中汽中心 | NTCAS 全国汽车标准化技术委员会
National Technical Committee of Auto Standardization

Developments of ICV standards in China

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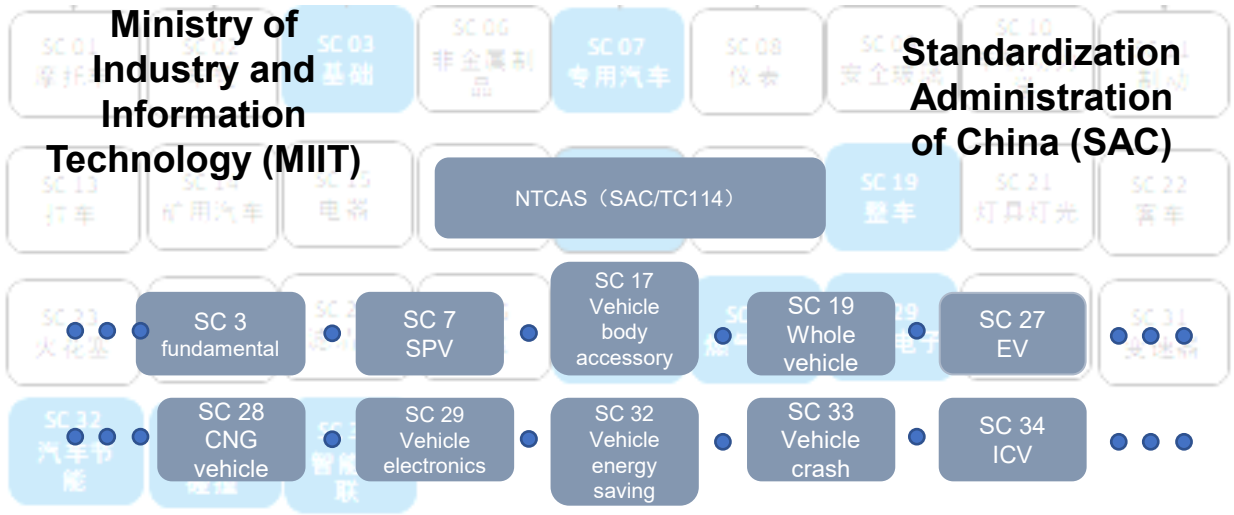
2020.12.04

CATARC, authorized by SAC and MIIT, is responsible for developments of auto standards in China and harmonization of auto standards and regulations at UN/WP29 and ISO and IEC.



CATARC plays the roles or conducts the work as below:

1

- Secretariat of NTCAS (National Technical Committee of Automotive Standardization
- Secretariat of Automotive Branch of China Association for Standardization
- Secretariat of over 10 branches of fundamental and whole vehicle areas etc.
- Standards research in the key areas
- Standard information service and consultation for the automotive industry

2

- Secretariat of Chinese WP29 Working Committee
- Centralized administration body for international standards as ISO, IEC etc. in China
- Study on the export market certification regulations/ admission system
- Harmonize the regulations among various countries and regions and participate in bilateral or multilateral technical exchange

Part One

Status and Trends of ICV Technology and Industry

Why ICVs are highlighted?

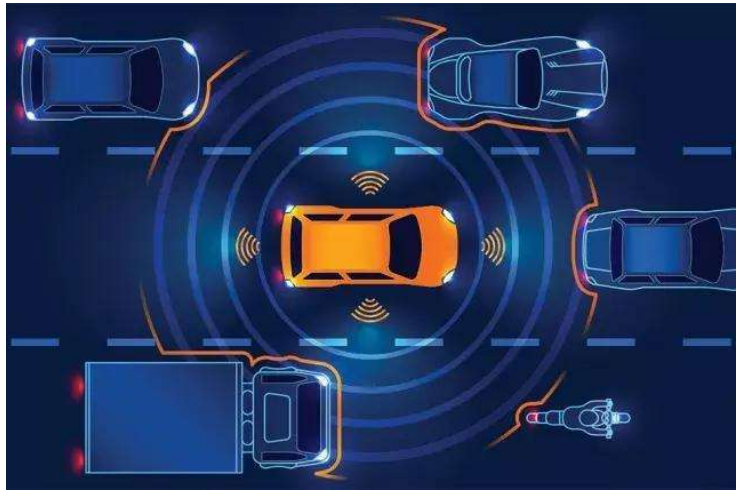
- ICVs bear the whole future of international auto industry
- ICVs work as an important platform for ICT application
- ICVs constitute as a key element of ITS
- ICVs work as one of pillars for smart city and smart living

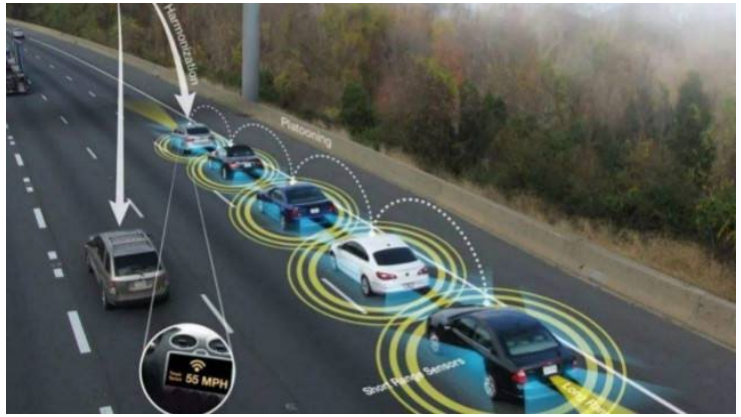
Promoting the development of ICV , to solve and improve the following issues:

