



# Session 3

Web Conference

28 July 2020

- FRAV-02 (Tokyo, 14-15 January 2020)
  - FRAV established “Document 5” as the basis for developing functional performance requirements.
  - FRAV gathered 140+ ideas for requirements.
- Scheduled April session canceled due to health restrictions
- FRAV adopted special procedures in response
  - Define narrow set of questions for consideration
  - Distribute initial draft written request for comments
  - Consolidate and review input in an interim D5 proposal for refinement
  - Repeat proposal-feedback loop until consensus reached
  - Issue consensus proposal to identify any reservations/objections
  - Issue updated D5 noting original text, consensus text, and items for future consideration.

- FRAV-03-05-Add.1: Initial ODD-related questions
  - Can a vehicle and/or ADS have more than one ODD?
  - What does the response mean for Document 5 and FRAV aims?
- FRAV-03-05-Add.2: ODD high-level consensus
  - Working definitions, scope and purpose of ODD chapter
- FRAV-03-05-Add.3: ODD elements request for comments
- FRAV-03-05-Add.4: ODD elements consensus
  - Development elements in line with performance requirements tbd
- FRAV-03-05-Add.5: System-safety questions
  - Proposed basis for working towards consensus (i.e., eventual FRAV-03-05-Add.6)?

# ODD General Discussion



- Focus should be on ADS more than on “automated vehicles”.
- ADS is a Level 3+ system that can operate a vehicle without human assistance for a period of time.
- An ADS may be designed to operate in more than one ODD.
- Defined “feature” to cover ADS operation within an ODD.
- Agreed that manufacturers should describe the ODD of the feature(s) made available by the ADS.
- Identified (and documented) additional points related to elaboration of these concepts.
- Agreed to elaborate ODD elements in association with development of functional performance requirements.

# ODD: Further Considerations

- Other design constraints a manufacturer should describe will need to be addressed –ref. China: ODC input.
- ODD should be definable, understandable, predictable, comparable, repeatable –ref Japan
- ODD elements should be described in measurable/verifiable terms –ref. SAFE input.
- ODD refers to external operating conditions –ref. SAE AVSC.
- The capability to operate a vehicle on a sustained basis is defined under J3016 as the Dynamic Driving Task (DDT) –ref SAE input.
- Mandatory and voluntary elements –ref Germany input

FRAV-03-05-Add.4 documents many ODD-related items to be considered  
as we elaborate Document 5

# ODD Scope and Purpose

## 3. Definitions

- 3.1. “*Automated Driving System (ADS)*” means the hardware and software that are collectively capable of operating a vehicle on a sustained basis.
- 3.2. “*Operational Design Domain (ODD)*” means the operating conditions under which an ADS feature is specifically designed to function.
- 3.3. “*(ADS) feature*” means an application of ADS hardware and software designed specifically for use within an ODD.

## 4. Operational Design Domain

- 4.1. This chapter concerns the description of an Operational Design Domain (ODD).
- 4.2. For the assessment of vehicle safety, the vehicle manufacturer should describe the ODD of each ADS feature available on the vehicle in accordance with the provisions of this chapter.

This is a “working draft text” that meets our immediate needs and may be refined as we elaborate the ODD and other D5 chapters.

# System Safety General Discussion



- Functional safety: Safety in the event of internal failure
- Safety of the intended functionality (SOTIF): Intended use and reasonably foreseeable misuse
- Functions enable features to meet performance requirements
  - For example, detection function enables feature to respect ODD conditions
- Relationship between “system safety” and other D5 chapters on performance
- Relationship between “system safety” and “functional safety”

System Safety relates to “functional requirements” which differ from “performance requirements”. FRAV-03-05-Add. 5 provides more detailed discussion.

# Context for Proposal on System Safety



Document 5 provides three categories of requirements: performance, functional, and ODD description.

Performance requirements address ADS feature behavior in traffic, interactions with the vehicle user or operator, and interactions with other road users.

Functional requirements address the ADS capability to operate a vehicle in traffic, including the means used to monitor the vehicle environment, ensure that a user or operator fulfills such roles as may be needed to ensure safety, and responses to ensure safety in the event of a system failure.

