AEBS HDV IWG

Comparison of AEBS
complexity of PCs vs HDVs

AEBS-HDV-SP-02
January 25-27, 2021

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- ❑ AEBS complexity (comparison of PCs and HDVs)

- ❑ Intermediate Conclusions

- ❑ Strategic views

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AEBS Legislated Applications

Vehicles primarily used in "urban driving conditions"

Medium range

PCs

Low speed

Collision with Vehicles and VRU

HDVs

Vehicles primarily used on "monotonous Highway conditions"

AEBS on PC and AEBS on HCVs only shares the same acronym, all the rest differs:
use case, applications, strategy, functionality...*

(* note: this led to making 2 different regulations)

High (Cruise) speed

Collision with Vehicles

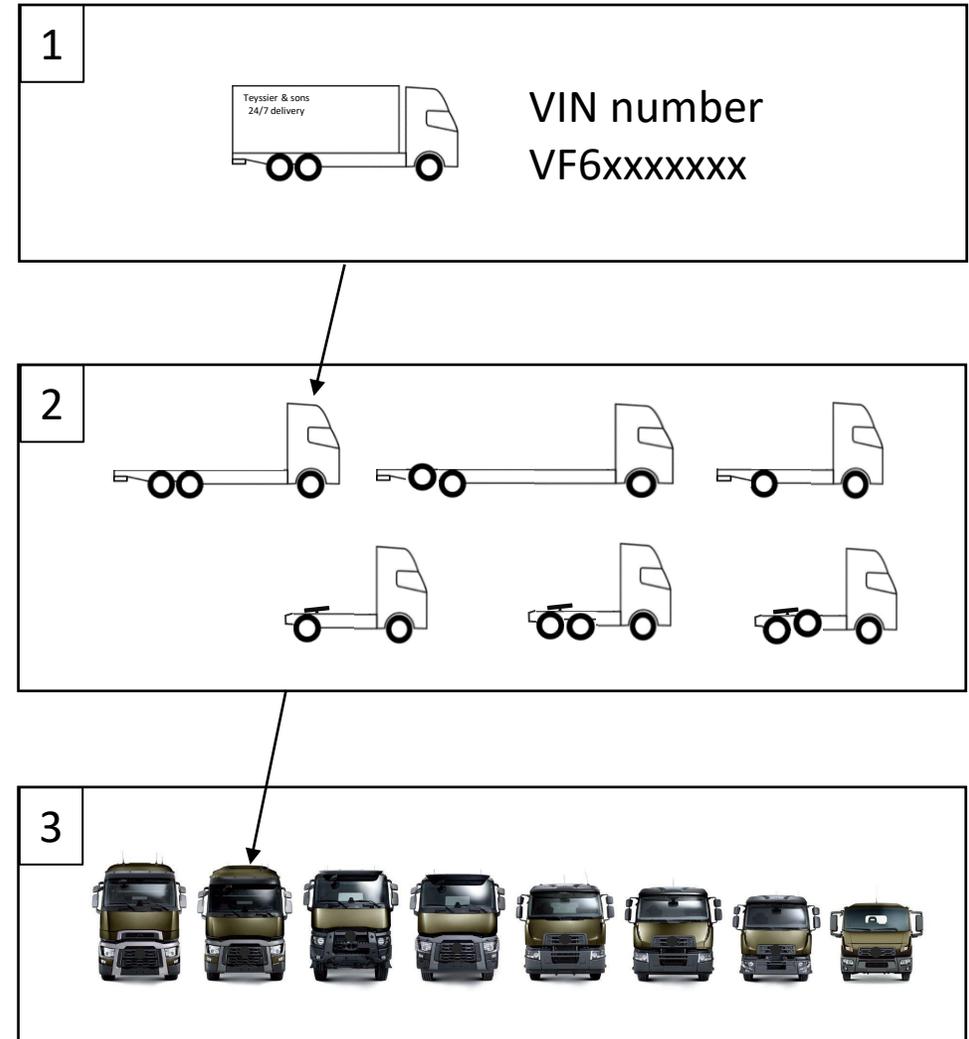**Long range**

AEBS complexity
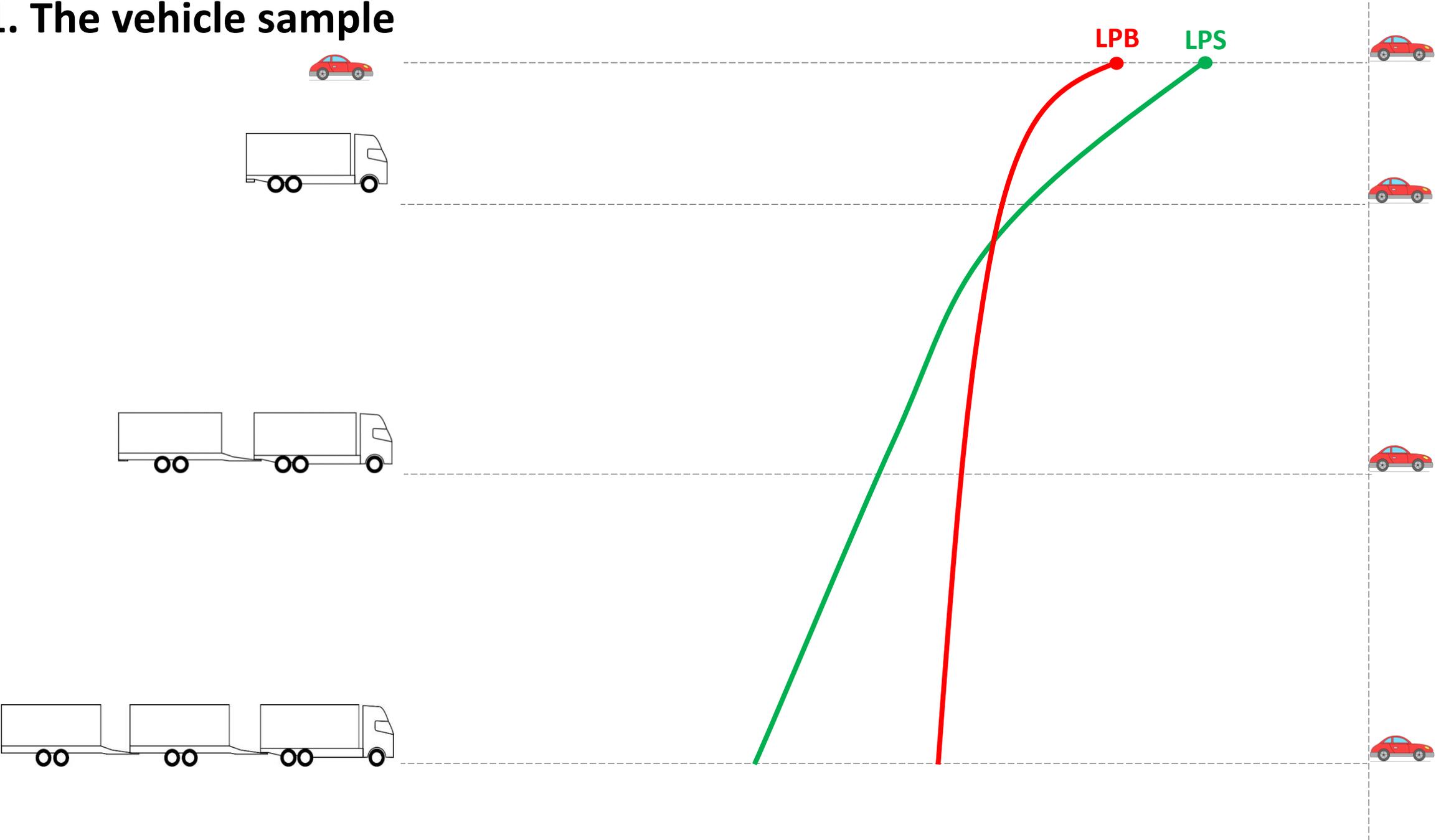## (comparison of PCs and HDVs)

AEBS complexity
(comparison of PCs and HDVs)

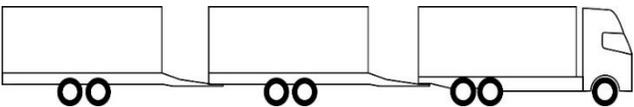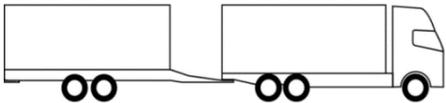Different levels to be considered for the comparison:
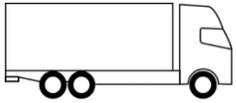
1. The vehicle sample (the individual)