- Reduce traffic accidents
- Smooth traffic flow
- Promote development of industry
- Reduce greenhouse gas emissions
- Improve the mobility of the elderly and the disabled
- ……

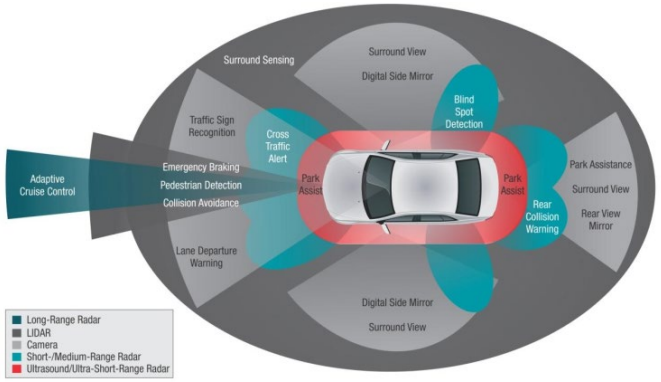
More agreements about ICVs and its solutions are achieved among different industries

Intelligence decide whether AD can achieve while connectivity influence its real value

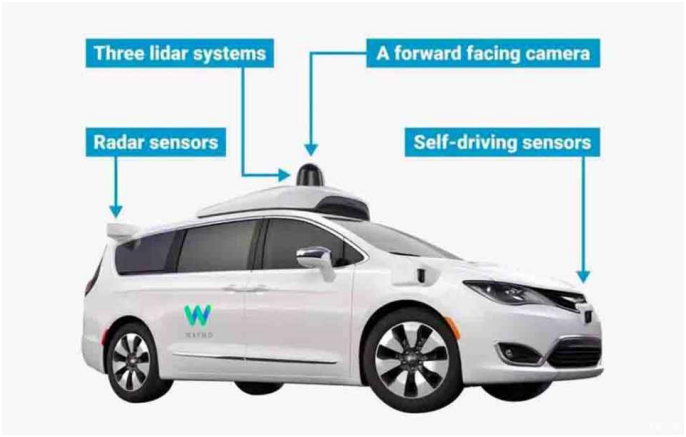




Integration and fusion of multi-sensors are common choice of the industry



Industries care more about technical feasibility, safety, reliability, consumer acceptance and values of AD



Many countries are pushing development of ICV by plans, policies and regulations

➢ The United Nations revised the "Vienna Road Traffic Convention" in 2016.

	European Union	Japan	China
Legal		➢ The "Road Traffic Law" was amended and will be implemented on April 1, 2020; ➢ The amendment to the Road Transport Vehicle Law was passed and implemented in May 2020.	
Policy	➢ In 2015,released "GEAR2030 Strategy"; ➢ In 2016, released "Cooperative Intelligent Transportation System Strategy" ; ➢ In 2018, released "The Road to Automated Travel: Europe's Future Travel Strategy"; ➢ In 2019, the "Collaborative Intelligent Transportation (C-ITS) service" will be deployed in member states.	➢ In 2017, released the "Remote Autonomous Driving System Road Test Permit Processing Benchmark" and the "2017 Government and Civil ITS Concept and Roadmap"; ➢ In 2018, the "Autonomous Driving Related System Improvement Outline" and the "Autonomous Driving Vehicle Safety Technical Guide" were released.	➢ In 2018, the "Three-Year Plan for the Development of the Internet of Vehicles Industry" was released. ➢ In 2018, the "Intelligent Networked Vehicle Road Test Management Specification" was released. ➢ In 2018, the "Testing Procedures for Autonomous Driving Functions of Intelligent Connected Vehicles (Trial)" was released. ➢ In 2020, the "Smart Car Innovation Development Strategy" will be released.
Standard & regulations	➢ In 2019, a new General Safety Regulation (EU) 2019/2144 was issued, which stipulates additional safety requirements that need to be met by advanced vehicle driving assistance technologies and autonomous vehicles.	➢ The "Security Standards for Road Transport Vehicles" has added relevant requirements for autonomous driving.	➢ NTCAS has successively initiated 71 standards and research projects, covering advanced driver assistance systems, autonomous driving, information security, networked functions and applications, resource management and information services.

International organizations are pushing harmonization of ICV standards and regulations

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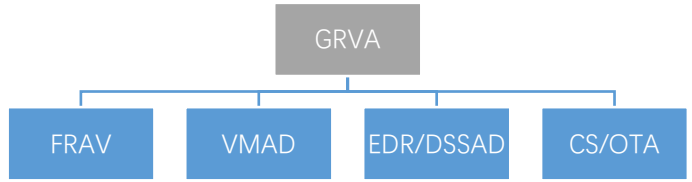
"Autonomous Driving Framework Document" was implemented and played an active role

The "Autonomous Driving Vehicle Framework Document" aims to establish the safety and related principles of L3 and higher level autonomous vehicles, and to provide work guidance for the subsidiary working group of the World Vehicle Regulation Coordination Forum (WP.29)

The United Nations issues three important regulations in the field of ICV

(WP.29) At the 181st plenary meeting (June 24, 2020), voted to pass information security (Cybersecurity), software updates (Software Updates) and automatic lane keeping systems (Automated Lane Keeping Systems, ALKS) 3 An important regulation in the field of intelligent connected cars

Two working groups FRAV and VMAD speed up



ISO Road Vehicles and Intelligent Transportation Standards Committee cooperate to carry out standard coordination

