AEBS-09 – Industry Input

AEB IWG 09 – Industry Input

Justification for need of repetition of single tests
(GEVA-02-22e IX. Proposal)

OICA/CLEPA recommendation:

- Since the results from all variants discussed above lie very close together, we propose a 2 out of 3 approach where the third test is not carried out if the first two tests are passed in order to decrease the testing efforts
- We therefore propose to include the following wording in the Regulation:

Draft Proposal:

Any of the following test scenarios [,where a scenario describes one test setup at one subject vehicle speed at one load condition] shall be performed two times. If one of the two test runs fails to meet the required performance, the test may be repeated once. A test scenario shall be accounted as passed if the required performance is met in two test runs. [The total number of failed test runs shall not exceed [10%] of all performed test runs of all scenarios Car2Car and Car2Ped in all load conditions.]

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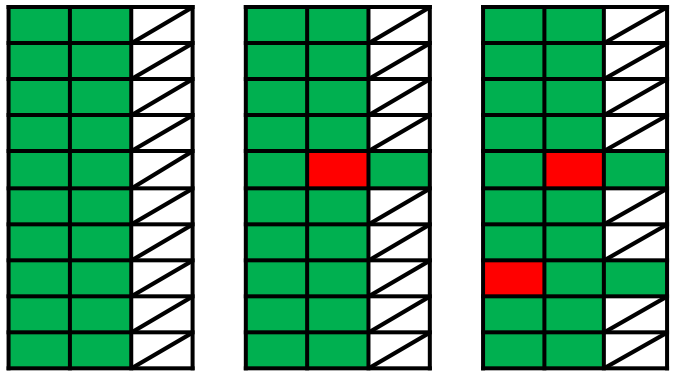
Pass Criteria for each Test Case: Pass 2 out of 3 Tests in Each Test Case

Option 1

- If the first two tests are passed no third test is carried out

Example: 10 test scenarios

- Number of tests: 20-22 tests
- 10% criterion: 2 tests can be repeated



Pass all tests | Repeat 1 test | Repeat 2 tests

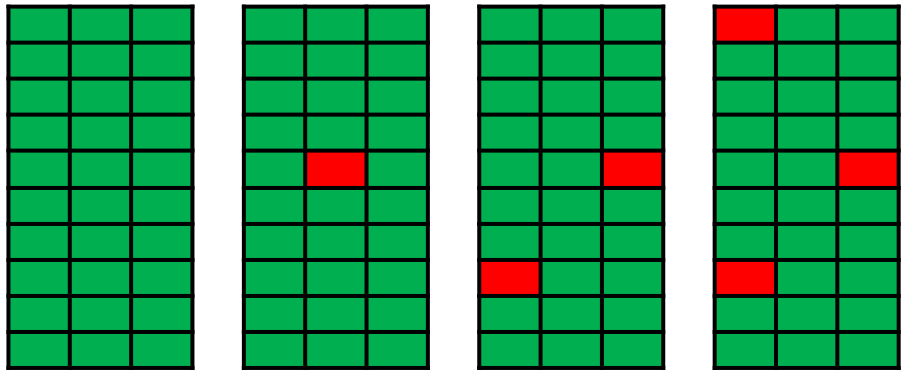
Option 2

- All three tests are always carried out

Example: 10 test scenarios

- Number of tests: 30 tests
- 10% criterion: 3 tests can be repeated

$$p_n = \binom{n_{testcases}}{n} \times \left(\binom{n_{tests}}{1} \times (1 - p_s)^1 \right)^n \times p_s^{n_{testcases} \times n_{tests} - n}$$



