Department
for Transport

DDT Open items

Pete Edwards

4.2.1 Careful and Competent human driver

What does this mean in practice for the manufacturer?

- Is a competent and careful human driver a standard applied to all requirements?
- Does fulfilling all requirements prove the ADS has met the competent and careful standard?
- What is expected of a careful and competent driver will vary country to country.
- Need to avoid requiring manufacturers to fulfil and undefined standard.
- Don't want vehicles on the road that are not meeting the standard of careful and competent humans
- Would "free from unreasonable risk" be more appropriate than "minimise"?

> " As a general concept, The safety level of ADS shall be at least to the level at which a **competent and careful human driver** could minimize the unreasonable safety risks to the ADS vehicle user(s) and other road users. "

Approach to derive verifiable performance criteria / ODD Framework

Link to Integration document Annex 3

"The manufacturer shall use a process to derive behavioural competencies and scenarios that are ODD-relevant. The methodology used in Annex [x] can be used or alternative methods providing they are equally comprehensive. "

Suggested way forward

Annex 3 "Approach to derive verifiable performance criteria" would be used unchanged as it describes a possible process there is not the need to change any "shoulds" to "shalls"

Questions

- Does the IWG see the use of behavioural competencies to demonstrate ADS safety performance as compulsory?
- If so should there be a corresponding requirement?
- Are there any other approaches that should be described in similar detail?

5.3.1.1. The ADS shall operate the vehicle at safe speeds;

- **What does "Safe speeds" mean in this context?**
- **Should this be covered by making the requirement more specific or in the interpretation document?**

Possible interpretations
- Following speed limit
- Choosing an appropriate speed based on road type and visibility even if the speed limit is higher
- Not causing a hazard by driving well below the speed limit
- Adjusting speed to environmental conditions

Department for Transport

How to approach conflicting requirements

Scenario

The ADS is on a road where all other road users are speeding well above the speed limit such that it would create a hazard if it remained driving legally, how should it proceed?

Relevant requirements

5.3.1.3.   The ADS shall adapt its driving behaviour to the surrounding traffic conditions in order to avoid disruption to the flow of traffic;

5.3.1.9   The ADS shall comply with traffic rules in accordance with application of relevant law within the area of operation;

Solutions

- Is the above scenario a critical scenario (see next open item)? In which case the requirements only apply "as far as reasonably practical", question remains how they should be prioritised.
- Changing one requirement to an "aim to" requirement makes hierarchy clear e.g. using DCAS language **"5.3.2.1. The system shall aim to avoid disruption to the flow of traffic by adapting its behaviour to the surrounding traffic in an appropriate safety-oriented way"**

Definition of Nominal Scenario and Critical Scenario

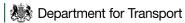## Current definitions could be considered subjective

Nominal Scenario means a traffic scenario representing **usual** and/or expected objects, object behaviours and/or road conditions.

Critical Scenario means a traffic scenario representing **unusual** and/or **un**expected objects, object behaviours, and/or road conditions.

Different requirements apply in nominal and critical scenarios and so it is important to be clear what the situation is.

Options

- Definition remains unchanged
- Leave to manufacturer to justify
- Give examples of nominal and critical scenarios
- Link to whether other traffic participants operating in line with traffic regulations and/or a sudden and not reasonably foreseeable change of the operating conditions of the given ODD (e.g., sudden storm, damaged road infrastructure) (Text from GRVA 18-50 could help)
- Should there be a link to critical occurrences?

5.3.1.7 The ADS shall not force other road users to take evasive action to avoid a collision with the ADS vehicle;

Definition required for evasive action

- Requirement refers to other road users taking evasive action, this term in undefined
- Similar concept to emergency manoeuvre from R157 (though that is from the system perspective)
- Difficult to measure whether the ORU was forced to take evasive action or chose to unnecessarily
- Definition should not include normal slowing down to allow other vehicles to merge into traffic

> "Emergency Manoeuvre (EM)" is a manoeuvre performed by the system in case of an event in which the vehicle is at imminent collision risk and has the purpose of avoiding or mitigating a collision.
>
> UNR 157

5.3.1.8 and 5.3.1.11
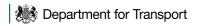
Collision requirements