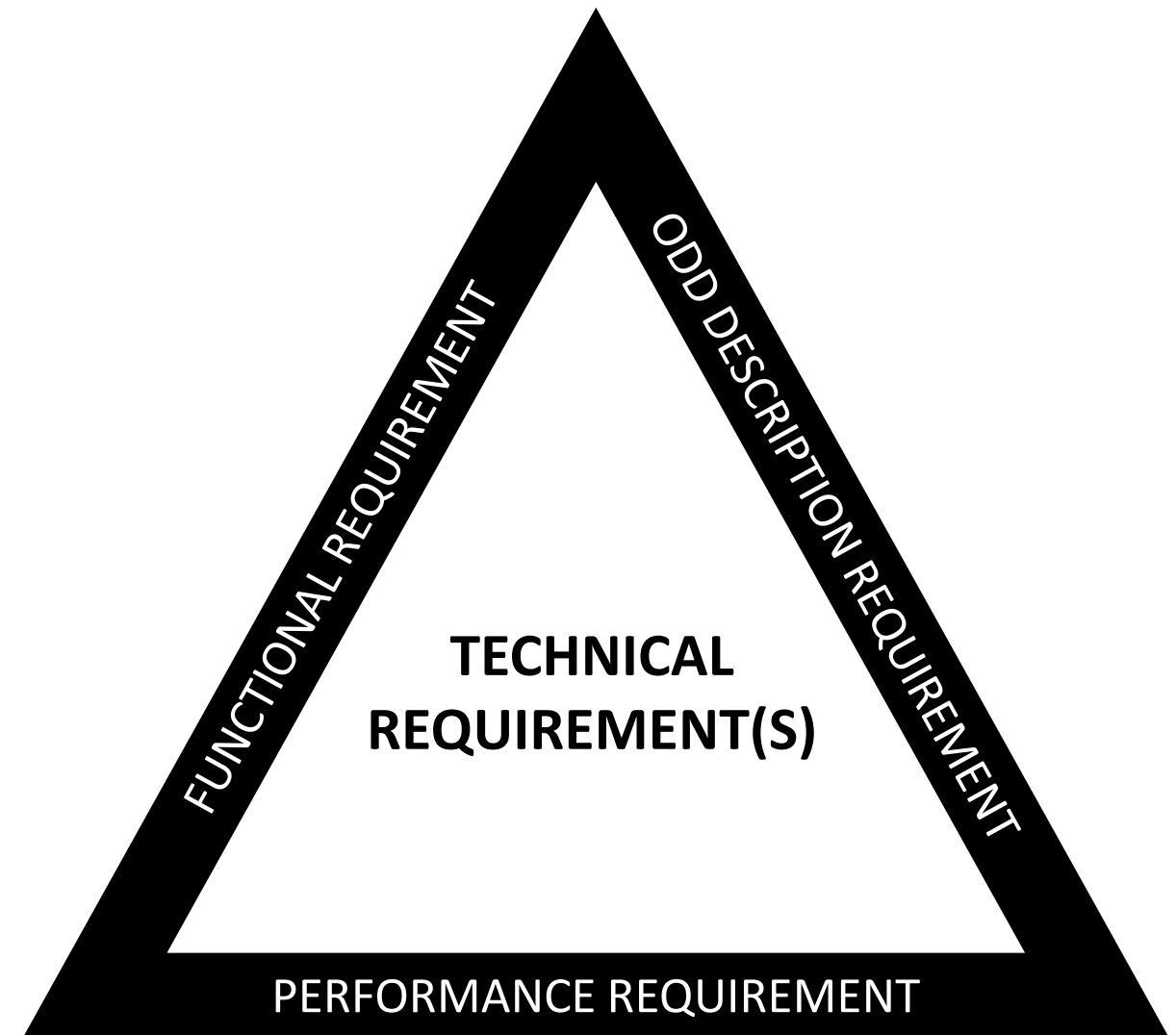
ODD description requirements address the intended use(s) of an ADS feature and limitations or constraints on the use of the feature related to the vehicle environment.

In combination, the requirements define the minimum criteria an ADS and its feature(s) should satisfy to ensure safety when used in traffic. The requirements address all configurations of ADS technologies while differentiating individual ADS according to their respective intended use(s) and design constraints.



# High-Level Concept: “Triangular Approach”

- Three aspects for comprehensive requirements
  - Performance to be achieved
  - Functions that enable performance present and able
  - ODD description with key information on intended use(s) and limitations
- Consider proposals for requirements under all three
  - Aim for optimal “high-level” coverage of ADS
  - Enable objective interpretation for specific ADS



# System Safety Proposal



## 3. Definitions

3.3.3. (ADS) function means a capability integrated into the design of an ADS to enable fulfillment of one or more performance requirements, including the means to detect a failure in the function.

3.3.4. Object and Event Detection and Response (OEDR) means the ADS function(s) designed to monitor the driving environment via object and event detection, recognition, classification, and response preparation.

3.3.6. User monitoring means the ADS function(s) designed to assess user performance of such roles as may be required to fulfill the requirements defined in this document.

## 5. System Safety

5.1. This chapter concerns the requirements for ADS system safety.

5.2. For the assessment of vehicle safety, the vehicle manufacturer should describe the ADS functions designed to satisfy the requirements of this chapter.

5.3. The purpose of this chapter is to ensure that an ADS integrates functions necessary to ensure fulfillment of the requirements established in this document, including the means to detect a failure in any of the functions.

# Next Steps



- Pre-FRAV-04
  - Elaborate or replace FRAV-05-03-Add.5 (pursuant to FRAV-03 decision)
  - Draft proposal for FRAV-05-03-Add.6 (if possible)
- FRAV-04
  - Discuss and (if possible) confirm System Safety scope and purpose
  - Discuss work plan for addressing D5 requirements
  - Discuss status report for GRVA-7

Agenda Item 7

Preferences for scheduling 4<sup>th</sup> FRAV session prior to GRVA-7 (fourth week of September)?