Pass all tests | Repeat 1 test | Repeat 2 tests | Repeat 3 tests

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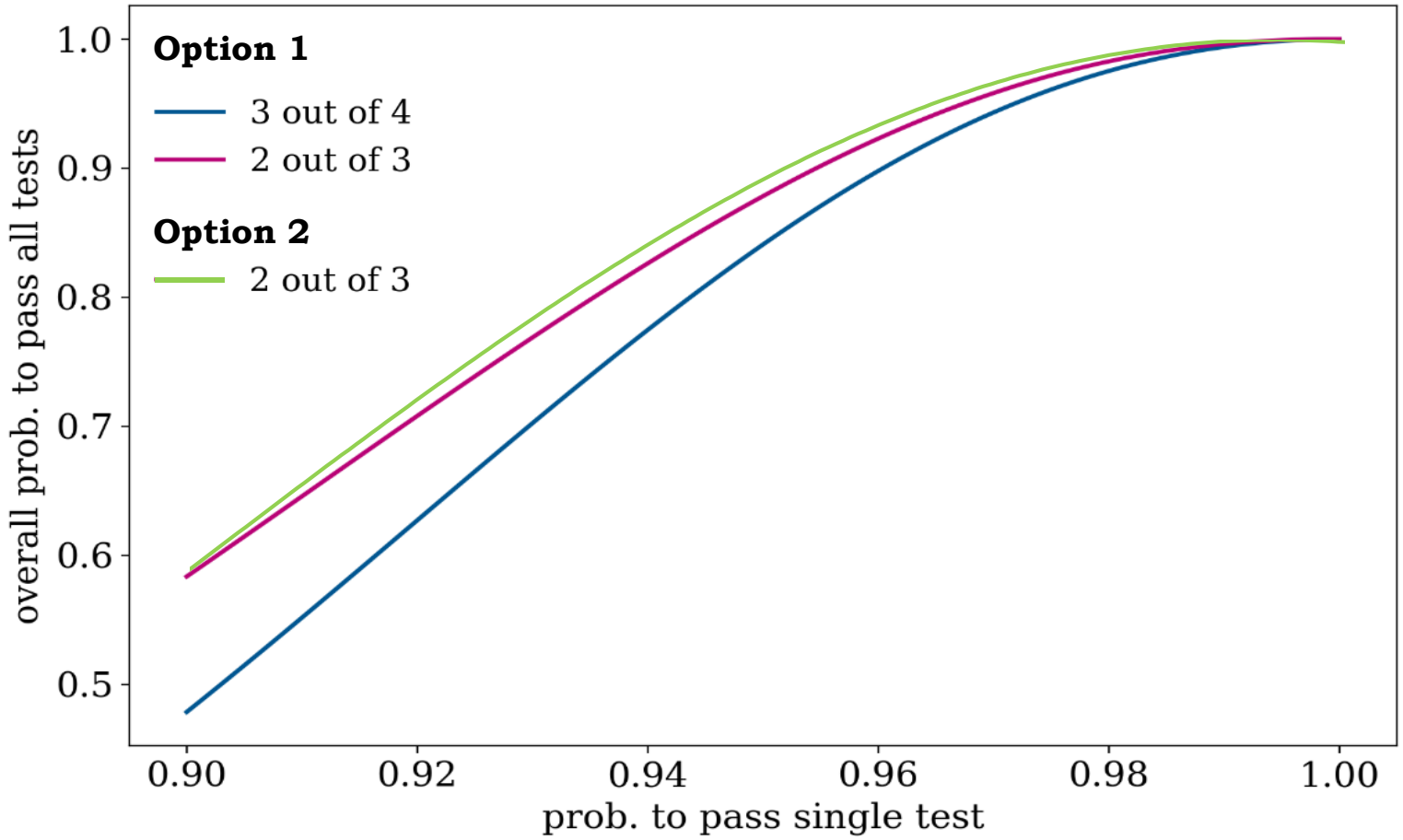
Overall Probability to pass all tests for “2 out 3” and “3 out of 4”:



AEB IWG 09 – Industry Input

Extending the Scope also to M2/N2 vehicles derived from M1/N1

In Scope of our proposal – M2/N2 vehicles derived from M1/N1 vehicles

N1

UN-R152 (M1/N1)

- same „basic“ vehicle
- same sensors
- same AEB system

N2

UN-R131 (>= M2/N2)

Not in scope of our proposal – all M2/N2 vehicles regardles of their „heritage“

- This does not aim at having ALL M2/N2 vehicles approved to UN-R152 instead of R131

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Extending the Scope also to M2/N2 vehicles derived from M1/N1

1.Scope

This Regulation applies to the approval of vehicles of Category M1 and N1 **1/** with regard to an on-board system to

(a) Avoid or mitigate the severity of a rear-end in lane collision with a passenger car, or

(b) Avoid or mitigate the severity of an impact with a pedestrian.

1/ This Regulation offers an alternative set of requirements for vehicles of category M2 and N2 derived from vehicles of category M1 or N1 to those contained in Regulation No. 131. Contracting Parties that apply both Regulation No. 131 and this Regulation recognize approvals to either Regulation as equally valid. M2 and N2 categories of vehicles are defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.6, para. 2 www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

Plus adding to the scope of UN-R131:

