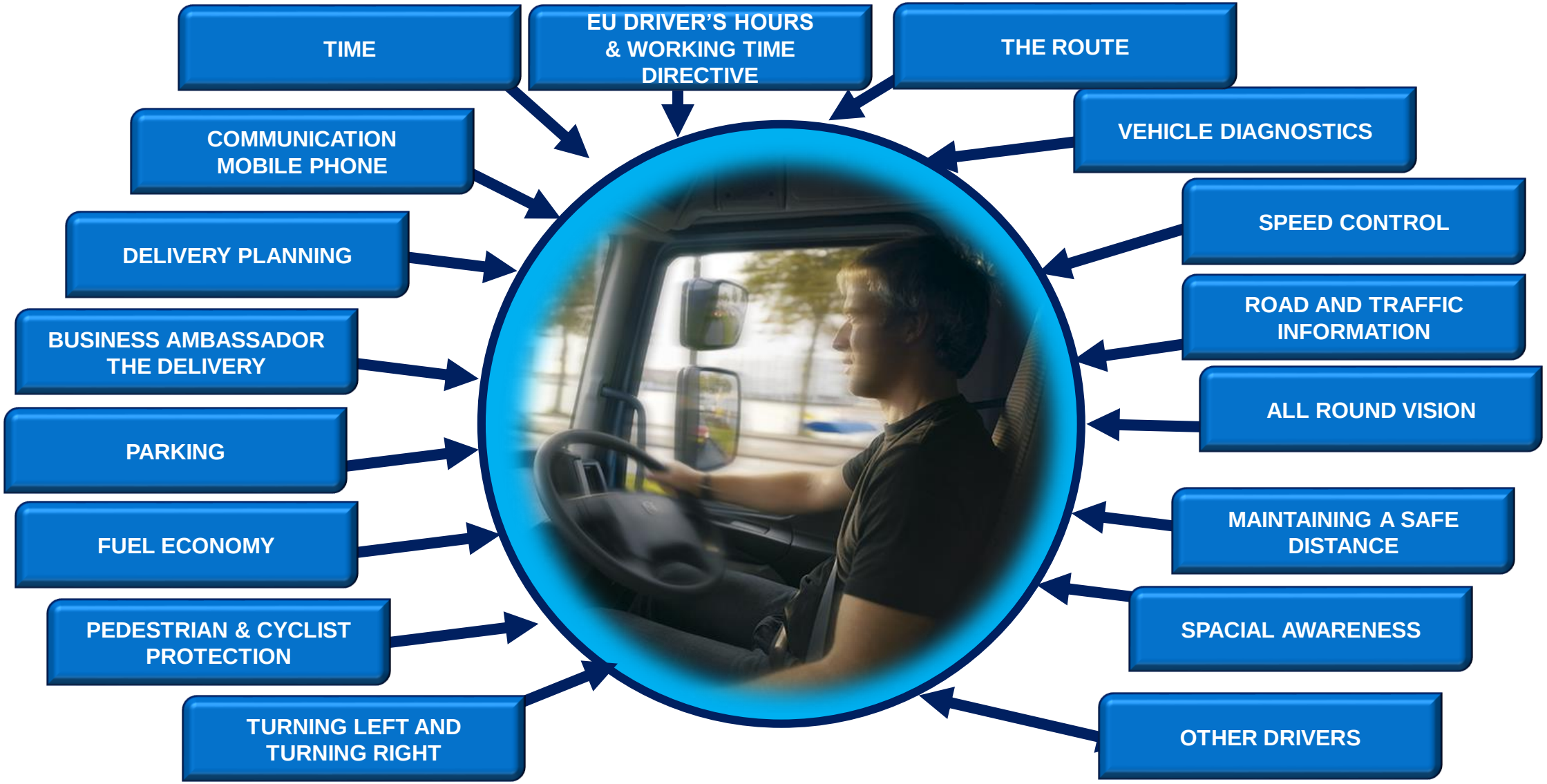


Our Goal

Why do Accidents Happen?

