

Informal document GRVA-09-27
9th GRVA, 1-5 February 2021
Provisional agenda item 4(a)

Progress Report

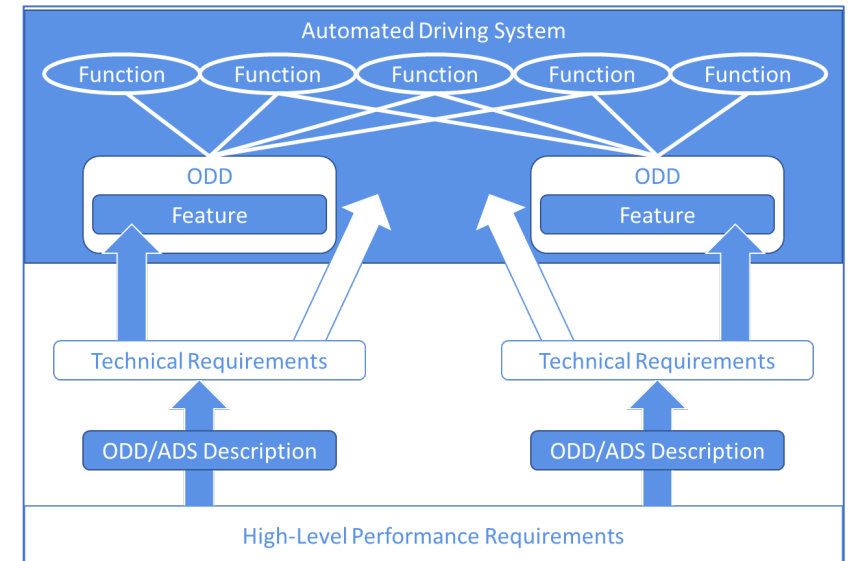
9th GRVA session, 1-5 February 2021



- White paper describing FRAV work
 - Summary for GRVA
 - Explanation of work, current thinking, and intentions
 - Work ongoing—Contents of paper subject to change
- Six sections
 1. Definition of an Automated Driving System
 2. Structure for ADS safety requirements
 3. Elaboration of ADS safety requirements
 4. Status of FRAV activities
 5. FRAV coordination with VMAD
 6. Outlook for 2021

- Driving and the Dynamic Driving Task (DDT)
 - Driving: Strategic, operational, and tactical functions
 - Strategic refers to decisions related to trip goals (e.g., destination)
 - Operational refers to basic driving skills and competencies
 - Tactical refers to maneuvering the vehicle under prevailing conditions
 - DDT: All the real-time operational and tactical functions required to operate a vehicle in on-road traffic
- Automated driving and Operational Design Domains (ODD)
 - ADS may be designed to operate under defined sets of conditions and constraints
 - ODD: The conditions under which an ADS is designed to operate
 - User roles and responsibilities may differ across ADS configurations
- Automated Driving Systems
 - ADS: A driving automation system capable of performing the entire DDT on a sustained basis
- ADS functions
 - Subsets of ADS hardware and software designed to perform aspects of the DDT and support operational safety
- ADS features
 - Applications of ADS capabilities designed to operate within an ODD

- Scope
 - All ADS (application or usage-specific approach discarded)
 - 3+ wheeled vehicles, excluding motorcycle derivations
 - Current vehicle category definitions may not address all ADS vehicle configurations
- ADS descriptions
 - Manufacturer definition of each ADS in accordance with requirements to ensure coverage and uniformity
- ADS safety requirements
 - Objectively applied to any ADS based on its uses and limitations as defined in the ADS description
- Overall approach
 - ADS descriptions enable application of requirements at technical level without interfering with innovation.
 - ADS features assessed on their merits within overall assessment of ADS



- Guiding principle
 - Short term: ADS intended for human use in human-dominated traffic
 - Traffic flows, predictability, public acceptance, user mental models, crash causation
 - C&C human driver, state-of-the-art, mathematical models, statistical positive risk balance (all have merits and may be used in combination)
 - Improve road safety and efficiency, performance-based, technology-neutral, verifiable, feasible, social acceptance
 - Explanation of guiding statement
 - Crash causation to understand what can and cannot be addressed by ADS
 - Crash causation to understand behaviors ADS may encounter
 - Addresses smooth integration into current traffic, improvement of road safety, use of new technology
- Top-down approach
 - General discussion → 5 categories → 40 topics → further elaboration

ADS performance should be consistent with safe human driving behaviors while avoiding recognition, decision, and performance errors and the introduction of unreasonable ADS-specific risks.

- Data collection
 - Understand traffic patterns, flows, and human responses to these conditions
 - Understand causes of crashes and human behaviors ADS may encounter
 - Nominal conditions and safety-critical conditions
- Elaboration of safety requirements
 - Derive measurable/verifiable assessment criteria from the 40 safety topics
 - Apply data and methods to determine specifications for ADS assessment
- Elaboration of ADS description requirements
 - Derive elements that may impact use and performance from the 40 safety topics
 - Define measurable/verifiable terms to describe use constraints and boundaries

- Leadership meetings to coordinate activities and desired outcomes
- Explanation of FRAV activities that may inform VMAD work
 - Scenarios: FRAV deliberations on ODD elements, current traffic patterns, nominal driving, and safety-critical conditions
 - Audit: FRAV deliberations on prerequisite functions and system safety
 - Virtual testing: FRAV deliberations on smooth ADS integration with current traffic
 - Physical testing: FRAV deliberations of performance, ODD exits, HMI, etc.
 - In-service performance: FRAV deliberations on maintaining the safe operational state of the ADS
- Integration under the NATM
 - Procedure to review and verification of ADS descriptions
 - Procedure to determine application of safety requirements to individual ADS
 - Procedure to determine relevance of scenarios to individual ADS

- FRAV aims to address all ADS configurations (not application-specific)
- Recognize interest in motorway applications
 - Aim to address but not be limited to motorway applications
- Recognize VMAD needs
 - Sufficient detail on goals and criteria to support decisions on assessment methods
 - Anticipate increasing collaboration and reference to VMAD outcomes
- Top-down approach moving through phases
 - General discussions → Five categories → 40 topics → Criteria → Specifications
- General outlook and aims
 - May 2021: ADS description elements and safety assessment criteria
 - September 2021: Verifiable specifications (covering motorway subset)
 - February 2022: Package covering descriptions and requirements (covering motorway subset)