2. The model

3. The range of models

1. The vehicle sample

LPB   LPS

1. The vehicle sample

The very same vehicle sample (i.e. a given VIN) will be used in a number of different configurations / situations.
Some impacting factors:
- Load, COG height,
- Speed,
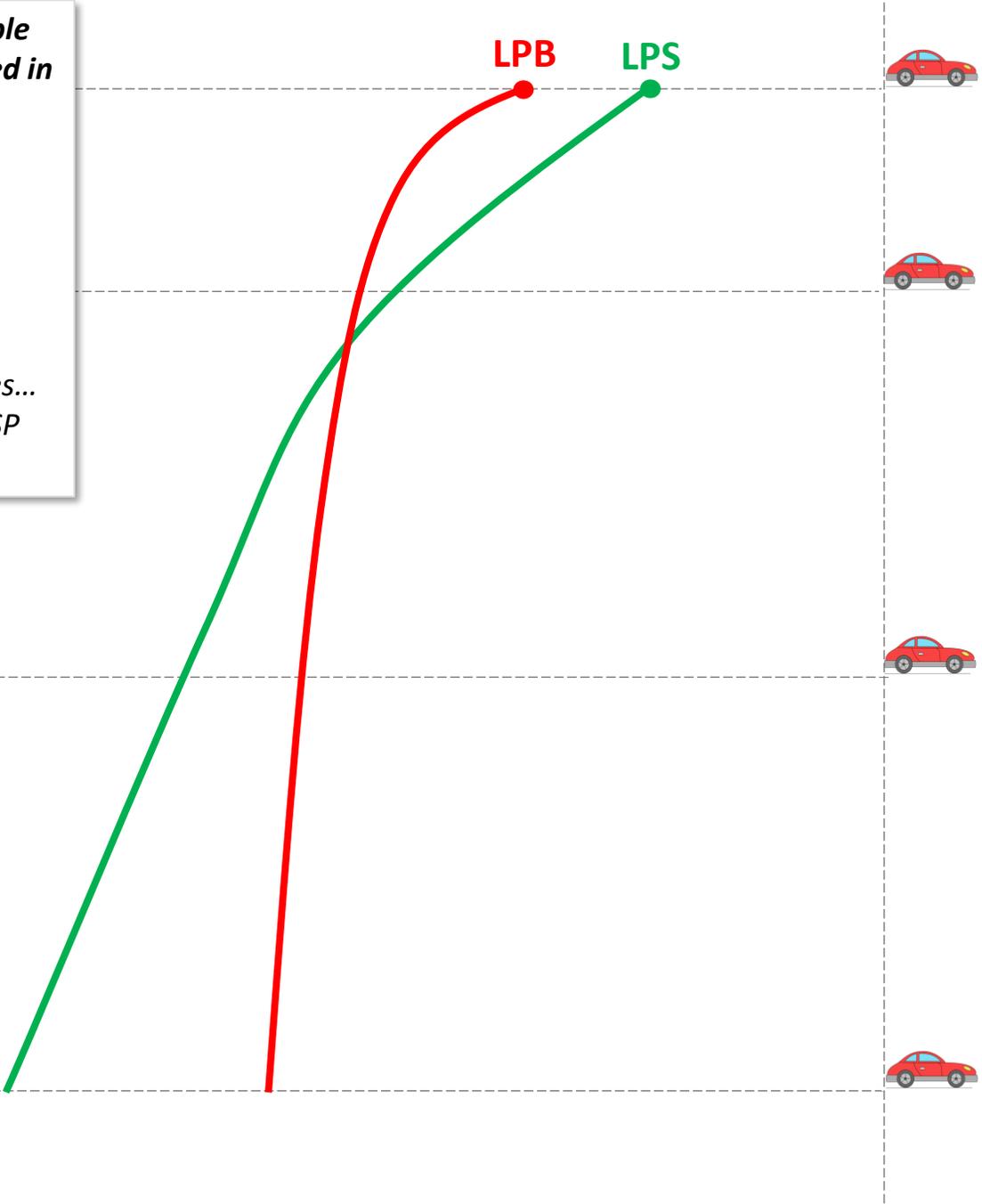- Road adhesion,
- Number of trailers:
