Japan input for safety level discussion

Takashi NAONO
MLIT, Japan
The question we would like to discuss is “which occasion must be avoided, and which occasion are not necessarily avoided?” (related documents: FRAV-04-13, FRAV-05-04, FRAV-06-08)

In our view, such question is what we should discuss in FRAV first, namely the fundamental and high-level concept of setting this criteria (i.e. safety level) (e.g. "if human driver can avoid, ADS shall avoid", "statistically better than human can be acceptable").

Once we agree such fundamental and high-level concept, we can discuss deeply how to set the criteria (e.g. "how to measure the reaction time of human", "how to simulate human behavior")

We think FRAV should discuss such fundamental and high level concept before discussing detail technical matter.

Firstly,
Agree upon the fundamental and high-level concept of safety level

Secondly,
Discuss the detailed methodology for defining the ADS performance limit/criteria.

Candidates at the moment may be
- C&C driver level (If C&C driver can avoid, ADS shall avoid.)
- State of the art (ADS shall avoid any collision that can be avoidable with the latest technology.)
- Statistically better than human (The total frequency of collision by ADSs shall be less than that of collision by human drivers.)

Possible way forward may be
- Gathering data (e.g. normal reaction time, delay time) of human driver.
- Gathering data (e.g. the maximum braking deceleration) of latest technology.
- Gathering data (e.g. statistical frequency of collision) of human driver and building reference model.

Japan has submitted FRAV-07-10 (Competent and Careful human driver performance model) for this IWG at the same time. However, FRAV-07-10 just addresses to the request raised at the last IWG for the discussion on the detailed methodology for defining the ADS performance limit/criteria. Japan emphasizes again that FRAV should agree upon the fundamental and high-level concept of safety level first of all.
Procedure to discuss the fundamental & high-level concept

Firstly, Agree upon the fundamental and high-level concept of safety level.

Fundamental and high-level concept can be considered by using the table below. (FRAV-04-13, FRAV-05-04)

<table>
<thead>
<tr>
<th>Candidate</th>
<th>Improve road transport safety</th>
<th>Performance based</th>
<th>Technology neutral</th>
<th>Measurable</th>
<th>Social acceptance</th>
<th>Feasibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>G&amp;C Human driver</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Physical limitation, State of the art</td>
<td>Excellent</td>
<td>Limited, because volume in our market are limited</td>
<td>Not good</td>
<td>Not good</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Safety envelope</td>
<td>Good</td>
<td>Good</td>
<td>Not good</td>
<td>Not good</td>
<td>Good</td>
<td>?</td>
</tr>
<tr>
<td>Positive risk balance</td>
<td>Some are good, but some are not good</td>
<td>Good</td>
<td>Good</td>
<td>?</td>
<td>Not good, because there is risk for accidents caused by relatively less safe type of AD</td>
<td>?</td>
</tr>
</tbody>
</table>

<Concept for each criteria>
The explanation of each evaluation criteria is below (FRAV-06-08)

**Improve road safety (individual):** Please explain the anticipated effect of setting performance limits using this approach in reducing, mitigating, or eliminating causes of traffic crashes, injuries, and deaths with regards to a vehicle.

**Improve road safety (fleet):** Please explain the anticipated effect of setting performance limits using this approach in reducing, mitigating, or eliminating causes of traffic crashes, injuries, and deaths considering the number of vehicle sold.

**Performance-based:** Please explain how this approach results in performance specifications applicable across ADS and ADS vehicles regardless of their design.

**Technology-neutral:** Please explain how this approach can be applied across all ADS regardless of the configuration, features, or means used to achieve the desired performance outcomes.

**Measurable:** Please explain how this approach can result in quantifiable assessments of ADS performance.

**Social acceptance:** Please explain how performance limits established under this approach would result in ADS performance that will not cause social criticism against ADS.

**Feasibility:** Please explain how this method can produce performance limits that are feasible for assessment under the NATM assessment methods.

Secondly, Discuss the detailed methodology for defining the ADS performance limit/criteria.

VMAD can make “logical” Scenario including some parameters based on this ADS performance limit/criteria.