AEBS standardized marker
Industry input

AEBS-HDV-10

2022-04-26 to 28

Background and General comments

- TNO and RDW shared the status of their work during a brief workshop last August, where industry (OICA and CLEPA) raised several questions and concerns.
- TNO's delivered last March an extensive study, with very valuable data and analysis.
- Industry reviewed the content of the study, and still see several open items to be addressed, before the feasibility can be concluded and a recommendation be done to GRVA. These items are summarized in the following slides.
- TNO and RDW have already taken the internal decision to continue with solution 2 (AEBS-HDV-10-03).

- Were sensor, system or vehicle manufacturers consulted or involved in the feasibility study?

- Were there other CPs or industry participants involved in the conclusions?

Proposed Methodology

- Analyse accident data
- Find root causes for accidents
- Define solutions to address root causes
  - Analyse risks created by different solutions
  - Assess costs and benefits of different solutions
  - Check technical feasibility
- Select solution(s)
- Define the best way for the implementation

Extract from TORs

b. Investigate the feasibility of a generic marker triggering AEBS reaction with the purpose to increase safety in road servicing areas and at railroad crossings.

Accident data and root cause

- Accident data
  - Statistics
  - Environment (daytime, night time, weather conditions,....?)
  - Vehicle equipment
    - Vehicles equipped with AEBS vs those not
    - Characteristics of AEBS system (e.g. single sensor system / fusion system)?
  - Accident occurrence
    - Partial braking or no brake intervention at all?
    - Full/partial overlap of the crash (subject vs target offset) ?
- Root cause for accident
  - Industry impression is that a major reason for accident is driver being inattentive
  - Working on the root cause (driver attention) seems to be a more efficient measure than relying on a “last second” emergency system (AEBS)

Some tracks to address root causes

- What is the most appropriate measure to address the root cause:
  - Warn driver, Warn and slow down…
  - AEB warning and emergency braking…?
- Trying to put the driver back in the loop (with appropriate warnings) is probably the most beneficial for safety (while limiting additional risks or negative side-effects)
- AEBS is not addressing the root cause (driver inattention) but the mitigation of the consequences of driver attention. Is AEBS the right system to address the issue? Is R131 the right regulation?
- Some other measures are already addressing the issue of driver inattention (or may be of interest to consider), e.g.
  - Driver drowsiness attention warning, Advanced driver distraction warning are aiming to keep drivers attentive
  - Intelligent Speed Assistance (ISA) may be a means to detect speed limits and lower the speed

Some tracks to be supported by AEBS

We may think about coupling different approaches, for example:

1. Training * the system to improve the detection of service vehicles
   - CPs could be of great help by providing data to industry, e.g.
     - An "exhaustive list" of which vehicles and bodies to be considered (what are the specific objects)
     - Relevant technical aspects of these objects from radar and camera detection point of view
   - However, the huge variety and little existence of training data of service vehicles may be an obstacle
2. Use of typical vehicles or dummy target, fulfilling the ISO target requirements (as specified in the regulation), ahead of service zones

** Training data would be the basis for further implementation*

Additional risks created by marker solution

- How would existing systems react to this marker?

  (Increased risk of false positives ?)

- What if the marker would be wrongly placed on the road

  (moving due to wind, vibration, wrong operator operation – what if the operator does not move the marker when the service vehicle moves ahead…?)

- Malicious misuse

- Increased risk of false positives if the marker would not be specific enough

  (that risk may be solved by standardization)

Comments about the different ways to implement

- Any need to create a new marker? Any need to standardize?
  → not if the marker is already standardized, e.g. ISO vehicle target
- Scope: service vehicles, railway… what is the scope?
- Is the focus on EU level or UN Level?
  What is the opinion by other CP´s on a “standardized marker” approach?
- Need to synch between “infrastructure regulations / service personnel instructions” and vehicle regulations (incl. liability in case of an accident)
- **Regulating a standardized marker means to Standardize first.**
  <u>If</u> it should be regulated, where should it be regulated? R131? ISA? Another reg.?

Conclusion

- A pragmatic solution could be to recommend the use of typical vehicles or dummy target, fulfilling the ISO target requirements (as specified in the regulation), ahead of service zones.

- For other potential solutions, further investigations would be needed to reach a conclusion and make a recommendation

Backup slides

Some industry questions

What is the system supposed to do when detecting the marker? Start AEBS phase? Warn driver?

What should such a marker look like ? Does it exist? It should be standardized first…

Solutions 2 assumes system training, right?

Is the technical feasibility of a marker proven ?

The preferred solution has a lot of yellow marks, why favouring that solution?

Feasibility aspects → Solution direction ↓	Added benefit	Technical feasibility	Operational feasibility	Legal feasibility	Economic feasibility	Scheduling feasibility	Additional risk
0. Do nothing	None	NA	NA	NA	NA	NA	None
1. AEB marker on vehicle	Moderate	▼	▲	▼▲	▲**	▼▲	Low
2. Stand-alone AEB marker	High	▼▲	▼▲	▼▲	▲**	▼▲	Moderate
3. Learn specific objects	Moderate	▲	▼▲ to ▲▲*	▼▲ to ▲*	▼▲ to ▲*	▼▲ to ▲*	Very low
4. Communication	Very high	▼	▼	▼	▼	▼▼	High

** depending on whether standardisation of roadworks vehicles (and equipment) is required; if yes → ▼▲, if no → ▲▲ / ▲ (and anything in between)*

** costs of marker will be highly dependent on actual implementation and use

How would existing systems react to this marker?
What if the marker would be wrongly placed on the road (moving due to wind, vibration, wrong operator operation – what if the operator does not move the marker when the service vehicle moves ahead…?)

Couldn't a training of systems be with "high" efficiency ? COM and CPs could be of great help to collect training data and provide them to industry

On what base is the solution quoted as "economic" before to know what the marker looks like?

Could systems be trained efficiently with current roadworks vehicles (without modifications)?