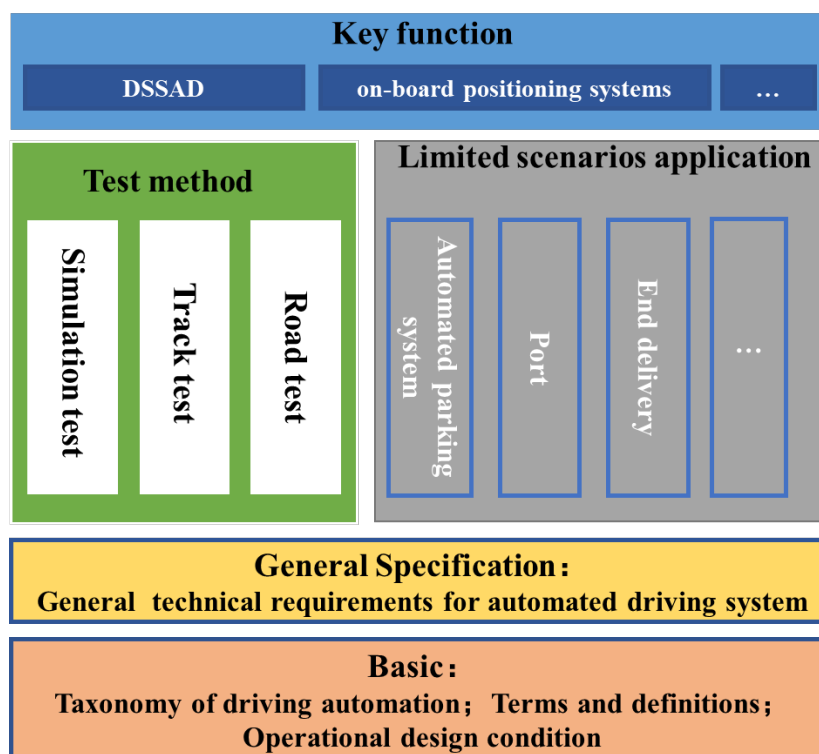


Introduction of China's automated driving standard system planning and proposal for GRVA

1. China's automated driving standard system planning

1.1 Framework of Automated Driving Standard System

According to the preliminary research, the deployment scenarios of China's AD industry are mainly urban roads, highways, and enclosed areas, which have a wealth of application scenarios and landing requirements. Therefore, under the guidance of the "Guidelines for the Construction of the National Internet of Vehicles Industry Standard System (Intelligent Connected Vehicles)", and with reference to the work progress of the UN/WP29/GRVA, ISO and other organizations in the international standards and regulations for autonomous driving. China plans to build up national standard system in five dimensions, including basic standards, general specifications, test methods, restricted scenario applications, and key technologies. The five dimensions of standards are organically combined to form an autonomous driving standard system, as shown in the figure. The details are as follows:



- Basic standards mainly include "Taxonomy of driving automation for vehicles", "Intelligent and Connected Vehicle—Terms and Definitions" and "Intelligent and connected vehicle—Operational design condition for automated driving system", etc., which will serve as the foundation of the entire automated driving standard system;
- General specification standards mainly include " Intelligent and connected vehicles—General technical requirements for automated driving system", etc. This type of standard is expected to be technically in line with the work in FRAV so as to formulate general and basic requirements for ADS. This type of standard will cooperate with the test method standards to jointly regulate the safe application of autonomous driving systems after fully drawing on the experience and relationships from the coordination of FRAV and VMAD;
- Test method standards mainly include "Simulation Test Methods", "Track Test Methods" and "Road Test Methods". This type of standard fully draws on the working ideas of the VMAD. And simulation test, field test and road test cooperate with each other to support the test and evaluation of the automatic driving system;
- The application standards for restricted scenarios mainly include "Automated Parking Systems", "ports", "End delivery" etc. This type of standard focuses on the application of automatic driving technology in limited scenarios. For different applications (ports, logistics parks, parking lots) scenarios, the corresponding technical requirements vary a lot. At present, such standards are in high demand and will continue to be improved and expanded according to industry developments;
- The key function standards mainly include "DSSAD" and "On-board positioning systems". This type of standard is a necessary technology for automated driving technology, which is of great significance for promoting the safety and rapid development of automated driving. This type of standard will also continue to be improved and expanded in accordance with industry developments.