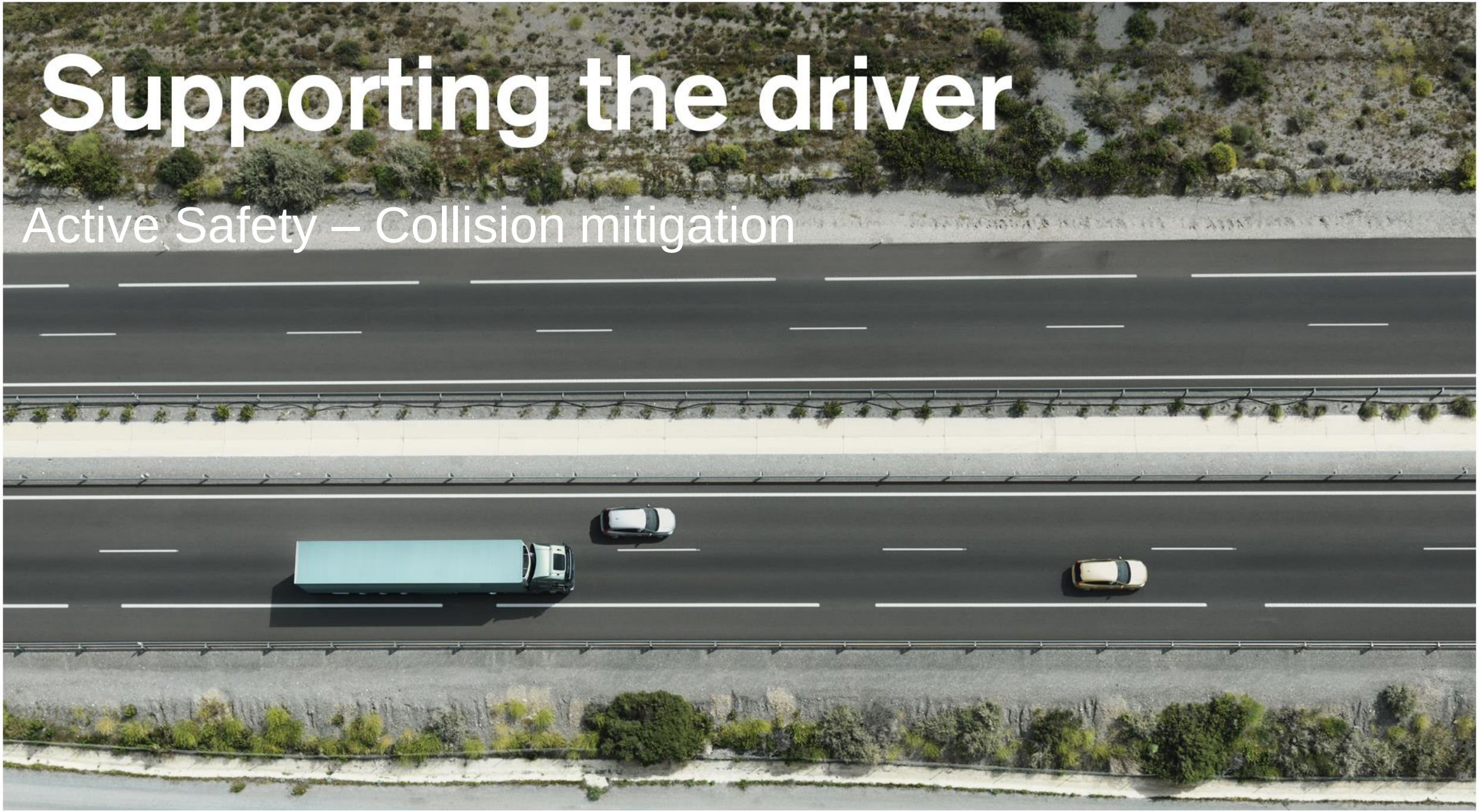
90% - Due to Human Factors

Driver Workload



Supporting the driver

Active Safety – Collision mitigation



Understanding New Industry Terms

ADAS	Advanced Driver Assistance Systems
AEBS	Advanced Emergency Brake
LKS	Lane Keeping Support
ACC	Adaptive Cruise Control
GSR	General Safety Regulation

