Document FRAV-05-03
5th FRAV session, 15 October 2020

FRAV

Session 5

Status Review and Session Orientation

Web Conference

15 October 2020

FRAV-05: Today's Discussion

- Review of current working consensus
- 4th session outcomes
  - System safety discussion
  - "Top-down approach" to performance requirements
  - Discussion on methods for defining performance limits
- 5th session aims
  - Agree on starting points for deriving performance requirements
    - Baselines to derive no more than ten "next level" safety targets
    - Basis for definition of "system safety" (Document 5 preface)
  - Further consideration of methods for defining "safe performance"
- Prepare for the 6th session

Review of FRAV Points of Consensus

1. "*Automated Driving System*" (ADS) means the hardware and software that are collectively capable of operating a vehicle on a sustained basis.
2. FRAV requirements specifically regard the ADS and its performance in the operation of a vehicle.
3. Operational Design Domain (ODD) refers to the operating conditions under which an ADS is designed to function.
4. ADS may be designed to function under more than one discrete set of operating conditions (i.e., more than one ODD).
5. "*(ADS) feature*" means an application of ADS hardware and software designed specifically for use within an ODD.
6. An ADS may have one or more features as defined by their unique ODD.
7. "*Operational Design Domain*" means the operating conditions under which an ADS feature is specifically designed to function.
8. In operation, the ADS continuously controls the vehicle motion, monitors the vehicle environment, interacts with other road users, and determines responses to road and traffic conditions (collectively known as the Dynamic Driving Task (DDT)).
9. The ADS has functions that collectively perform the entire DDT while the ADS is in use.
10. The ADS monitors the functions and safely manages failure modes when detected.
11. The ADS functions enable the features to operate the vehicle within the ODD of the feature.
12. An ADS feature may use all or some of the functions of the ADS.
13. ADS features may share ADS functions.
14. An ADS should be assessed based on its intended use(s) and limitations on the use of its features.
15. ADS requirements should be technology-neutral and performance-based.