1.2 List of Autonomous Driving Standards

No.	Category	Name	Progress
1	Basic	Taxonomy of driving automation for vehicles	Publish
2		Intelligent and Connected Vehicle—Terms and Definitions	CD
3		Intelligent and connected vehicle—Operational design condition for automated driving system	NP
4	General Specification	Intelligent and connected vehicles—General technical requirements for automated driving system	WD
5	Test method	Intelligent and connected vehicles — Methods and requirements of simulation test for automated driving functions	Pre-research
6		Intelligent and connected vehicles — Methods and	DIS

		requirements of track test for automated driving functions	
7		Intelligent and connected vehicles — Methods and requirements of road test for automated driving functions	WD
8	Limited scenarios application	Intelligent and connected vehicle — Technical requirement and test methods for automated parking system	NP
9		Intelligent and connected vehicle — Technical requirement and test methods for automated driving limited scenario application — Part 1: Port	Pre-research
10		Intelligent and connected vehicle — Technical requirement and test methods for automated driving limited scenario application — Part 2: End delivery	Pre-research
11	Key function	Intelligent and connected vehicle — Data storage system for automated driving	NP
12		Intelligent and connected vehicle — Technical requirements and test methods for on-board positioning systems	Pre-research

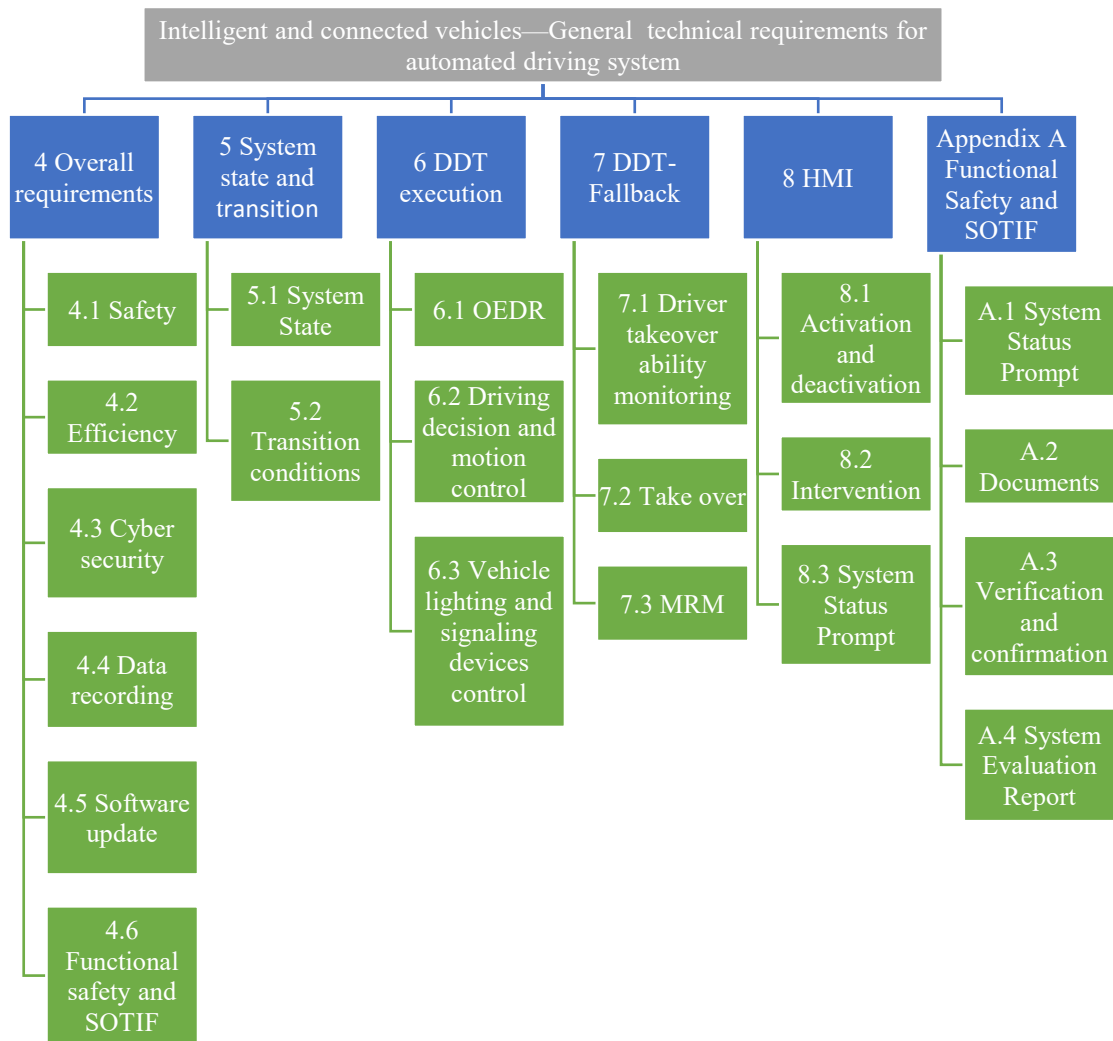
2. Introduction to key standards " Intelligent and connected vehicles— General technical requirements for automated driving system "