Active Safety – Collision Mitigation

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Two pedal I shift

I-See

ESP electronic stability program

Driver Alert Support

Volvo Engine brake

Rain sensing wipers

Dynamic BiXenon bending lights

Adaptive Cruise Control

Hill hold

Alcolock

Cruise control

Day time running lamps front and rear

Bluetooth

Lane change support

Integrated 7” camera screen in dash

Automatic Headlights

Tyre Pressure Monitoring option

Dynamic Steering

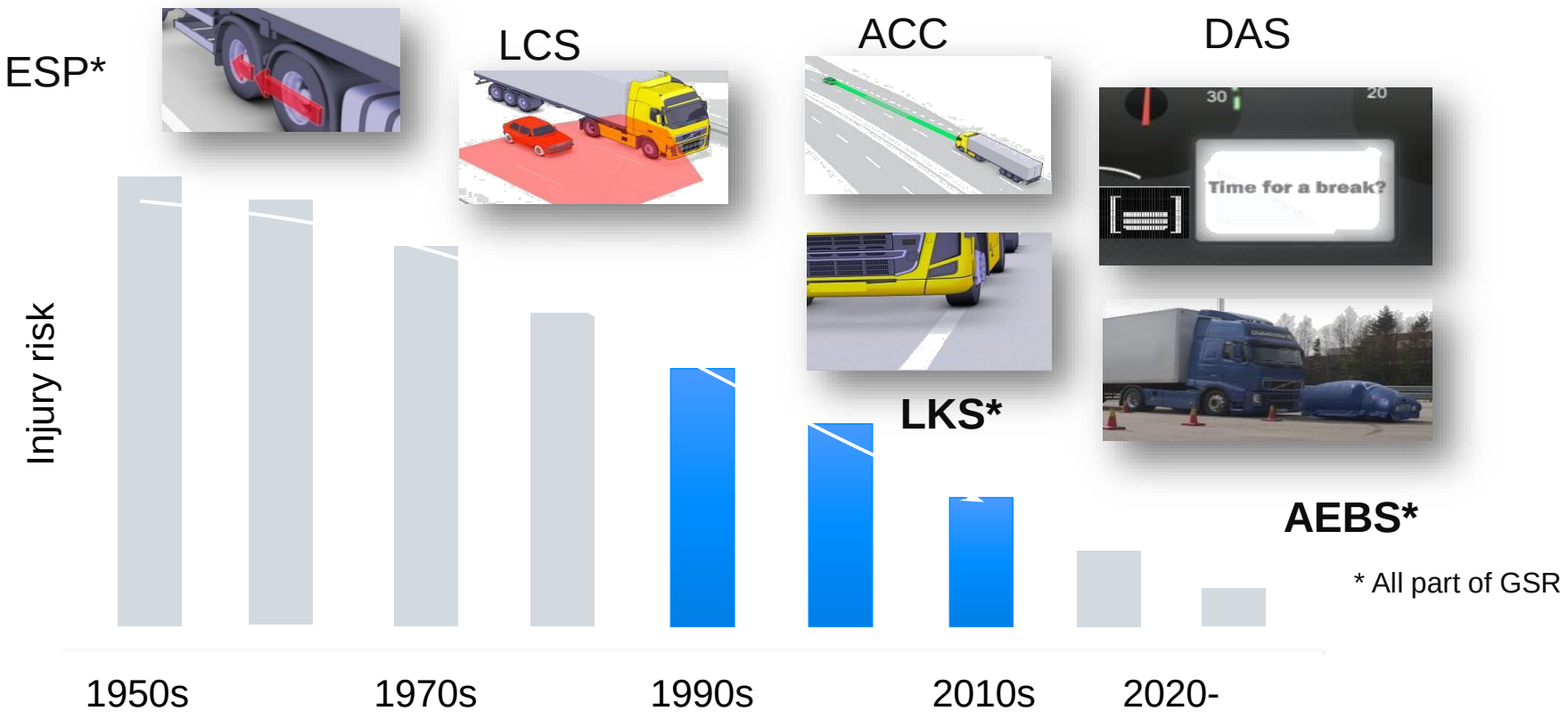
Advanced Emergency braking with a unique head up headway support

