Chinese ICV standards development and international harmonization

WANG Zhao
National TC for Auto Standardization (NTCAS ,SAC/TC 114)
Auto Standardization research Institute （ASRI）, CATARC
2019-05-29

ICVs and autonomous driving

Human driver			ADS/Machine
Sensing	Eye Ear	→	Sensor & Camera Connectivity
Decision	Experience Learning Emergency response	→	Control logic Scenarios Self-learning
Action	Hand Feet	→	Warning Control

Vehicle=
An acting mechanism controlled by human

Driving tasks performed by human and vehicle

- Ability to perform precise and rapid maneuvers in respond to the control demand of human

Hardware dominate vehicle functions/performances

- Functions/performances keep unchanged based on the same hardware

Vehicle=
A moving robot to perform all driving tasks

Driving tasks performed only by vehicle

- Ability to sense environments, make decisions and control behaviors of vehicle

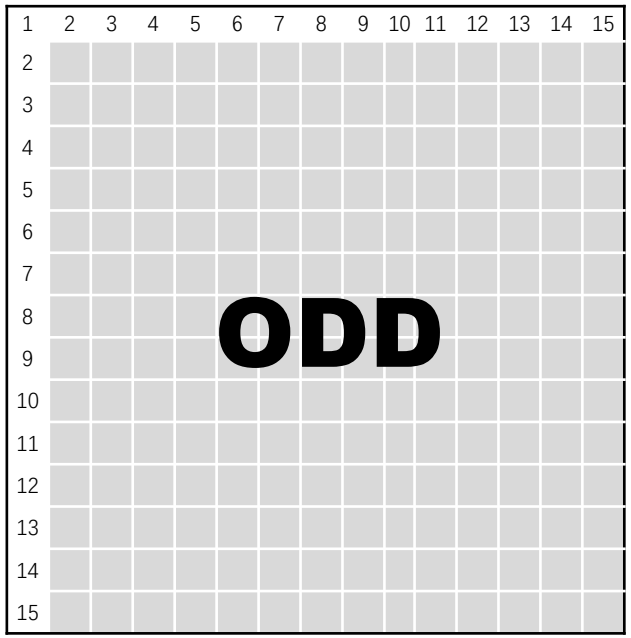
Software dominate vehicle functions/performances

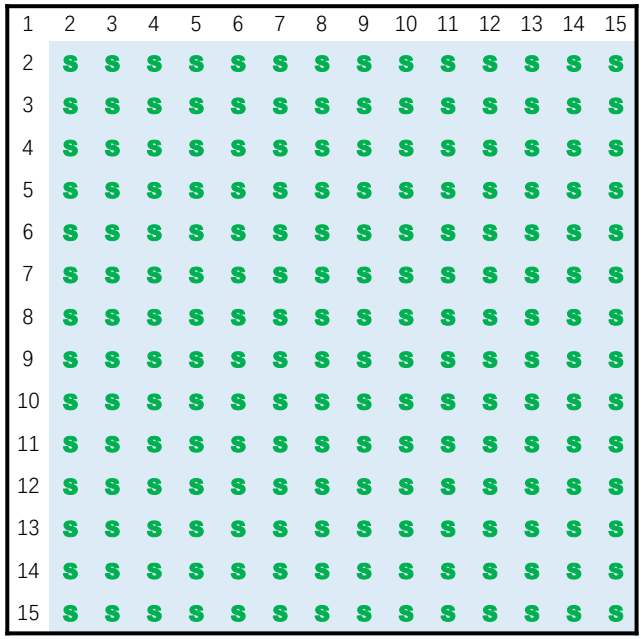
- Functions/performance changes with software updates