2.1 Brief introduction to the standard

The "Intelligent and connected vehicles—General technical requirements for automated driving system" is a recommended national standard. The standard is applicable to M and N vehicles equipped with ADS. It mainly specifies the overall requirements of the ADS, DDT execution requirements, DDT-Fallback requirements, HMI requirements, functional safety and SOTIF. The purpose is to formulate universal and basic requirements applicable to all levels of ADS. The standard is currently in the drafting stage, and the standard framework has been determined.

2.2 The main content of the standard

The standard framework is shown in the figure below. The standard framework draws on the framework of FRAV and refers to the related content of ALKS.



The main technical content of the standard includes overall requirements, system status and transition, dynamic driving task execution, dynamic driving task support, human-computer interaction, functional safety and expected functional safety, etc. The specific contents are as follows:

- "Overall requirements" put forward overall requirements in terms of safety, efficiency, data recording, cyber security, software upgrades, functional safety and SOTIF.
- "System State and Transition" mainly defines the system state necessary for ADS, and regulates the transition conditions between each state, and is used for unified understanding in the standard document.
- "DDT execution" puts forward requirements for the perception, decision-making, and execution of ADS in the normal operation process, and is used to regulate the safety of ADS driving behavior. It is related to "4.1 ADS performance of the DDT" in FRAV-19-05;

- "DDT-Fallback" and "DDT Execution" complement each other and mainly include requirements such as "takeover", "MRM" and "driver takeover capability monitoring function". Related to “4.2 ADS interactions with ADS vehicle users” and “4.3 ADS management of safety-critical situations” in FRAV-19-05;
- "HMI" mainly focuses on the requirements of ADS's "Activation and deactivation", "Intervention" and "System Status Prompt", which is related to “4.2 ADS interactions with ADS vehicle users” in FRAV-19-05.
- "Functional Safety and SOTIF" mainly focuses on "System Status Prompt", "Documents", "Verification and Confirmation" and "Evaluation Reports" for the functional safety and SOTIF of ADS. Related to “3 Guidelines for ADS descriptions” and “4.4 ADS management of system failures” in FRAV-19-05.

3. Proposals

3.1 Pay attention to the application of automated driving technology in specific scenarios

The FRAV documents and the ALKS regulations are mainly aimed at road scenarios and cannot be applied to some specific scenarios. Scenarios such as parking lots, ports, parks, etc., are the key track where the AD industry urgently needs to be commercialized due to the characteristics of high controllability, low driving speed, and low risk. However, such kind of the “vehicles” is being used on public road from time to time. For example, driverless delivery vehicle is commonly used in community and campus, but sometimes needs to drive on road to transportation. It is recommended that GRVA consider how to deal with the vehicle operating on both public road and limited areas.

3.2 Promote the organic combination of FRAV and VMAD work results

FRAV and VMAD develop general requirements and test and evaluation methods for ADS respectively, and their work is complementary, and the two IWGs have carried out close communication in the course of their work. China is expecting the specific corresponding between technical requirements and test methods.

3.3 Clarify the relationship between AD and ADAS

According to the international consensus, there is a clear distinction between AD and ADAS in terms of function realization and responsibilities. At present, GRVA has carried out workstreams of AD and ADAS parallelly, and the requirements for them seem to be more and more similar. It is recommended that GRVA clearly identify the boundary between AD and ADAS, and research on how to clearly tell apart them by specific technical method.

3.4 Promote research on key functions for automated driving

Along with the development of automated driving technology, a large number of new

technologies have emerged, DSSAD is one of them and GRVA has carried out work for regulation development. It is recommended that GRVA also consider to regulate other technologies or functions, such as on-board positioning system, as the basic function to serve the automated driving.