Automatic headlamp switching option

Lane departure warning

Distance Alert

Active Safety Phase



* All part of GSR

The Motivation for Advanced Emergency Braking

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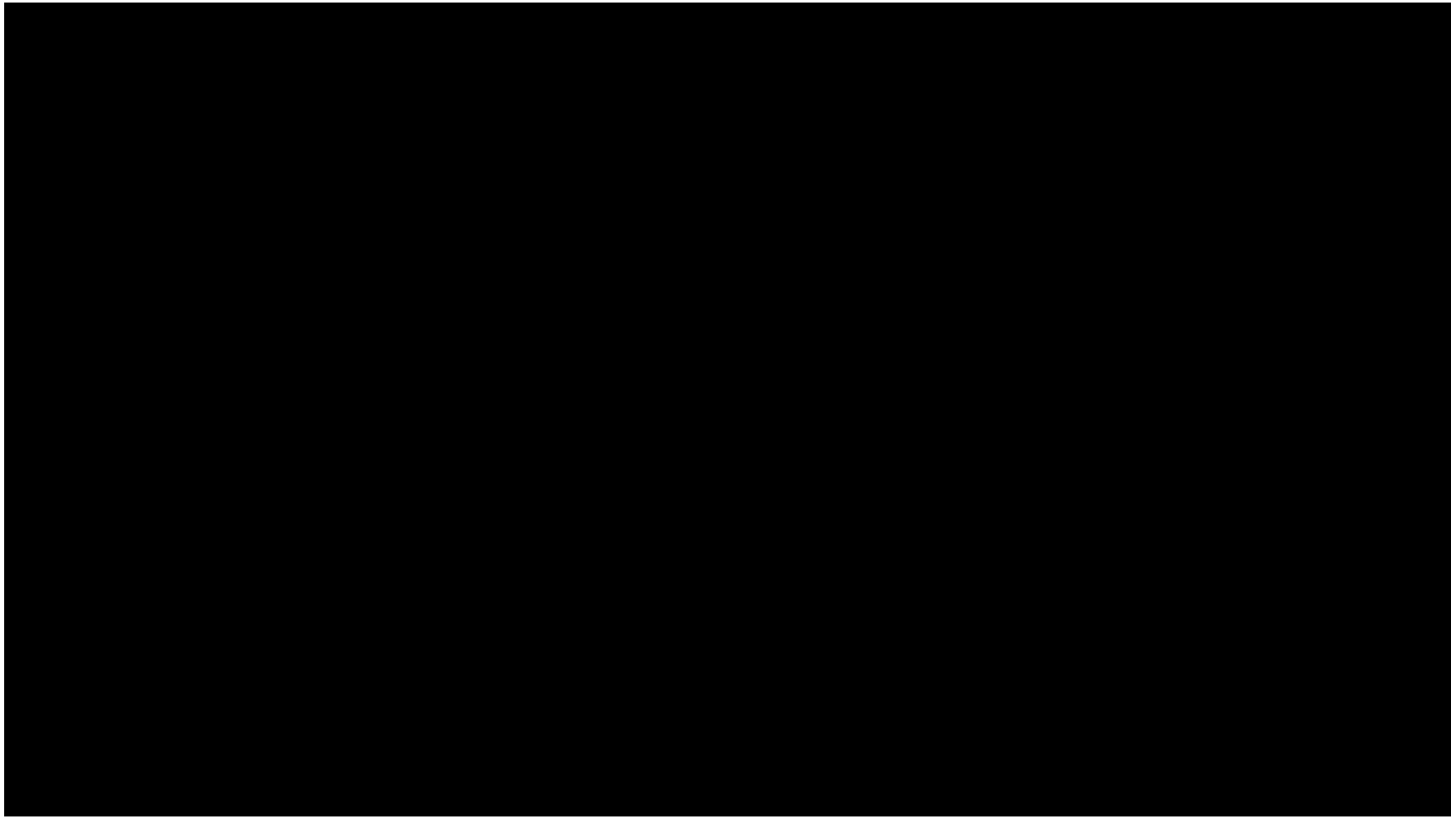
“The aim is to help reduce incidents and hence reduce casualties in which a truck drives into the back of a vehicle in front.”

– the most common form of truck incident on motorways and A roads.