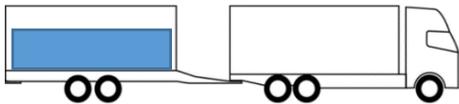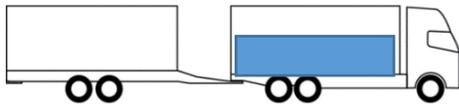 - Trailer type, brake, axles...
  - actual Status of ABS/ESP
- ...

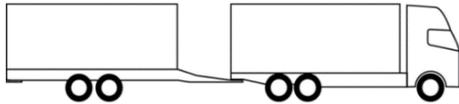LPB

LPS

1. The vehicle sample
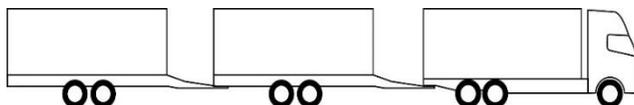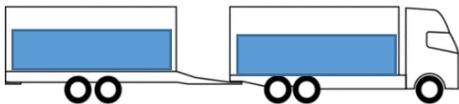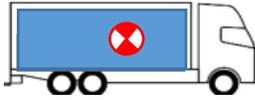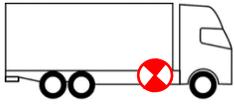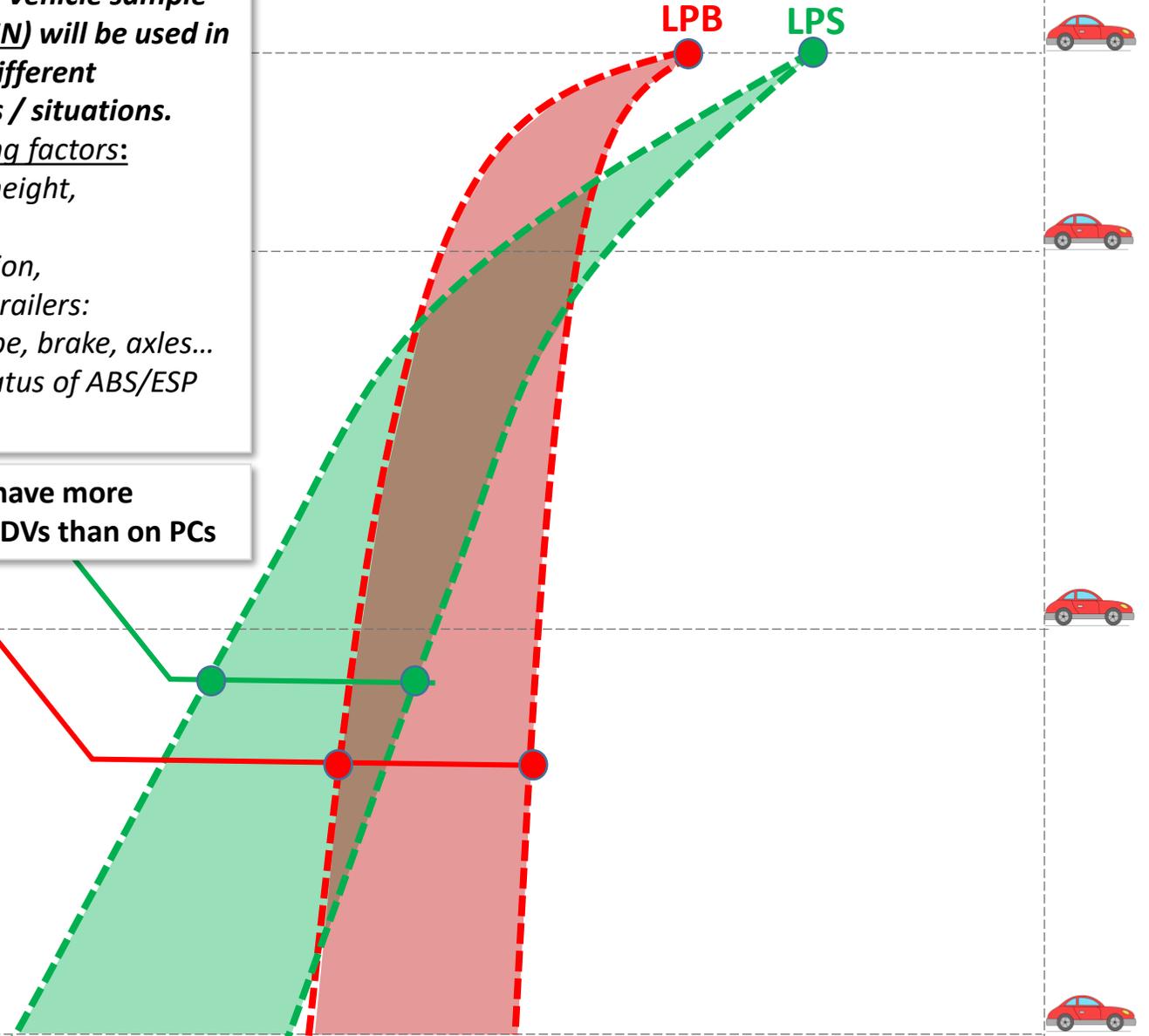