ISO/TC22- ISO/TC 204 Cooperative framework

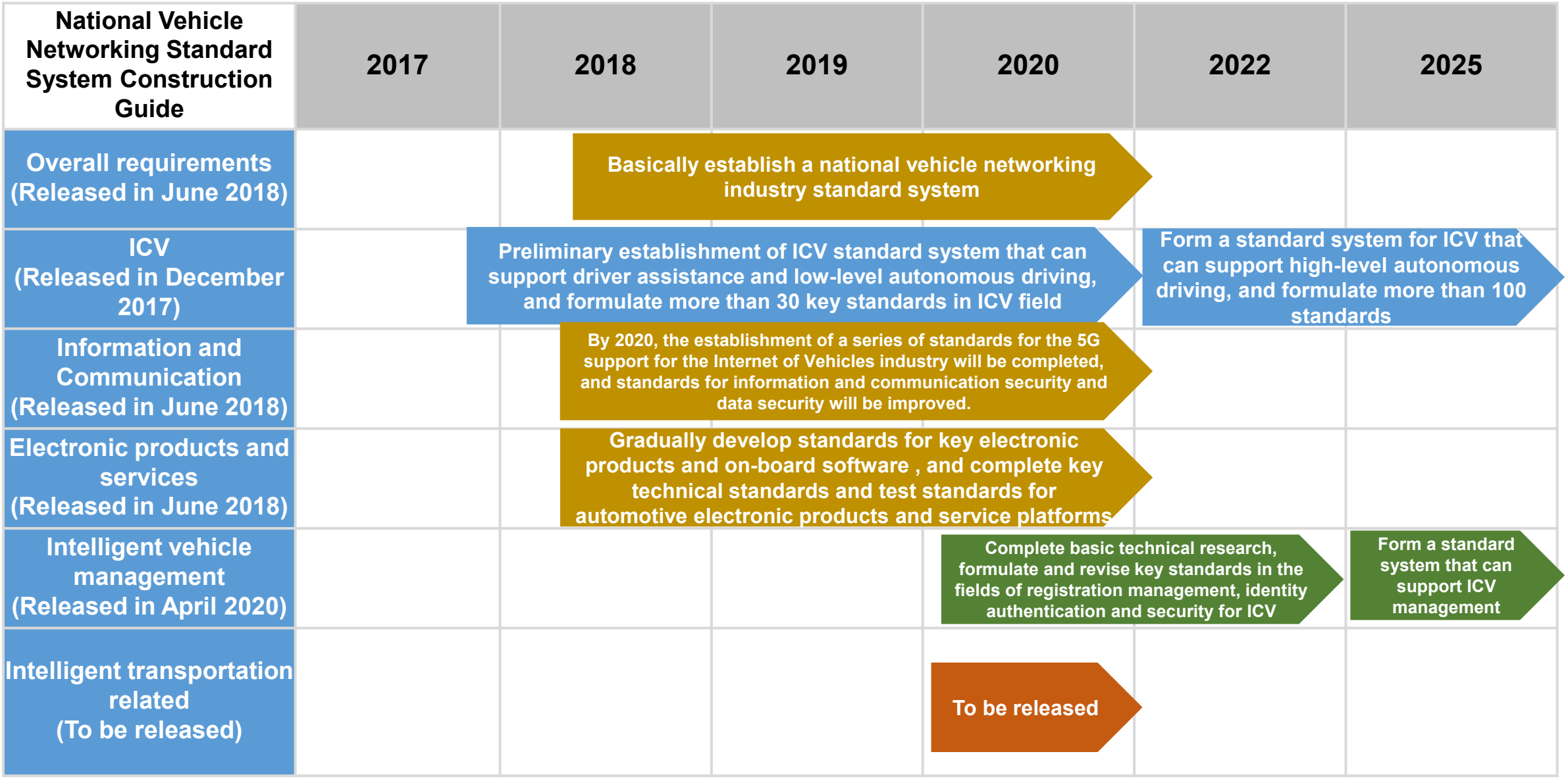
Steps to be taken to harmonize new WIs where there are overlapping interests between TC22 and TC204

		TC22 Road vehicles					
		SC3	SC9	SC10	SC12	SC13	
TC 204 Intelligent transport systems	WG9					X	Integrated transport information, management & control
	WG14		X	X	X	X	Vehicle/roadway warning and control systems
	WG16	X					Wide area communications /protocols &interfaces
	WG17	X				X	Nomadic devices in ITS systems
	WG18	X				X	Cooperative systems
		Electrical and electronic equipment	Vehicle dynamics & road-holding ability	Impact test procedures	Passive safety crash protection systems	Ergonomics applicable to road vehicles	

Part Two

Researches and development of ICV standardization

Several standardization guidelines were issued by SACs and other ministries in China



More communications and cooperation are undergoing among different industries and organizations

China Communications Standards Association

NTCAS and China Communications Standards Association establish standardization exchange and cooperation mechanism in ICV filed, to jointly promote the construction of the standard system.

Cryptography standardization technical committee

NTCAS and Cryptography standardization technical committee have established standardization exchange and cooperation mechanism in ICV field, and focus on convergence and coordination about cyber security and cryptography.