Legal demands for Emergency Braking systems

Legal Demand	Step 1* November 1, 2015	Step 2 November 1, 2018
Stationary “Object”	from 80 km/h (50mph) a reduction of 10 km/h	from 80 km/h (50mph) a reduction of 20 km/h
Moving “Object”	32 km/h: from 80 km/h no impact	12 km/h: from 80 km/h no impact

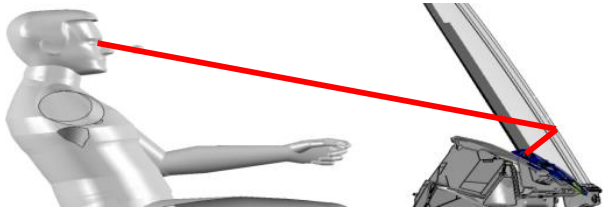
Legal from 1st November 2015

- Only for vehicles N2,N3 with rear air suspension and maximum three axles

- Four axle trucks and off road defined trucks are exempt today
- Four axle into scope November 1st 2018

Supporting the driver

Active Safety – Forward Collision Warning with Advanced Emergency Braking AEBS

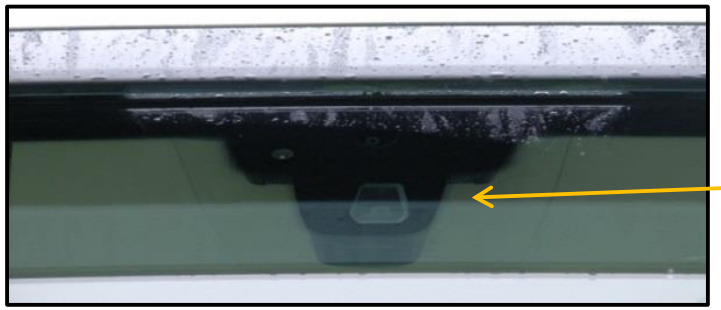


- A safety system not a comfort system
- If the truck detects vehicles / objects in front of the vehicle in its travelling path.
  - Collision Warning - Designed to mitigate a rear end collision by warning the driver to react
  - Emergency Brake - Automatically engages the wheel brakes
- Active above 15km/h or 10mph up to full speed

Supporting the driver
Advanced Emergency Braking– The Components

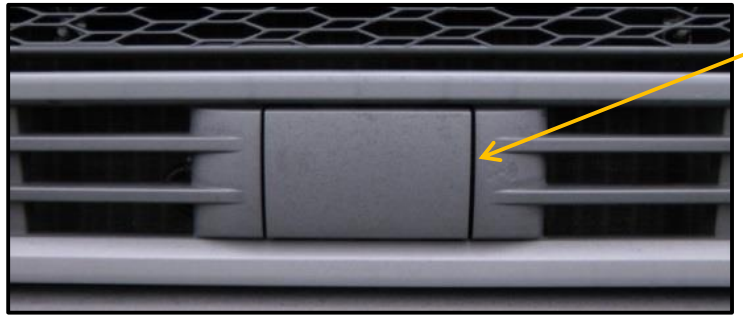
Camera Sensor FLS
Forward Looking Sensor

Good at classifying the object and placing them laterally.
The system tries to cater for bends in the road.
Not good at measuring distance or speed.