***M2/N2 derived from vehicles of category M1/N1 can alternatively be type approved according to R152”**

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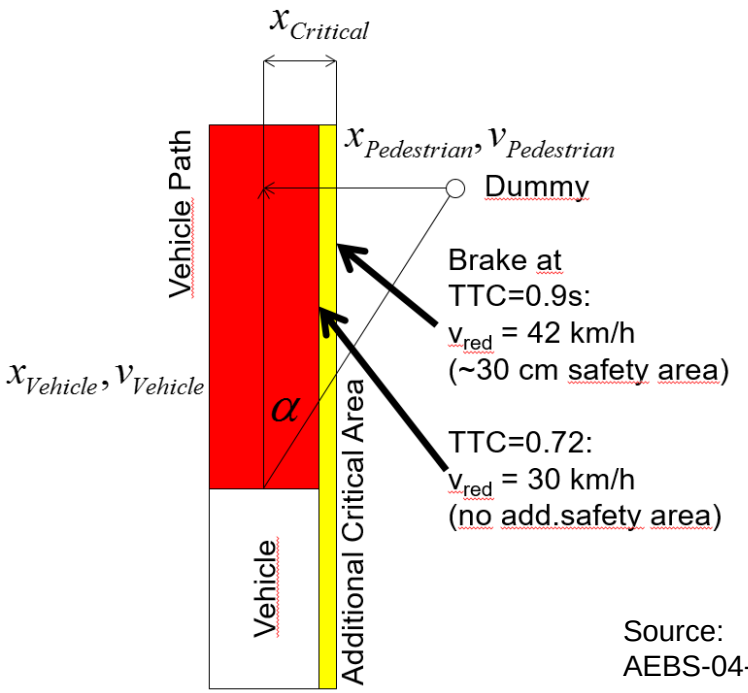
Car2Ped Step 2 – Speed Reduction

„Ideal“ sensor compared to a real sensor with latency time caused by computing time to reach a reliable object recognition, which is necessary to avoid „false postive“ warning and braking of the system.



Source:
AEBS-04-05 (Germany) D approach.pptx

Conclusion of graph above:
Don‘t start braking phase before reliable pedestrian recognition in the critical area
→ Comparison of scenario above and real case show that **latency** is missing

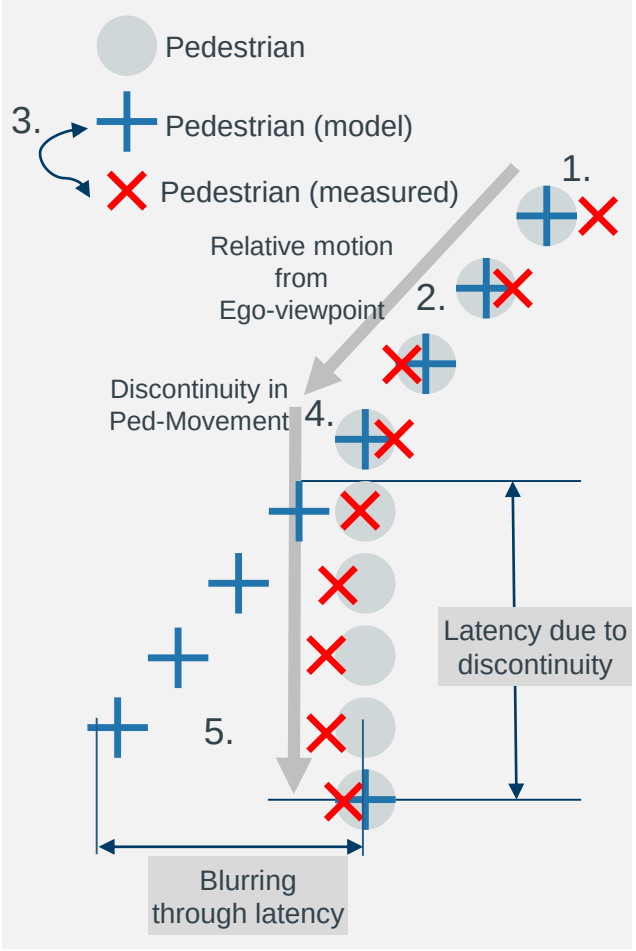
AEB IWG 09 – Industry Input

Car2Ped Step 2 – Speed Reduction

Where is latency coming from?

Problem: Discontinuity of moving objects

1. Sensor gets enough reflexions and opens „track“
2. Track gets object type (e.g. pedestrian) and movement type (crossing)
3. Movement model smooths discontinuities from measuring inaccuracy
4. Problem: If the pedestrian suddenly halts the discontinuity is realized and initially smoothed by the movement model
5. Until sensor notices the mistake, time goes by → Latency



Note:

- Pedestrians are able to move very dynamically
- In comparison vehicles are sluggish and easy to handle
- Therefore, the problem of latency in vehicles is not as pronounced as it is with pedestrians

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Car2Ped Step 2 – Speed Reduction

Today:
Robust collision avoiding till
30 km/h

Future:
A reduction of latency through sensor improvement will aid more robust detection, but the higher the required speed reduction, the higher the remaining risk of false activations.