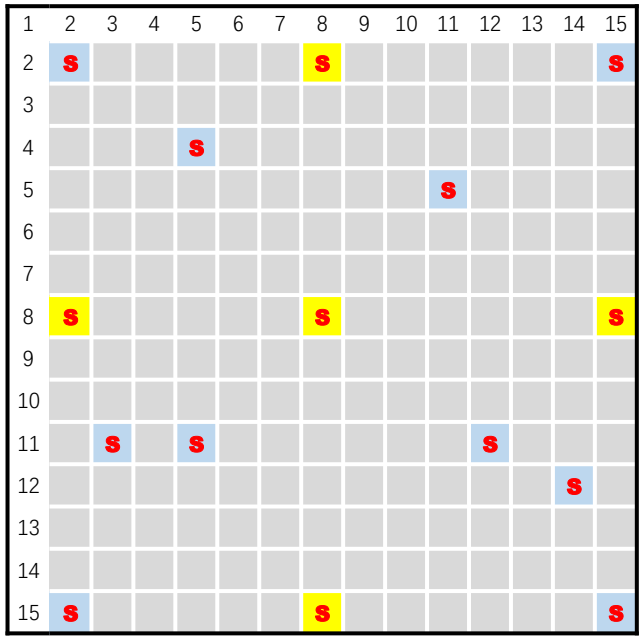
Principals for ADV driving and testing

Safely	• AD maneuver shall comply with local rules for traffic safety. • AD maneuver shall be initiated under suitable traffic situations without safety risks
Timely	• AD maneuver shall be initiated in a proper timing • AD maneuver to avoid risk shall avoid the occurrence of accidents
Precisely	• AD maneuver shall be initiated and completed in ideal conditions. • AD maneuver shall be performed precisely as expected.
Smoothly	• AD maneuver shall be performed smoothly in the whole procedure. • AD maneuver shall be performed without violent vehicle behaviors.

Measures to make autonomous driving safe enough







Industry	Eliminate risks in ODD and ensure AD safety by proper design, strict management and sufficient verification
Government	1. Specify key scenarios necessary for ADVs safety in standards or regulations. 2. Verify safe running of ADVs by tests under these regulatory scenarios. 3. Verify that sufficient tests have been done on the ADVs by random samples. 4. Verify sufficient management measures were taken to ensure ADVs safety.

Ideas about regulatory Scenarios

Scenario Group or Scenario Family consists of comparable scenarios

1. With same ego-vehicle behaviors, road geometry, participants and key environments
    1. Ego-vehicle behavior: Cut-in, Cut-out, lane-change…
    2. Road Geometry: Crossing, Ring, Merging lane…
    3. Participants: Type and behaviors
    4. Environments: Normal, Snow, Rain….
2. With minor differences in parameters and other details，such as vehicle speed, land width, detailed behaviors of participants

ADVs shall run safely under various scenarios in its ODD.

↓

ADVs shall properly perform its driving tasks under various scenarios in its ODD.

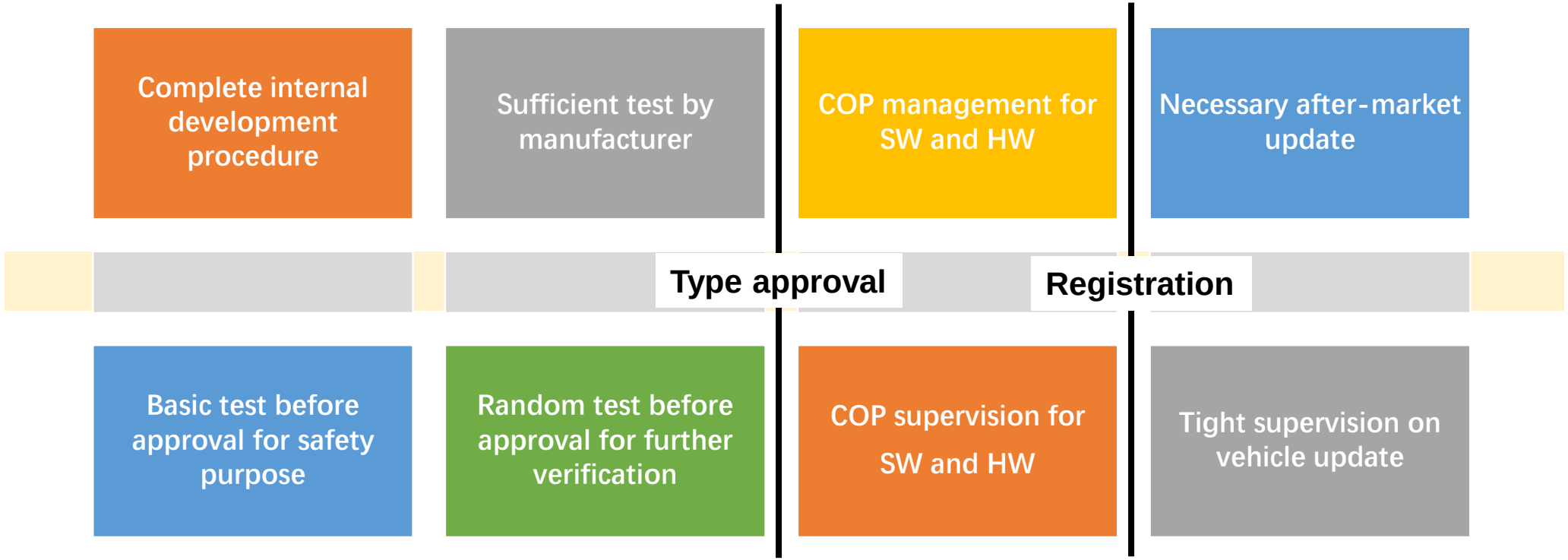
↓

ADVs' functions shall not be affected by minor changes of scenarios.