Communication and coordination

China society of Automotive Engineers

NTCAS & SAE-China

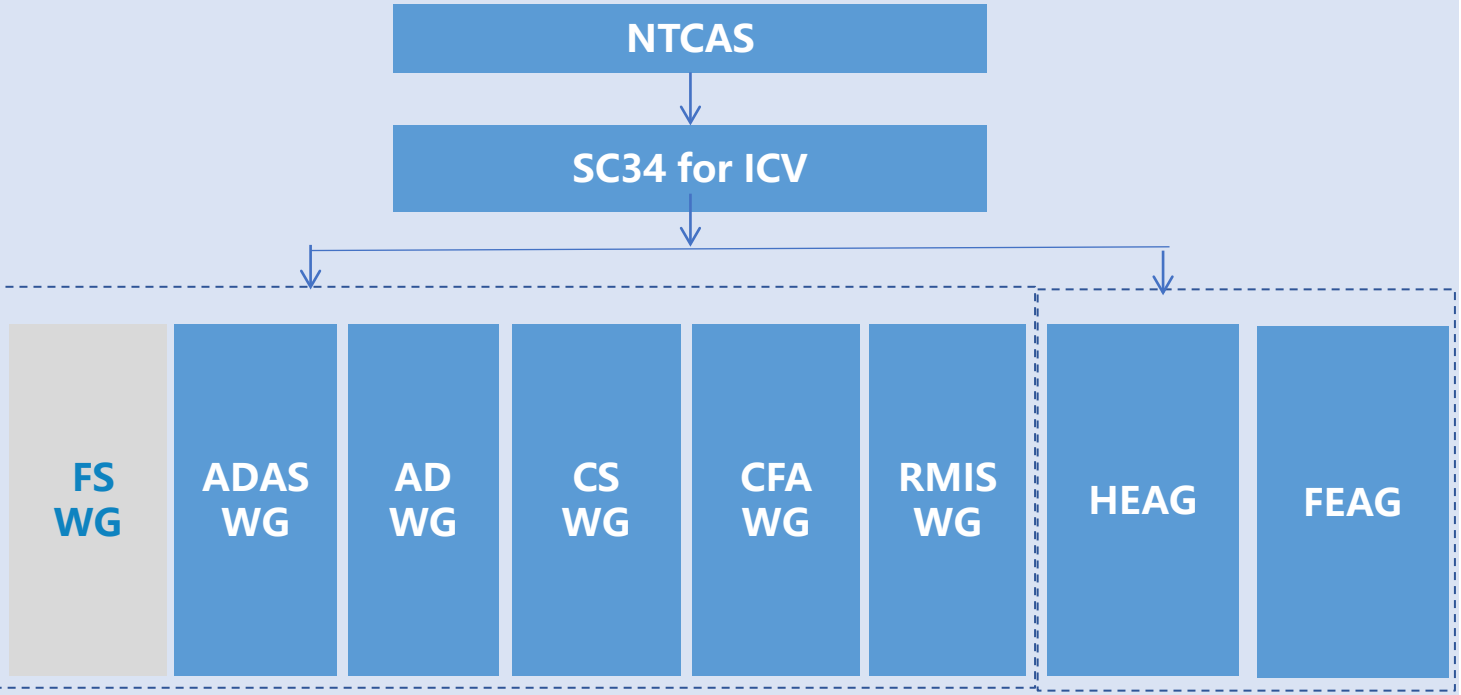
Sub-committee for ICV standard
+
China Industry Innovation Alliance for the Intelligent and Connected Vehicles(CAICV)

Four-party agreement

The standard committees of automobiles, transportation, information communication and traffic management jointly signed a framework agreement for cooperation.

Workings Groups were set up to deal with specific standardization or harmonization of ICV

Organizational structure



Key work

➢ Complete the phased construction

Achieve the goal of the first phase of the "Guide" and form a standard system for ICV that can support driver assistance and low-level autonomous driving.

➢ Accelerate the development of critically needed standards

- Basic general standard
- Intelligent Vehicle Standard
- Connected Vehicle Standard

➢ Strengthen international cooperation

- Strengthen the coordination of international standards and regulations
- Systemically carry out the tracking, coordination and transformation of international standards

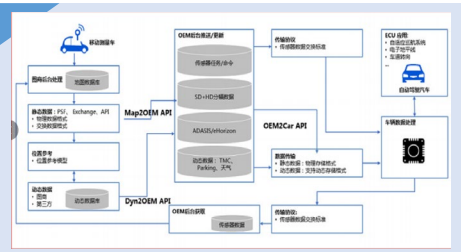
Comprehensive investigations and researches are conducted to capture the demands of industries

Based on the status of the industry, 20 research projects on standard requirements have been initiated, and standard system projects have been optimized and improved based on the research results.

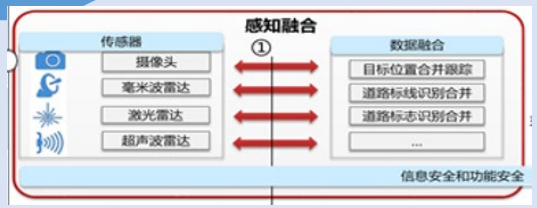
No.	Topic
1	ICV's demands for communication
2	Demands for HD maps and relevant standards
3	Standards demands for driverless logistic delivery vehicles
4	Evaluation method of sensor fusion
5	Demands for Autonomous vehicle on road testing standards
6	Demands for Intelligent Parking Function standards system
7	ICV's demands for Test Equipment standards
8	Technical Requirements for Automobile (ECU) Cyber Security protection
9	Demands of the information interaction function between the ICV and the mobile terminal
10	Demands for Message Set Classification standards
11	White paper on Operational design Conditions of Autonomous Driving System
12	Demands for Autonomous vehicle transition and HMI standards
13	Demands for ADV simulation testing standards
14	Demands for MDC relevant standards
15	Standardization requirements of automobile safety early warning scenario based on connected technology
16	Research on general technical requirements of vehicle operating system
17	Research on general technical requirements of operating system on vehicle
18	Test evaluation reaearch of vehicle operating system
19	Study of architecture of operating system on vehicle
20	Research on the architecture of vehicle control operating system