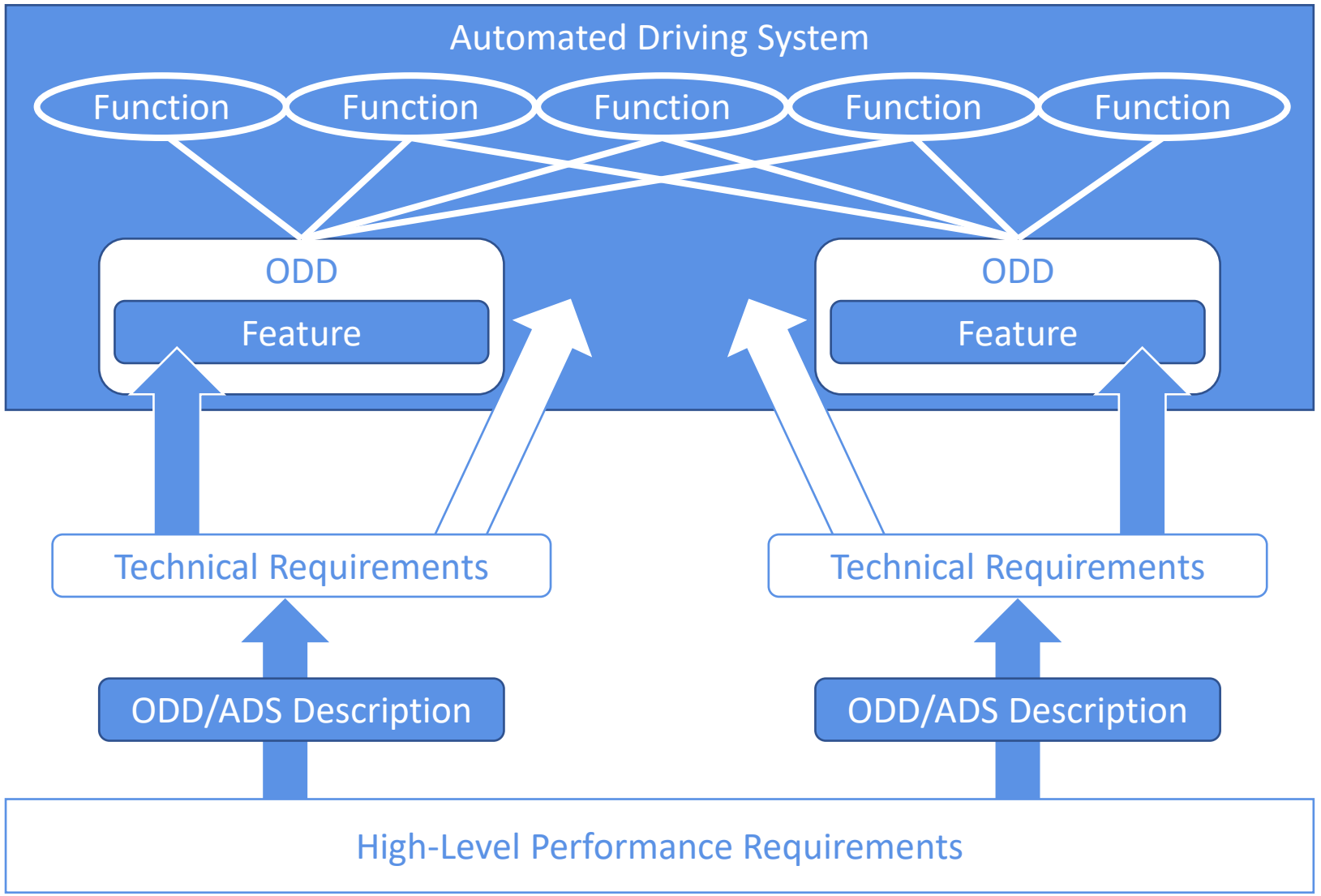
Review of FRAV Points of Consensus

16. ADS requirements should be applicable across the anticipated diversity of configurations (i.e., features and functions).
17. ADS assessments require information specific to the configuration of the ADS (i.e., features, functions, ODD, other usage specifications).
18. Manufacturers provide the information specific to the ADS design and intended uses.
19. FRAV will define mandatory requirements for ADS descriptions (i.e., ODD elements, other usage specifications).
20. The manufacturer description of the ADS provides a means to determine the application of the ADS performance requirements.
21. The NATM process should begin with a review of the ADS description to verify fulfillment of the mandatory description requirements and to determine the application of the performance requirements.

If there are reservations, concerns, or questions regarding these points, please convey them to the FRAV secretary. FRAV will address the issues at a future session.

Agenda Item 3

FRAV Strategy for Requirements



What FRAV means by ADS

ADS is the system.

ADS has one or more features.

Features defined by the ODD.

ADS functions perform DDT.

Feature uses all or some functions.

Features may share functions.

If there are reservations, concerns, or questions regarding these points, please convey them to the FRAV secretary. FRAV will address the issues at a future session.

…Covering features and functions.