The very same vehicle sample (i.e. a given VIN) will be used in a number of different configurations / situations.
Some impacting factors:
- Load, COG height,
- Speed,
- Road adhesion,
- Number of trailers:
  - Trailer type, brake, axles…
  - actual Status of ABS/ESP
- …

These factors have more influence on HDVs than on PCs

LPB   LPS

One AEBS strategy that "fits to all" is a challenge…

2. The model

HDVs

PCs
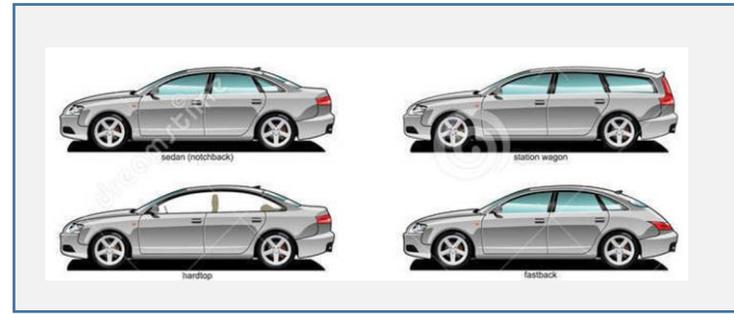
Trucks
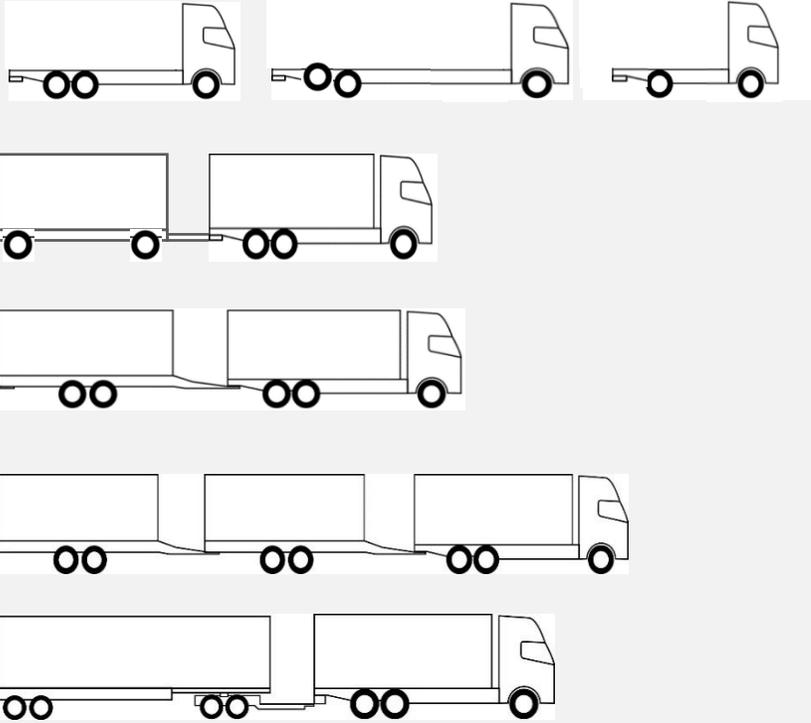
Tractors
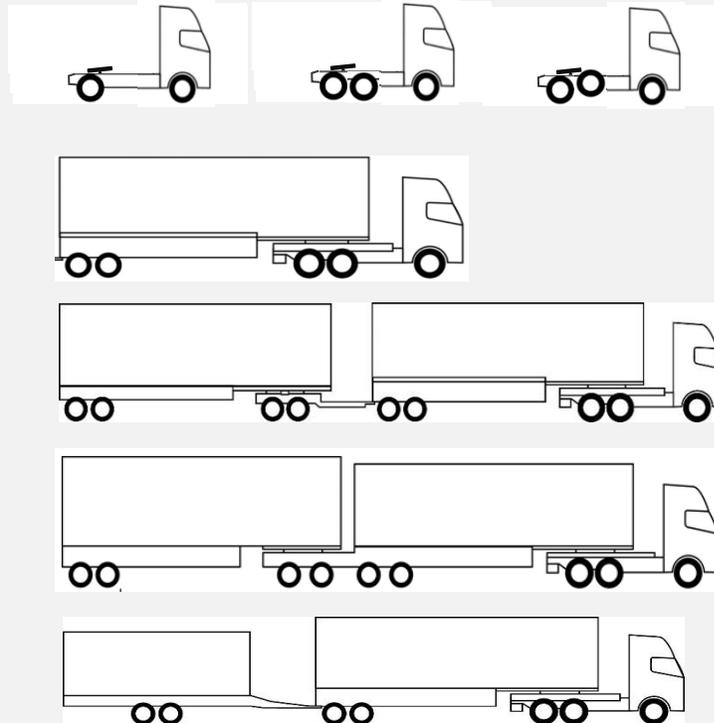
Huge variety of applications:
- Tippers,
- Refuse,
- Tankers,
- Snowplough, cranes,
- Weight Transport,
- Volume Transport...