ICV' s demands for communication

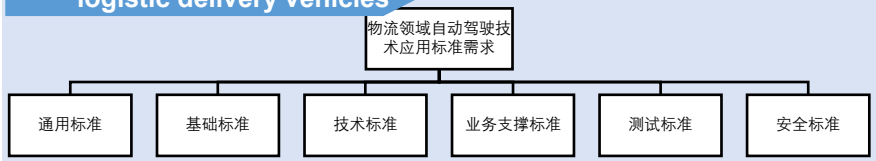
Demands for HD maps and relevant standards



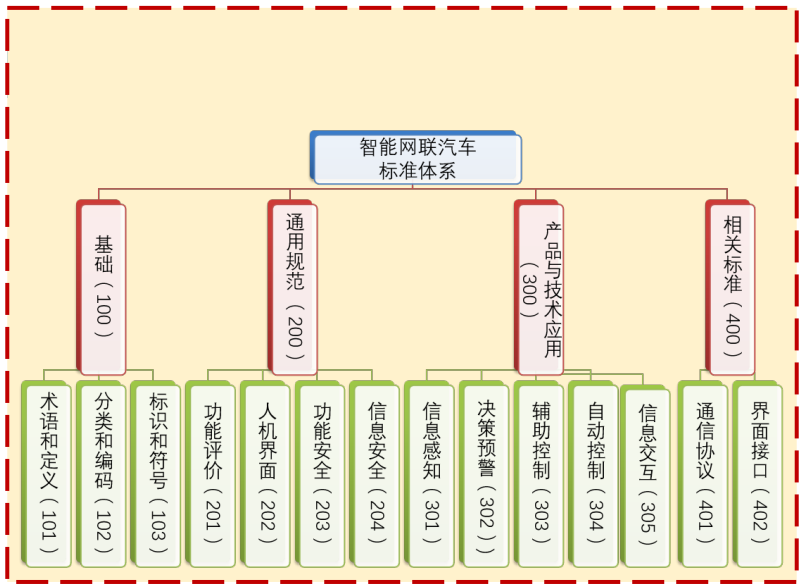
Evaluation method of sensor fusion



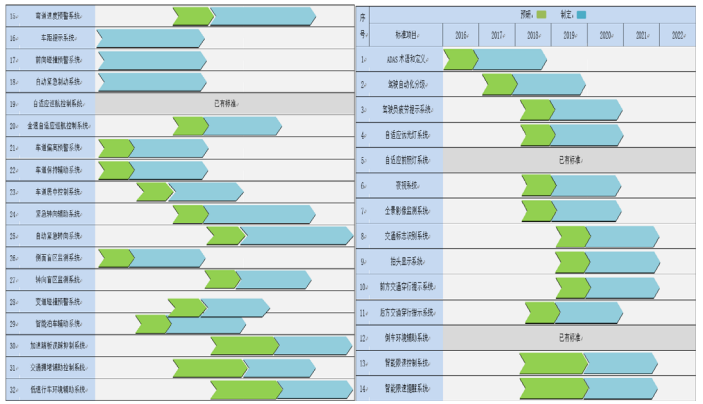
Standards demands for driverless logistic delivery vehicles



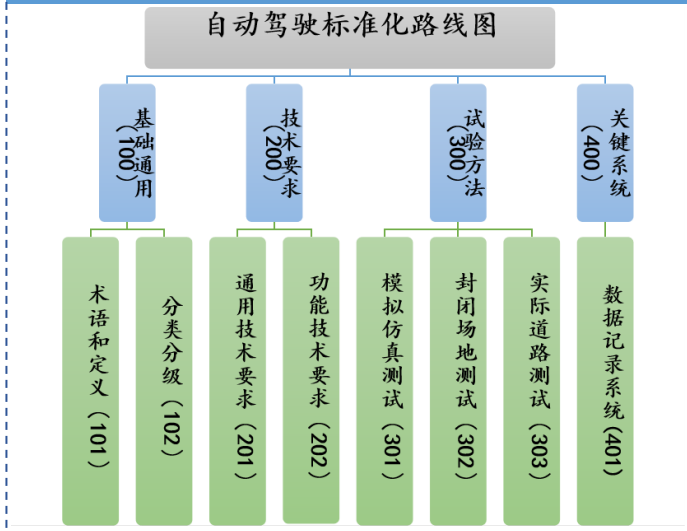
NTCAS release roadmap or sub-sys of ICV standards in specific field to improve the ICV standardization package



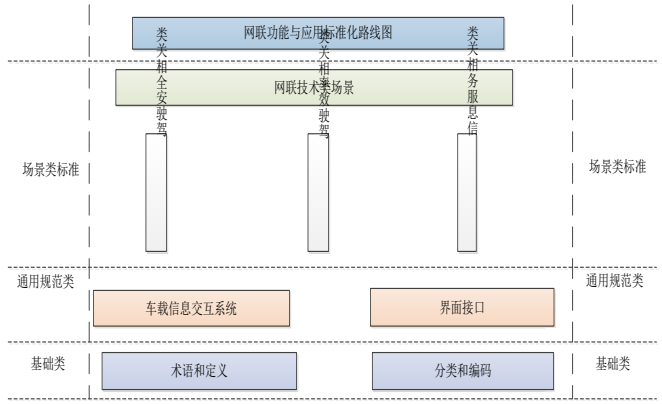
ADAS



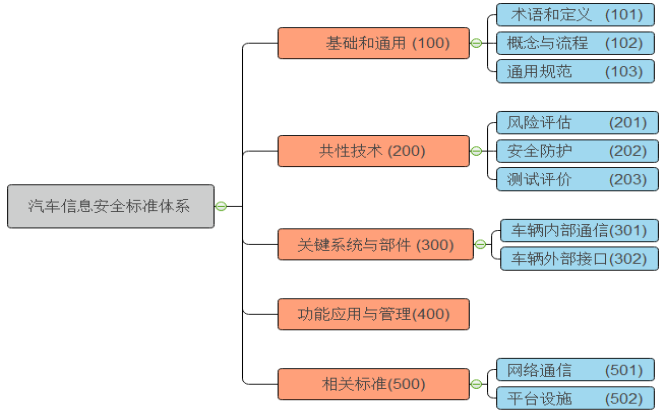
Autonomous Driving



Connected Function & Application



Cyber Security



Vehicle Operating System

Standards covering all specific field are under developments with collaborative of stakeholders