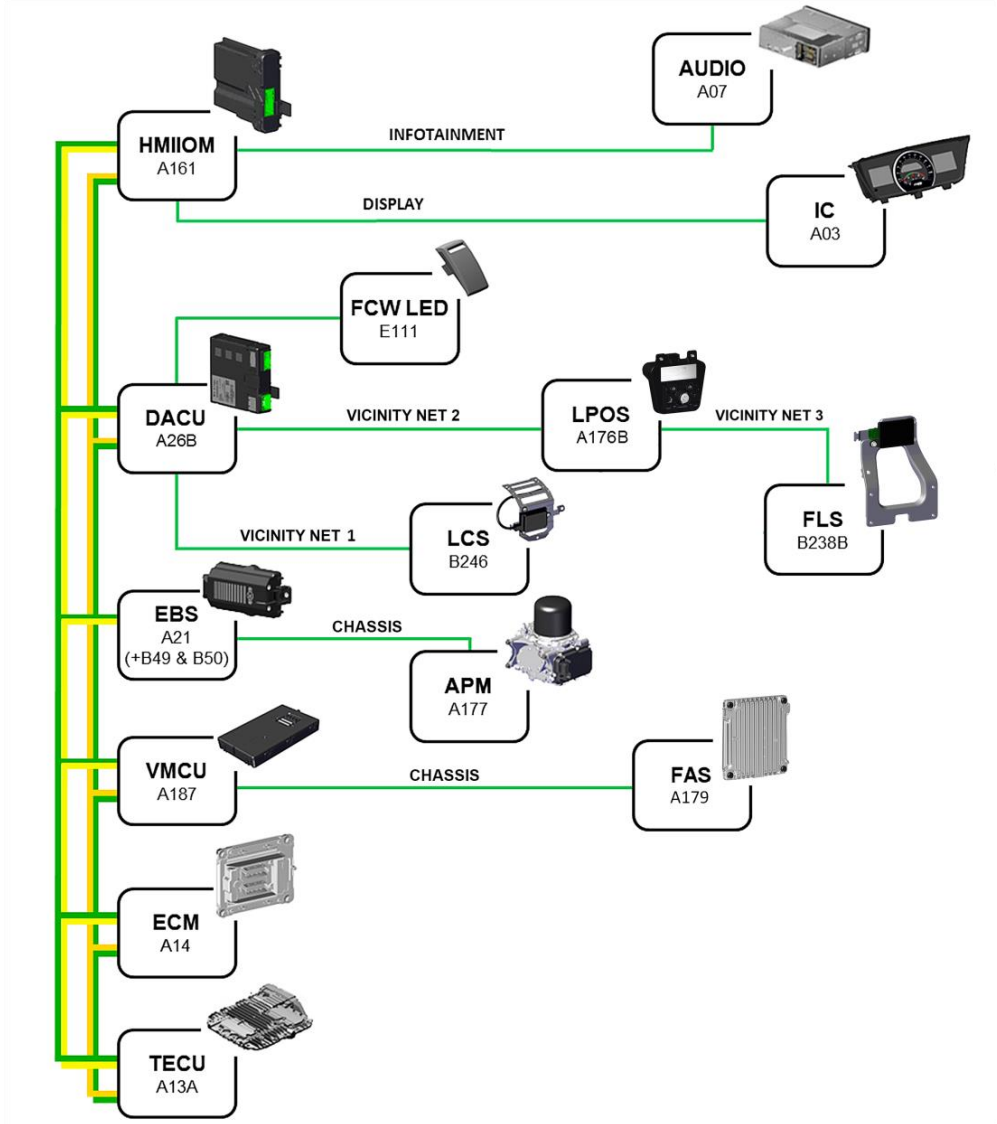


Radar Sensor LPOS
Lane Position Object Sensor

Good at measuring distance and relative speed.
Not good at classifying objects or their lateral placement



Driver Assistance Control Unit - DACU



Supporting the driver
Advanced Emergency Braking – The Components

Radar alone detects

- the distance to the object
- the speed of the object

Combined radar and camera detects

- the distance to the object
- the speed of the object
- the shape of the object
- the lateral position of the object

Fog & Snow

+ In clear weather a combined radar and camera system sees better than a “radar only” system

± In fog & snow a combined radar and camera system sees as good as a “radar only” system

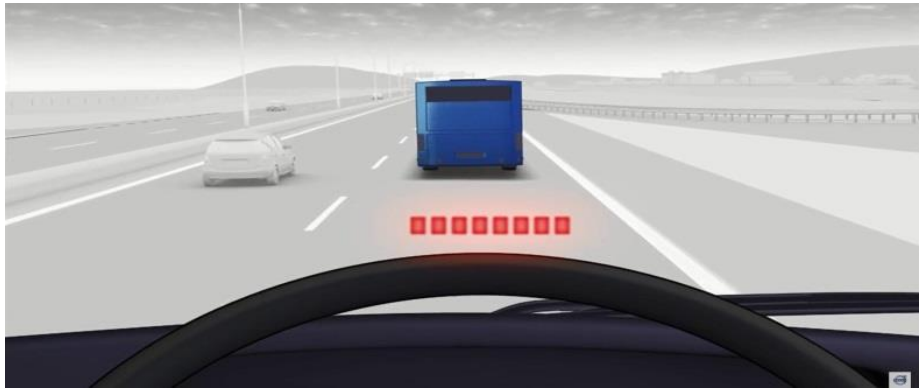
Advantages with Head up Display and Dual Sensor system