Infinite combination of variants:
- Suspension
- Brake type
- Cab/chassis height
- Tyre/wheel size
- Wheel base
- Cab suspension
- Tag / pusher / Liftable / steerable axles

A given model requires a number of different AEBS applications (strategies, tunings, validation, type approval...)

3. The range of models

N3

N2
(derived from "heavies")

N2
(derived from N1

90   110   130

M3

M2

4. The example of "Chassis-Cab angle dynamic variation"

1

Dynamic variation of cab angle (camera)

Dynamic variation of chassis angle (radar)

4. The example of "Chassis-Cab angle dynamic variation"

Dynamic variation of cab angle (camera)

Dynamic variation of chassis angle (radar)

4. The example of "Chassis-Cab angle dynamic variation"
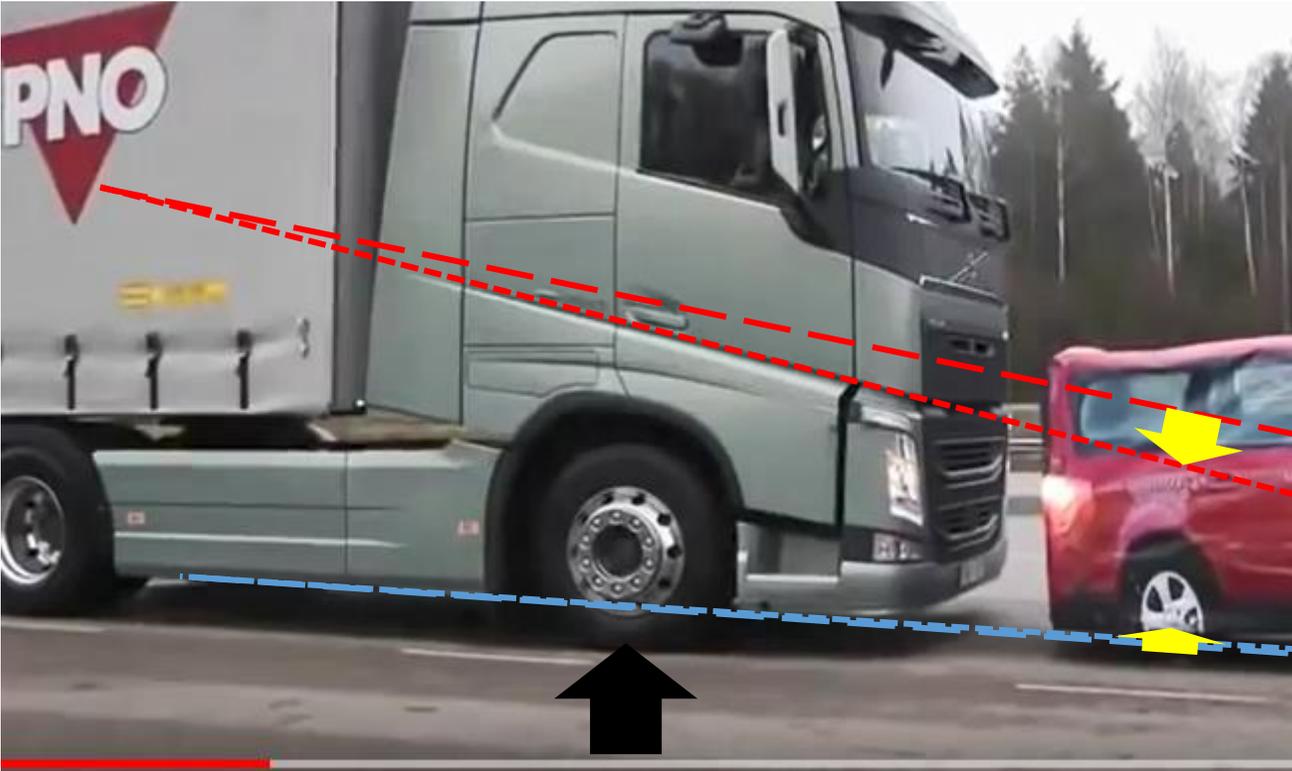
Dynamic variation of cab angle (camera)

Dynamic variation of chassis angle (radar)