ADAS

standards publication

- AEB system for commercial vehicle
- electronic stability control system for commercial vehicles

standard projects for authorization

- AEB system for Passenger car
- blind spot detection system
- ADAS terms and definitions
- LKA system of passenger cars

standard projects being developed

- intelligent parking assist system
- driver attention monitoring and warning system
- lane keeping assistance (LKA) system of commercial vehicles

standard projects submitted for approval

- rear cross traffic alert system
- Intelligent speed limit system
- symbols in ICV field
- The priority of the vehicle information
- around view monitor
- night view
- door open warning
- full speed range adaptive cruise control
- combined driver assistance system

pre-research standard projects

- test devices for target vehicles, vulnerable road users and other objects

Autonomous Driving

Technical requirements

- General functional requirements for AD
- Evaluation Guidelines for AD Functions

Test methods

- Methods and requirements for field testing of autonomous driving
- Methods and requirements of public road testing for autonomous driving

Critical system

- DSSAD

General

- Taxonomy of Driving Automation for Vehicles
- terms and definitions of ICV

Promote the research and formulation of standards under each working group

Cyber Security

Cyber Security Management

- Cybersecurity engineering
- Incident response
- Risk Assessment

Vehicle

- Vehicle Cybersecurity test
- OTA
- General requirements

Critical systems and components

- OBD
- TBOX&IVI
- GW
- electric vehicles charging system
- remote service and management system

Connected Function & Application

Application scenario

- Extended vehicle(ExVe) methodology

General

- Vehicular Communication System based on LTE-V2X Direct Communication
- Vehicle-mounted wired high-speed media transmission system
- Vehicle dedicated wireless short-distance transmission system

Vehicle Operating System

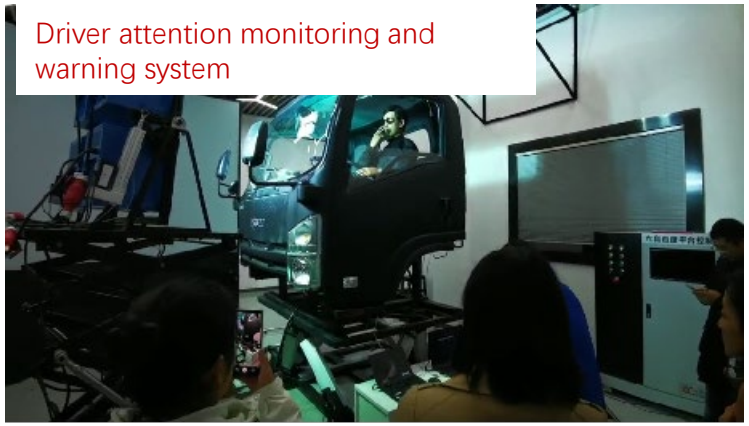
- Communication between vehicle operating systems
- General Requirements of Data

Carry out verification experiments to ensure that the standards are scientific and reasonable

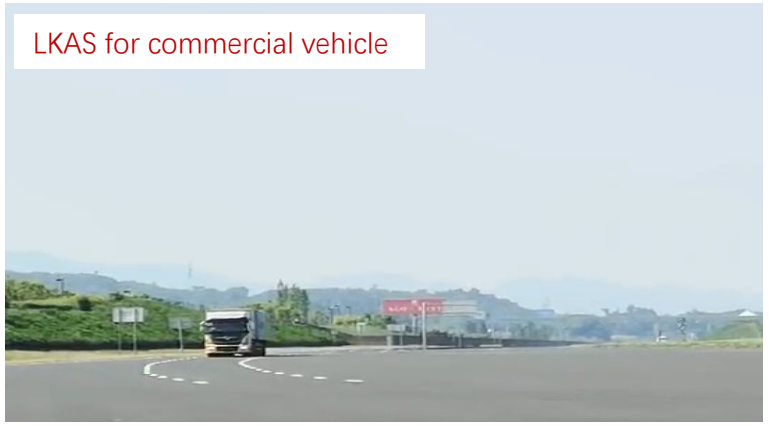
Comprehensively plan and systematically carry out a number of vehicle and system standard verification tests to verify the scientificity and rationality of the standards. .