Head up Display

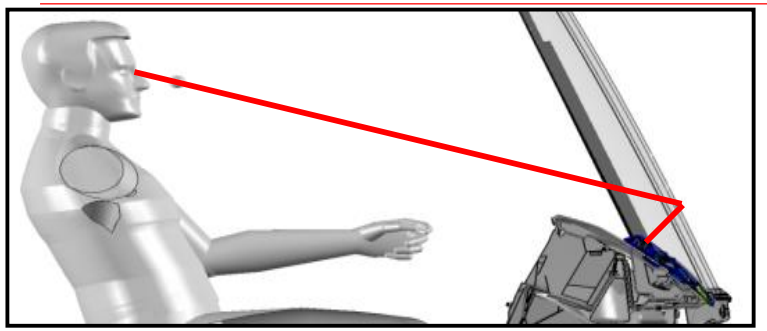
+ Quicker warnings and gain in reaction time

The combined radar and camera is a much safer system

+ Increased precision in off-set situations
+ Better certainty in defining a stationary object
+ A more precise detection in more traffic situations
+ Quicker warnings and gain in reaction time
+ Less false warnings

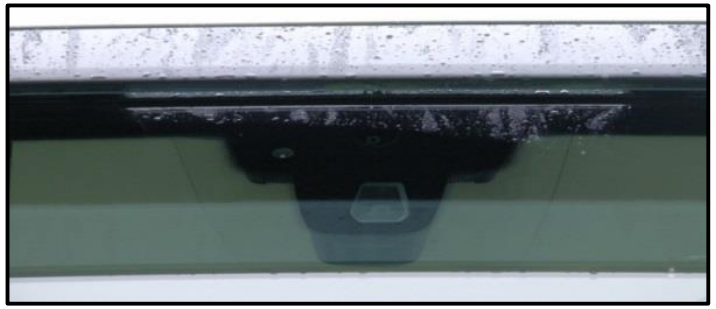


Looking after the System – To Maintain Performance



Head up display

- Keep paper work away from the top of the instrument panel at risk of obscuring the LEDS that emits the light signal.
- The Volvo FL/FE have collision warning in the instrument cluster



Camera Sensor

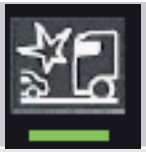
- Keep the camera clean
- If the camera is obstructed the display shows the message “CHECK CAMERA”
- If a new windscreen is required the camera has to be recalibrated
- The fashion for deep aftermarket sunvisors – The camera **must not** be obscured

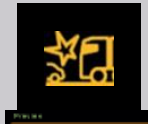
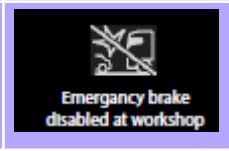
Radar Sensor

- Keep the sensor clean and free from obstructions like snow and dirt
- Do not paint the sensor cover
- Clean the outside and inside of the step by folding it down
- Performance can be limited by extreme weather conditions

Supporting the driver

Handover – Understanding the Warnings

ACTIVATION / ON	Switch	
DISABLE / OFF	Switch	
DISABLED in AM	HW telltale	
DISABLEd in AM	DID -Pop-Up	

Reduced Mode	HW telltale	
	DID -Pop-Up	
	DID -Pop-Up	
End-State	DID -Pop-Up	

Ensure trailer connection ISO7638 coupling crucial

New Distance Alert

Modular system serving many segments and applications

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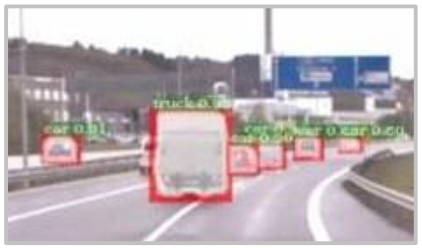
DRIVER SUPPORT SYSTEMS