4. The example of "Chassis-Cab angle dynamic variation"

4
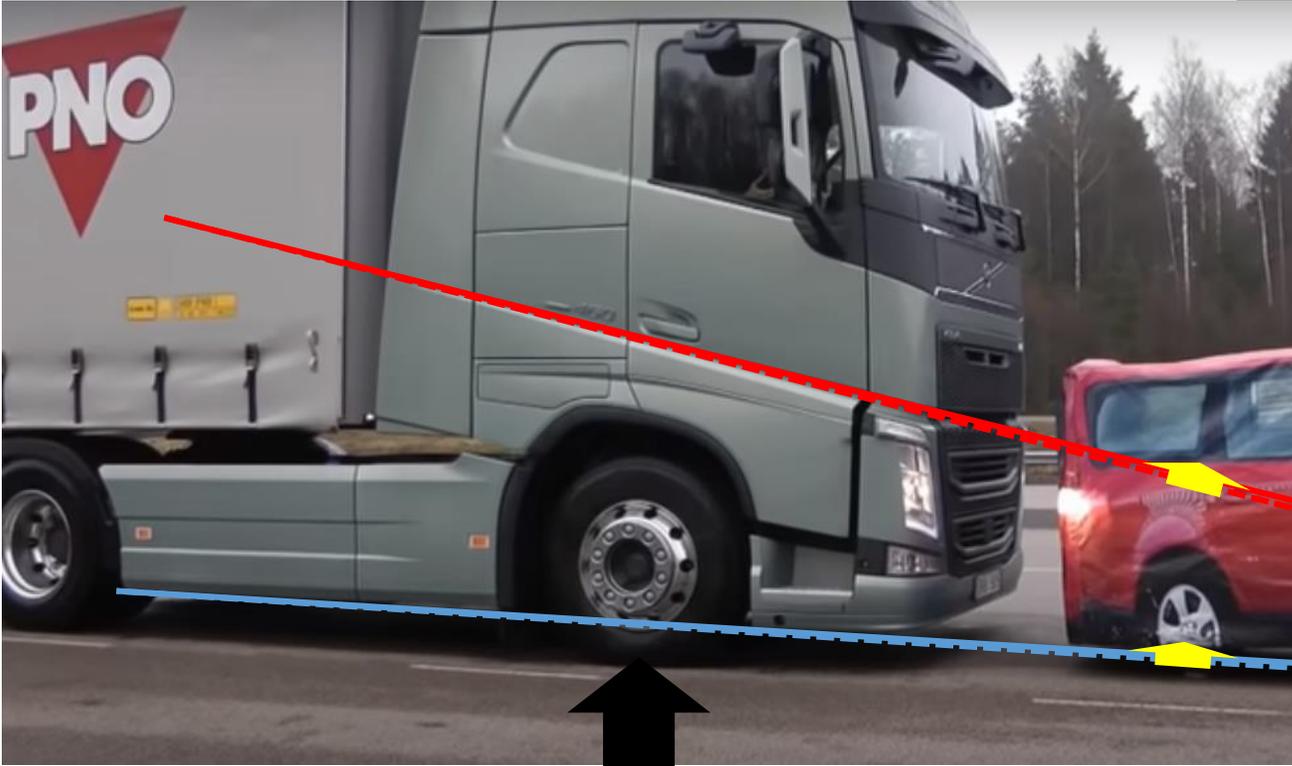
Dynamic variation of cab angle (camera)

Dynamic variation of chassis angle (radar)