Platooning

Driver attention monitoring and warning system

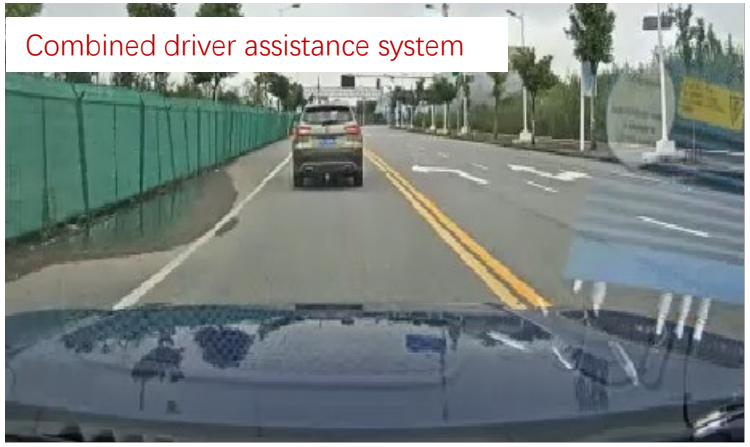


LKAS for commercial vehicle



Methods and requirements of field testing for AD

Combined driver assistance system

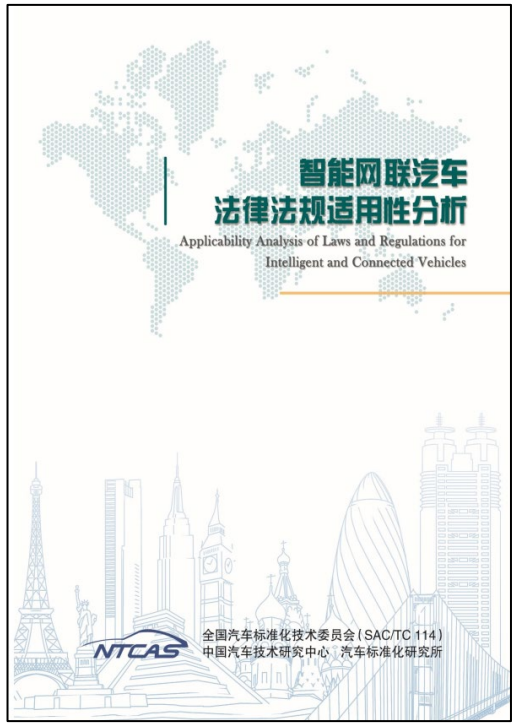


Blind spot detection system

Analyze the applicability of laws and regulations for ICV

Release of "Analysis of Applicability of Laws and Regulations on ICV"

1	Completion of 25 regulations and 120 compulsory standards analysis
2	Logic deconstruction with driving task as the core
3	Categorize adaptability and impact
4	Propose major measures to remove legal obstacles
5	Documents support government management and guide industrial development



Suggested measures to remove barriers to standardization

Vagueness of the language	Restriction son structures and functions	Abundant structures and functions
Clarify by explaining relevant texts	Exempting ADT from certain clauses	No need for modification or clarification
Clarify by rewording the texts	Modify clauses hindering ADT	

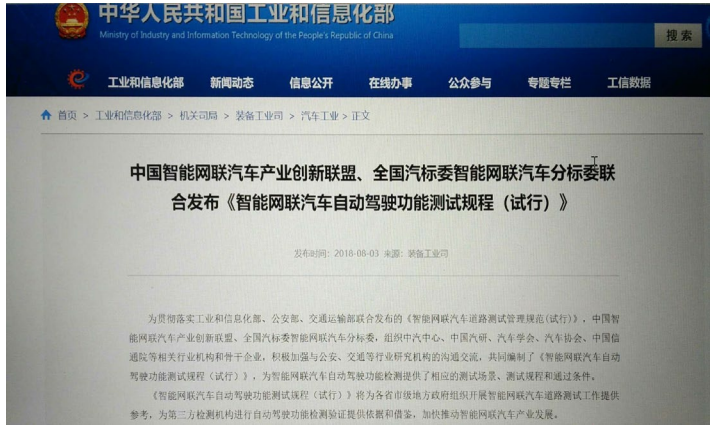
Support for legislation on testing and demonstration of AD functions of ICVs on public roads

Simulation

Field Test

Public Road Test

Public road test is an **indispensable** step of the development and application **in ICV field.**