…Enable ADS-specific application…

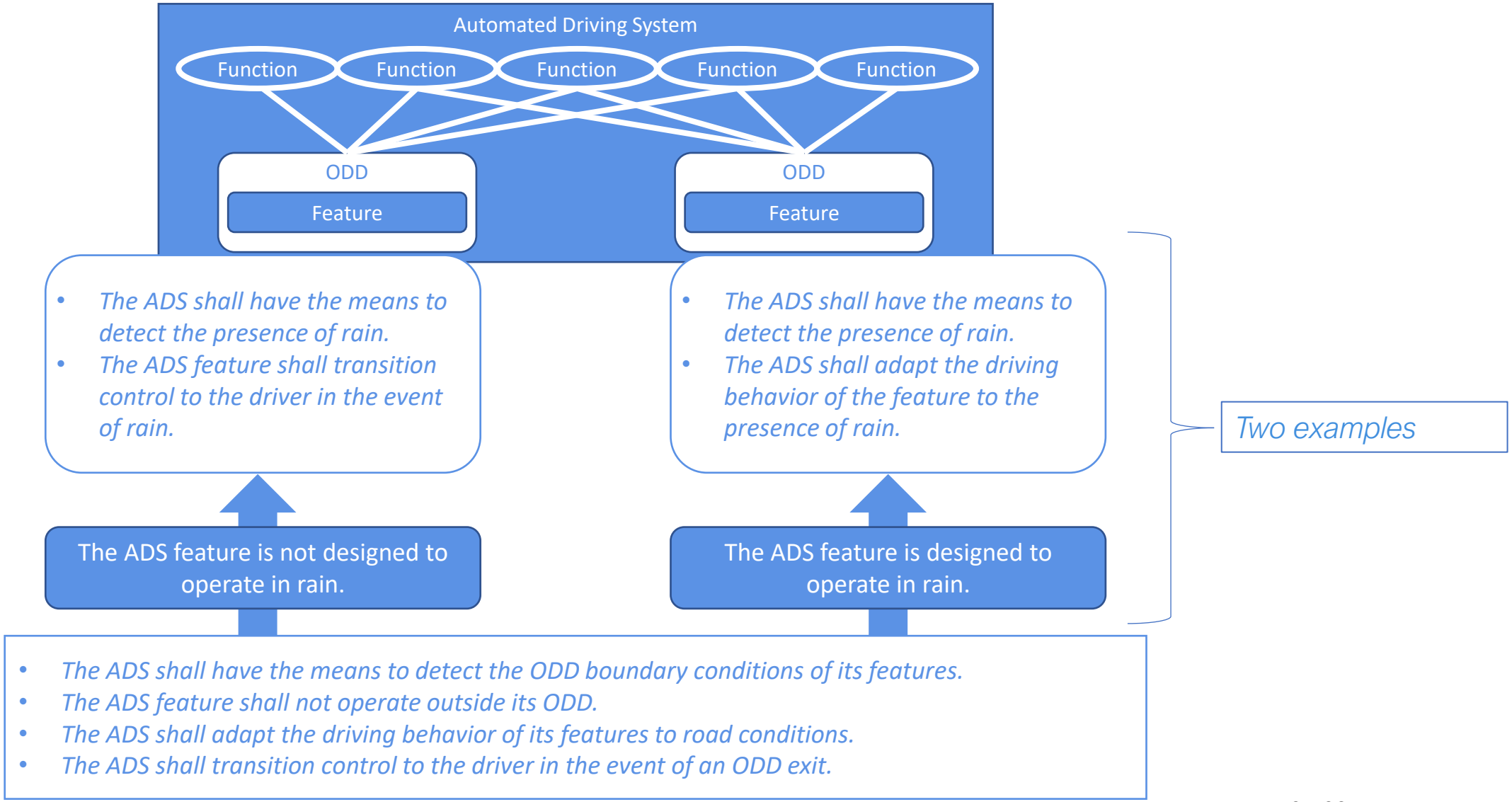
Mandatory descriptions…

Applicable across ADS configurations.

FRAV requirements strategy

Agenda Item 3

Current Status



Last FRAV Session: “Top-Down Approach”

- “System Safety” is the overall objective of the FRAV and VMAD effort.
  - “System Safety” removed as chapter under Document 5 (address in preface).
  - VMAD has agreed that FRAV will propose definition/description.
- Start with broad concepts that describe “system safety” objectives.
  - Basis for definition of “system safety”
  - Starting point for elaboration of performance requirements
- Analyze each concept to identify individual aspects of “safe performance”.
- Continue this step-by-step analysis until a meaningful definition of “safe performance” applicable across ADS configurations is reached.
- Identify ODD and other elements that may impact “safe performance” depending upon the configuration of an individual ADS.
  - Define these elements in terms that enable objective interpretation of the high-level performance requirements.

Agenda Item 4

FRAV-05 Discussion: AV Framework Document

- ADS should reassure road users of their safety.
- ADS should not confuse users.
- ADS should not disrupt traffic.
- ADS should not cause any non-tolerable risk.
- ADS not cause any traffic accidents resulting in injury or death that are reasonably foreseeable and preventable.
- ADS should be free of unreasonable safety risks.
- ADS should comply with road traffic regulations.
- ADS should detect failures.
- ADS should detect when the ODD conditions are not met and transfer control to the driver or execute an MRM.
- ADS should interact with other road users.
- ADS should assess driver awareness and readiness to perform the full driving task.
- ADS should detect and respond to object/events that may be reasonably expected in the ODD.
- ADS should allow the driver to take over control of the vehicle.
- ADS should meet behavioural competencies for normal operation, crash avoidance situations and fall back strategies.
- ADS should be protected against cyber-attacks.
- ADS should be updated as needed in a safe and provide for aftermarket repairs and modifications.
- ADS should collect and record data to establish the cause of any crash and to identify the status of the ADS and of the driver.
- ADS vehicle occupants should be protected against crashes with other vehicles
- ADS vehicles should be put in a safe state immediately after being involved in a crash.

Starting Points?

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1. ADS should drive safely. (Ensure safe behavior of the ADS as “the driver”)
2. ADS should interact safely with the user. (Ensure safe use of ADS and safe interactions with the user such as transfers of control, user override, etc.)
3. ADS should manage safety-critical situations. (Differentiate between normal driving and emergency situations to ensure safe responses to the latter)
4. ADS should safely manage failure modes. (Ensure safe responses to system malfunction, physical damage, etc.)
5. ADS should maintain a safe operational state. (Ensure safety throughout the useful life of the ADS, such as safety critical updates, response to obsolescence)

Proposal to elaborate ≤ 10 “next level” safety goals for consideration at the 6th session. Industry has submitted a document concerning the derivation of initial safety targets from these starting points. Suggest to hear Industry views and then discuss the starting points and next steps.

Establishment of performance limits

- Several methodologies have been raised in FRAV discussions (as presented by Japan during FRAV-04)
  - Competent and careful human driver model (C&C)
  - Technological feasibility (State-of-the-Art)
  - Safety envelope
  - Positive risk balance
- FRAV should consider stakeholder proposals for determining performance limits
  - Initial phase to identify and describe safety needs
  - Second step to define performance criteria and thresholds

Japan and Germany have submitted presentations on this topic.
Suggest to hear from these stakeholders and then share views on developing performance criteria.

Next session

- Request FRAV stakeholders to identify “next level” items under the “starting points”
  - Intention to agree on top-level list of safety targets at 6th session
  - Purpose of list to define scope of FRAV’s plans for safety requirements (Digestible overview to solicit review and feedback from WP.29)
  - ±10 items under each starting point (Remain at top level to facilitate consensus on safety needs/goals before moving to next level of detail)
  - Provide input by 27 October to facilitate 6th session preparations
- Request further views on methods for establishing performance criteria/limits.