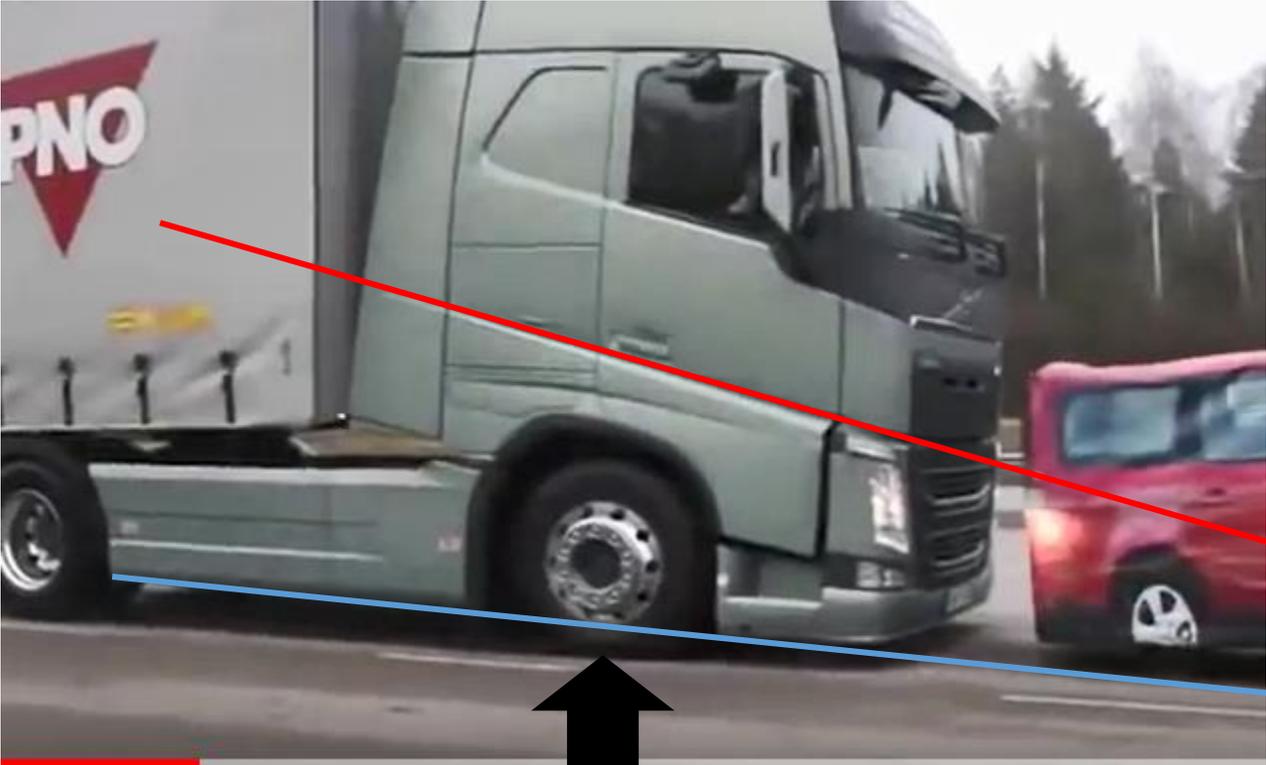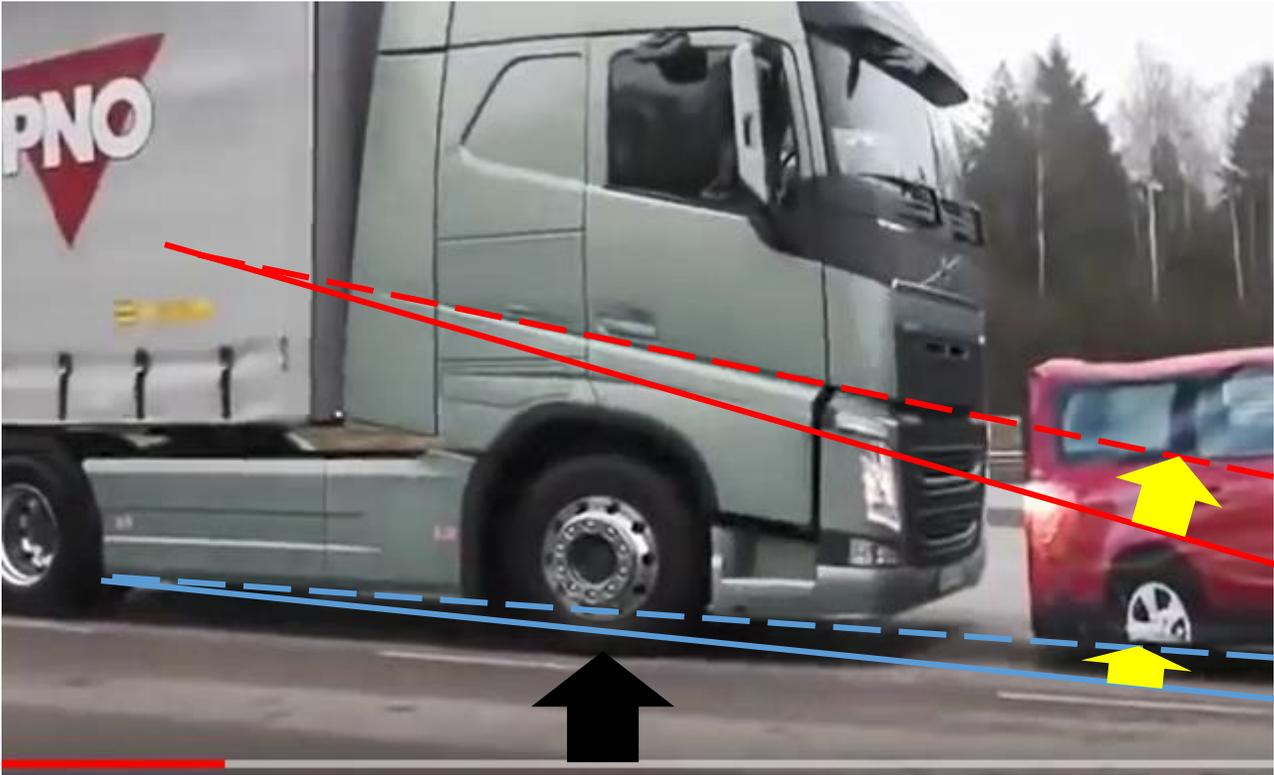*This construction affects the quality and speed of the detection*

Intermediate Conclusions

- Complexity of HDVs, with comparison to PCs
  - High diversity of technical variants / models / ranges
  - High variability of usages (e.g. load, COG height, trailer(s))
  - Complex construction (e.g. chassis/cab suspensions)
  - Multi-stage built (add-on of axles, lengthening of wheelbase…, after the production line)

- The more complex the product…
  The more efforts to fine-tune AEBS for each and every variants / usage
  - To find the right balance between "intrusive" and "necessary" interventions
  - To ensure robustness of the performance

Strategic views

Strategic views

PCs

- **First City-AEB appeared on the market around 2010**
- **UN R152 entered into force in 2020 (with NR dates in 2024 / 26)**

Medium range

HDVs

- First City-AEB appeared on the market around 2010
- UN R131 entered into force in 2013 (NR step 2 2018 in EU)