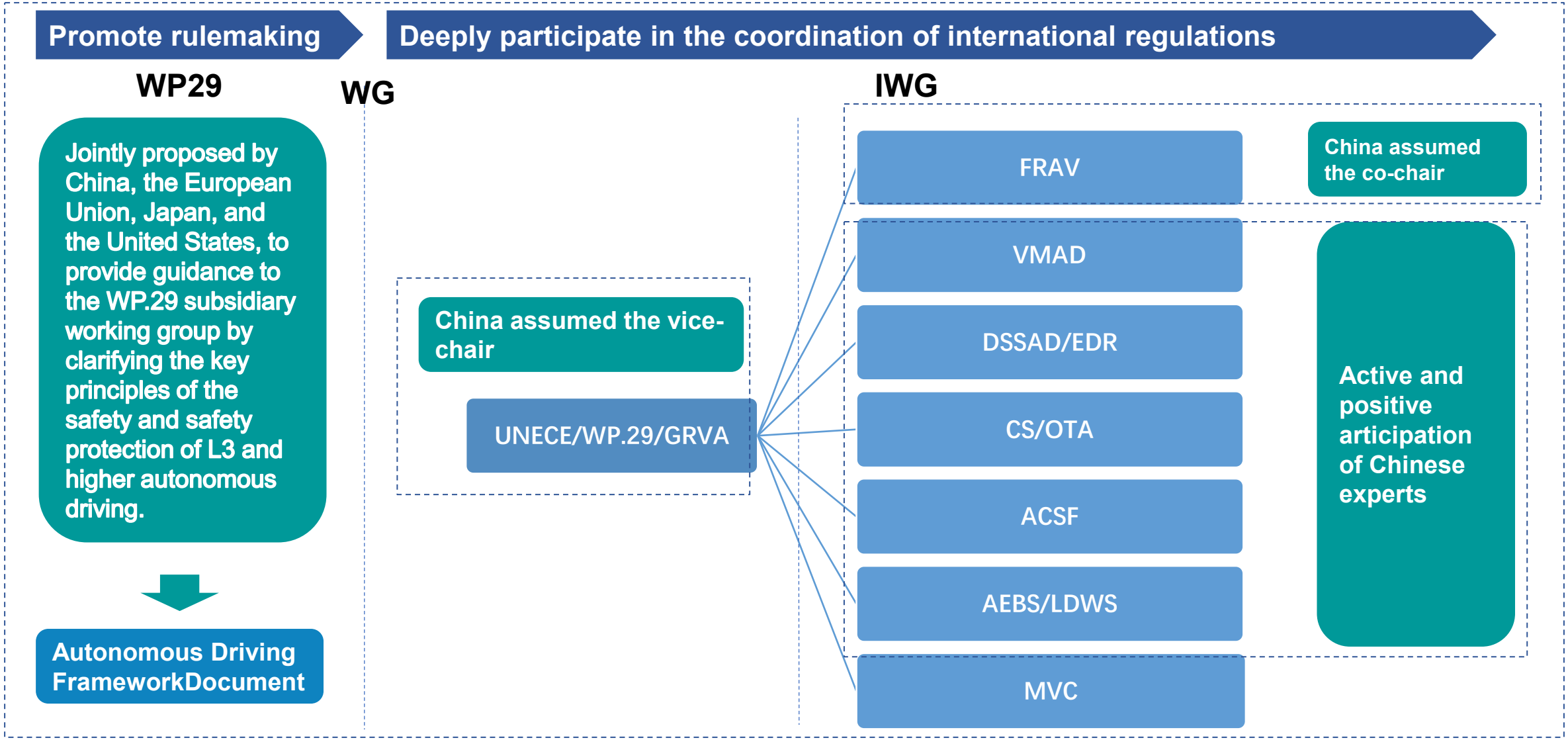


Jointly formulated and issued the "Test Procedures for Autonomous Driving Functions of ICV (Trial)"

Support the signing of the demonstration zone (field) sharing and mutual recognition initiative

Test licenses>400
Test road >2000km
Test range >2M km

Work closely with international experts at UN WP29



Participate into coordination activities at ISO/TC22 and its sub-committees and working groups

ISO

Participate in TC22 Strategic Advisory Group (SAG22) and Autonomous Driving Coordination Group (ADCG) related strategic planning discussions

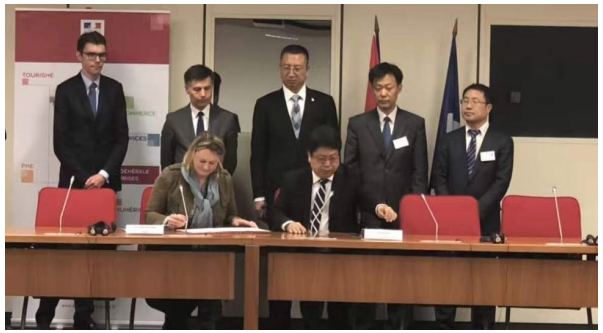
- Focus on key ISO/TC22/SC31 data communication projects
  - "Connected Vehicle Methodology" related international standards; ISO 23150 multi-sensor fusion; ISO21111 Ethernet
- Deeply participate in key projects of ISO/TC22/SC32 vehicle electrical, electronic components and general systems
  - ISO 26262 Road Vehicle Functional Safety
  - ISO 21448 Road Vehicle Safety of the Intended Functionality(SOTIF)
  - ISO/SAE 21434 Road Vehicle Cyber Security
- Organized and undertook the coordination of ISO/TC22/SC33 standards for autonomous driving test scenarios
  - ISO 34501 Terms and Definitions of Test Scenarios for Auto_x0002_mated Driving Systems
  - ISO 34502 Engineering framework and process of scenario based safety evaluation
  - ISO 34503 Taxonomy for Operational Design Domain for an Automated Driving System
  - ISO 34504 Scenario Attributes and Categorization
  - ISO 34505 Evaluation of Test Scenarios for Automated Driving Systems

IEC

Undertaking the Chinese counterpart of SEG-11 "Future Sustainable Transport" newly established by IEC

Close communications and cooperation with different organizations and national bodies

- International cooperation
  - Sino-German
    - Sino-German standardization cooperation Commission
    - Sino-German Joint Declaration on ICV cooperation
    - Mou between SC 34 and Germany Auto standard commission
    - Sino-German JWG on ICV standard and regulation
  - Sino-EU
    - Sino-EU Working Group on automobile
    - NTCAS and ACEA update cooperation on ICVs
  - Sino-France
    - Sino-France Working Group on automobile
    - Mou between CATARC and BNA of France
  - Sino-Japan
    - Dialogue between China and Japan
    - Forum between CATARC and Japan JASIC
  - Sino-US
    - Communication with NHTSA



Part Three

Questions and thoughts on ICV standardization

Questions about ICV standards and regulations

- How to correctly understand, treat rationally, and accurately locate the role and influence of standards on the development of ICV technology and industry?
- How to accurately adapt to the diverse needs of technology and industrial development, and correctly play the role of standards: promote, guide or regulate?
- How to implement the “multi-pillar ” and the new type of test and evaluation system to ensure the safety of autonomous driving?
- Does the evaluation of ICV need to correspond to the level of its automation, and could an evaluation system be established that is separated from the taxonomy of automation systems?
- Does the ethics of autonomous driving need to be regulated under the condition of "software-defined car", and can the embedded logic of autonomous driving be standardized?
- What is the impact of autonomous vehicles on consumers and road traffic, and how to give consumers appropriate training and education in a timely manner?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