CONFINED AND SEMI-CONFINED

PUBLIC / ON-ROAD

VOLVO AUTOMATION PLATFORM – HARDWARE AND SOFTWARE

Sensors

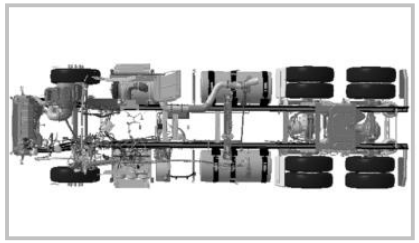


Perception

V2X communication

Cyber security

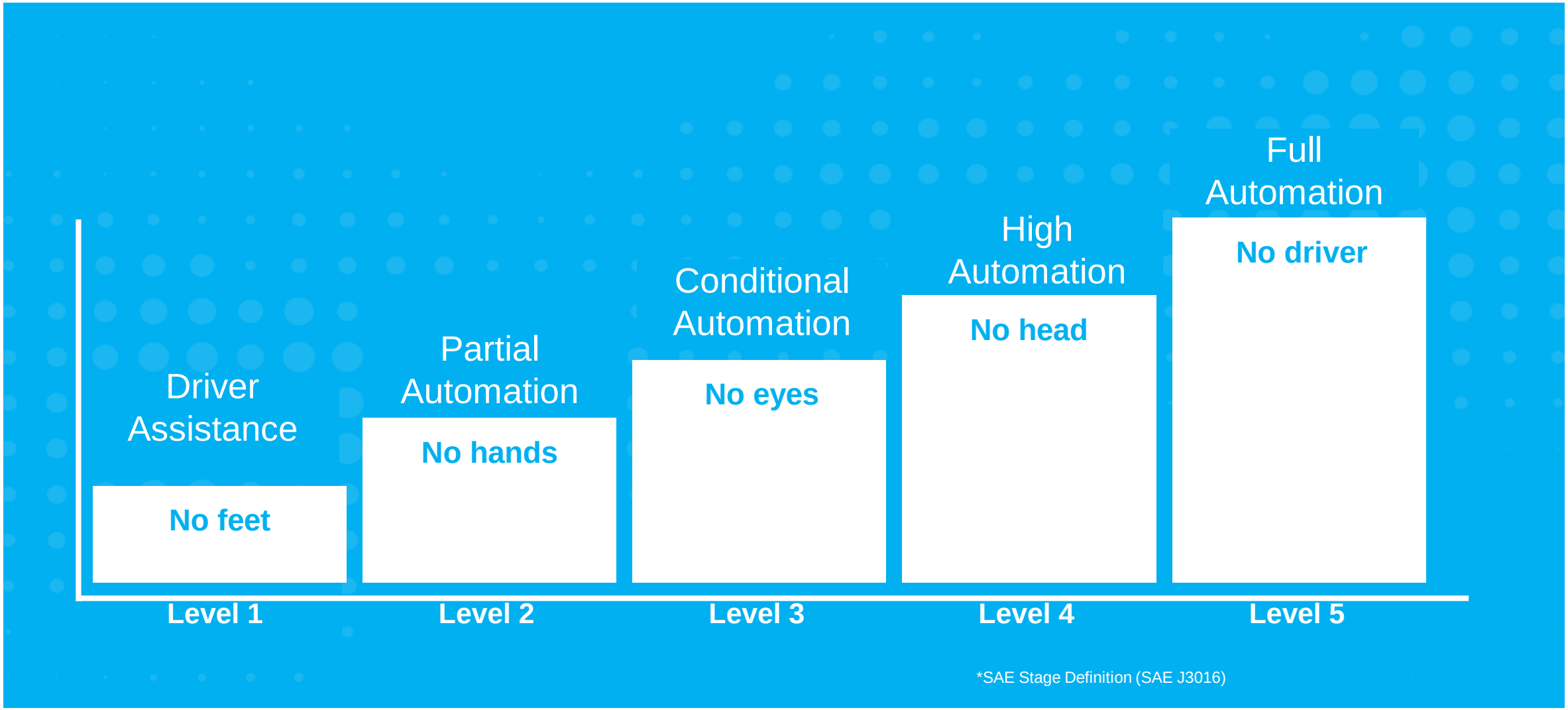
Fleet & Mission management



Redundant vehicle with automation interface

Closed Loop Autonomy

Levels of Automation



VERA

Summary

- Today - GSR safety support systems they are **NOT** comfort system, they give support if it all goes wrong.
- The systems support – but they cannot override the laws of physics
- It works to support the driver, the driver is still responsible for his driving and safety
- Handover training on these systems are essential
- Calibration required when damaged, warnings in service