5.3.1.8 The ADS shall not cause a collision

5.3.1.11 The ADS shall avoid collisions with safety-relevant objects where possible

- Are these requirements sufficiently different concepts?
- Determining cause is difficult
- Would there be a risk of collision under nominal scenarios or should 5.3.1.11 be a critical scenario requirements?
- "Where possible" is ambiguous, would DCAS language work "The ADS shall aim to avoid collisions with safety-relevant objects"
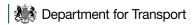- "Safety relevant objects" in undefined

Department for Transport

5.3.1.12   The ADS shall signal intended changes of direction;

- Does this refer to anything more than direction indicators?
- If not then is it necessary given 5.3.1.9 The ADS shall comply with traffic rules in accordance with application of relevant law within the area of operation ?
- Would signalling be required where is was not for a human?
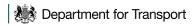
Department for Transport

5.3.2.2 In the event of a collision, the ADS shall stop the vehicle in an MRC and/or in accordance with applicable traffic laws;

- "In the event of a collision" Does this include collisions the ADS is not involved in? (may affect other requirements)
- What threshold of collision would cause a fallback to MRC? (would slapping the ADS vehicle make it pull over?)
- Is the reference to traffic laws necessary given 5.3.1.9?

Department for Transport

Resuming travel after a collision

5.3.2.2.1 The ADS shall not resume travel until:

a) the safe operational state of the ADS vehicle has been verified,

b) it is permissible under the applicable law / traffic rule(s),

c) there are no other safety considerations;

- **Is the reference to traffic laws in b necessary given 5.3.1.9?**
- **What other safety considerations does c refer to?**

5.3.3.4

- **Some of the subpoints to 5.3.3.4 seem redundant, rewriting this requirement may make it clearer and avoid duplication**

- 5.3.3.4 The ADS may continue to operate in the presence of faults that do not prevent that the ADS from fulfilling the the safety requirements applicable to the ADS;

  — 5.3.3.4.1   In response to a fault, the ADS may permit activation and use of a feature impacted by the fault provided that the ADS continues to provide the functions necessary to perform the entire DDT;

  — 5.3.3.4.2   The ADS shall adapt its performance of the DDT in accordance with the severity of the fault to ensure road safety;

  — 5.3.3.4.3   The limited operation of the ADS shall comply with the normally applicable safety requirements;

  — 5.3.3.4.4   The ADS shall prohibit activation of an ADS feature in the presence of a fault in an ADS function that compromises the ADS capability to perform the entire DDT within the ODD of the feature;

5.3.3.3, 5.3.3.4, 5.3.3.4.3, 5.3.3.4.4

- There are a number of different ways faults that prevent the ADS from performing the DDT are described

- 5.3.3.3 ….. Prevents the ADS from performing the DDT
- 5.3.3.4 ….. Prevent the ADS from fulfilling the safety requirements applicable to the ADS
- 5.3.3.4.3 …… normally applicable safety requirements
- 5.3.3.4.4 …… the ADS capability to perform the entire DDT within the ODD of the feature

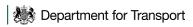There is no definition that distinguishes between faults and failures.

Proposal: replace all these with "prevents the ADS from meeting the requirements of this regulation" and define fault and failure or use consistent wording

5.3.3.5.1   Remote termination for an ADS

- **5.3.3.5.1   Remote termination for an ADS performing the DDT shall ~~be capable of~~ trigger~~ing~~ an ADS fallback response;**

- "be capable of triggering" vs "shall trigger"

- Is a requirement that remote termination **be capable of triggering** a fallback response actually requiring anything?

Department for Transport

5.3.5.3

- **5.3.5.3   If the ADS feature is designed to request and enable intervention by a fallback user ~~human driver~~, the ADS ~~should~~ shall execute a fallback to an MRC in the event of a failure in the transition of control to the user;**

- It would be useful to have a term to refer to systems that are designed to request and enable intervention by a fallback user without having to refer to transition demands or use the wordy solution of "ADS features capable of system initiated deactivation to manual driving", perhaps TF AVC could be asked for a solution? This would also aid the user section

Suggested new requirements

- **5.3.1.15   The ADS shall be able to determine whether itself is unmanned when performing the DDT**
- **5.3.1.16   The ADS shall adapt its performance of the DDT in accordance if it is unmanned.**