

# Japan input for safety level discussion

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# Fundamental and high-level concept of setting criteria

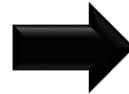
The question we would like to discuss is “which occasion must be avoided, and which occasion are not necessarily avoided?” (related documents: FRAV-04-13, FRAV-05-04, FRAV-06-08)

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.**

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)

Candidate	Improve road transport safety		Performance based	Technology neutral	Measurable	Social acceptance	Feasibility
	individual	fleet					
C&C Human driver	Good	Good	Good	Good	Good, because capability of human driver doesn't differ in each countries *	Good	Good
Physical limitation, State of the art *2	Excellent	Limited, because volume in our market are limited	Not good	Not good	?	?	Not good, because OEM cannot make AD with affordable cost
Safety envelope	Good	Good	Not good	Not good	Good	?	Good
Positive risk balance	Some are good, but some are not good	Good	Good	Good	?	Not good, because there is risk for accidents caused by relatively less safe type of AD	?

**<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.