- **City-AEB ~not available on the market**
- **HDV manufacturers need time to build experience (same way as PCs did)**
- **HDVs cannot challenge the new Electronic and sensor architecture currently under development for VRU Proxi**

Current HDV industry efforts are put on the implementation of VRU-Proxi systems for NT 2022, NR 2024

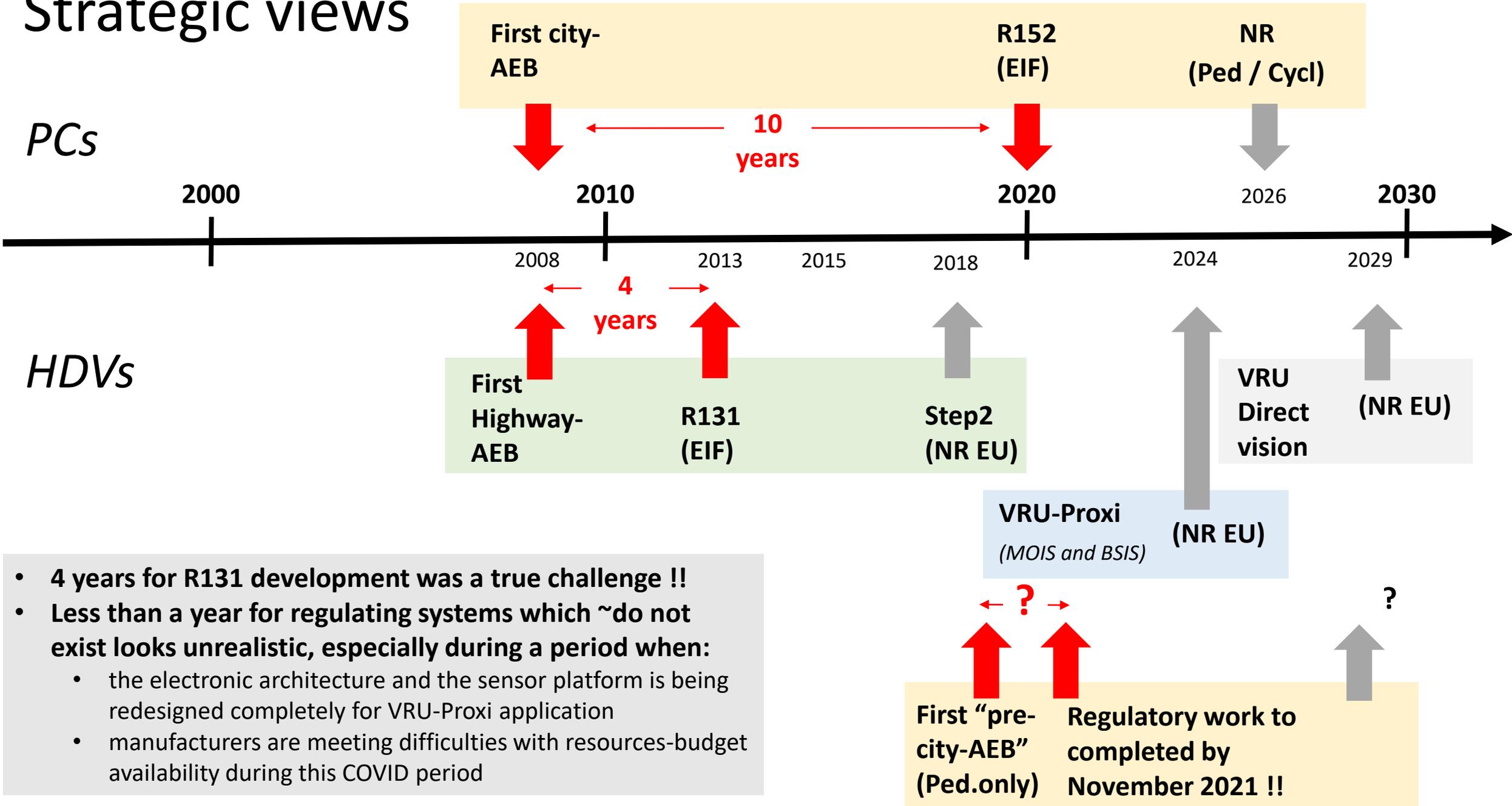VRU Direct vision coming in 2026 (NT) / 2029 (NR), in EU

Medium range

Long range

Short range

Strategic views

PCs

First city-AEB

R152 (EIF)

NR (Ped / Cycl)

10 years

2000   2010   2020   2026   2030

2008   2013   2015   2018   2024   2029

4 years

HDVs

First Highway-AEB

R131 (EIF)

Step2 (NR EU)

VRU Direct vision

(NR EU)

VRU-Proxi
(MOIS and BSIS)

(NR EU)

First "pre-city-AEB" (Ped.only)

Regulatory work to completed by November 2021 !!

?

?

- **4 years for R131 development was a true challenge !!**
- **Less than a year for regulating systems which ~do not exist looks unrealistic, especially during a period when:**
  - the electronic architecture and the sensor platform is being redesigned completely for VRU-Proxi application
  - manufacturers are meeting difficulties with resources-budget availability during this COVID period

Industry recommendation

Industry recommendation

Stepwise approach needed:

1. Focus on "vehicle to vehicle" collisions ("highway-AEB") within the proposed timeframe

2. Gain technical experience and complete item 1 before start regulating City-VRU-AEB

3. Group application dates (NT / NR) to avoid multiple changes of the product

Thanks for your attention