↓

ADVs' performance shall keep stable under certain Scenario Family.

Certification and administration of ICVs



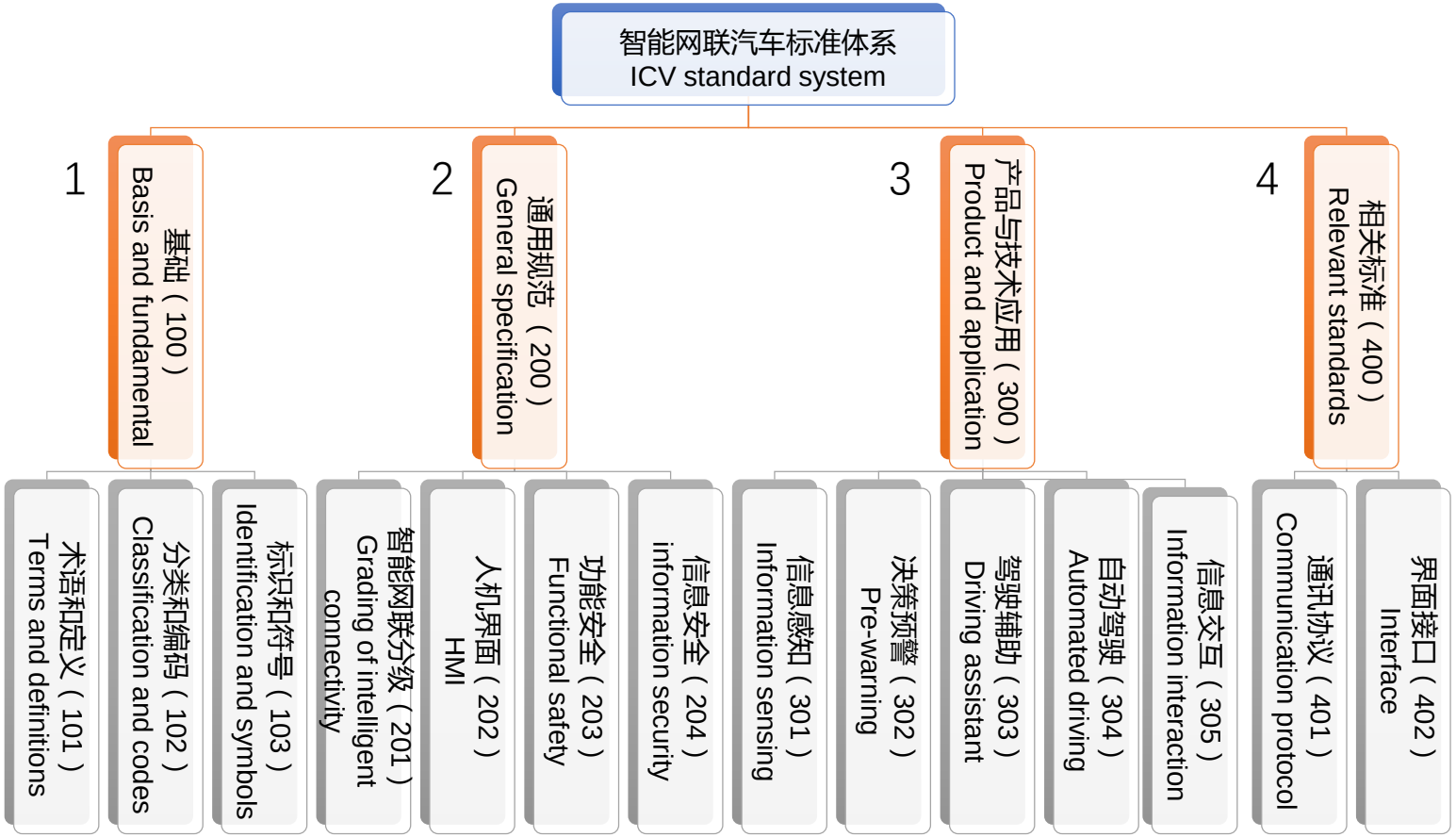
1. Evaluation based on scenarios with comprehensive tool consisting of simulation, track tests and real vehicles in actual situations
2. Life-span administration mechanism covering R&D, production, test, certification and usage.

1 Basics understandings about ICV and autonomous driving

2 Updates of ICV standards research and development in China

3 International harmonization and cooperation on ICV standards

Main contents of the ICV standards package

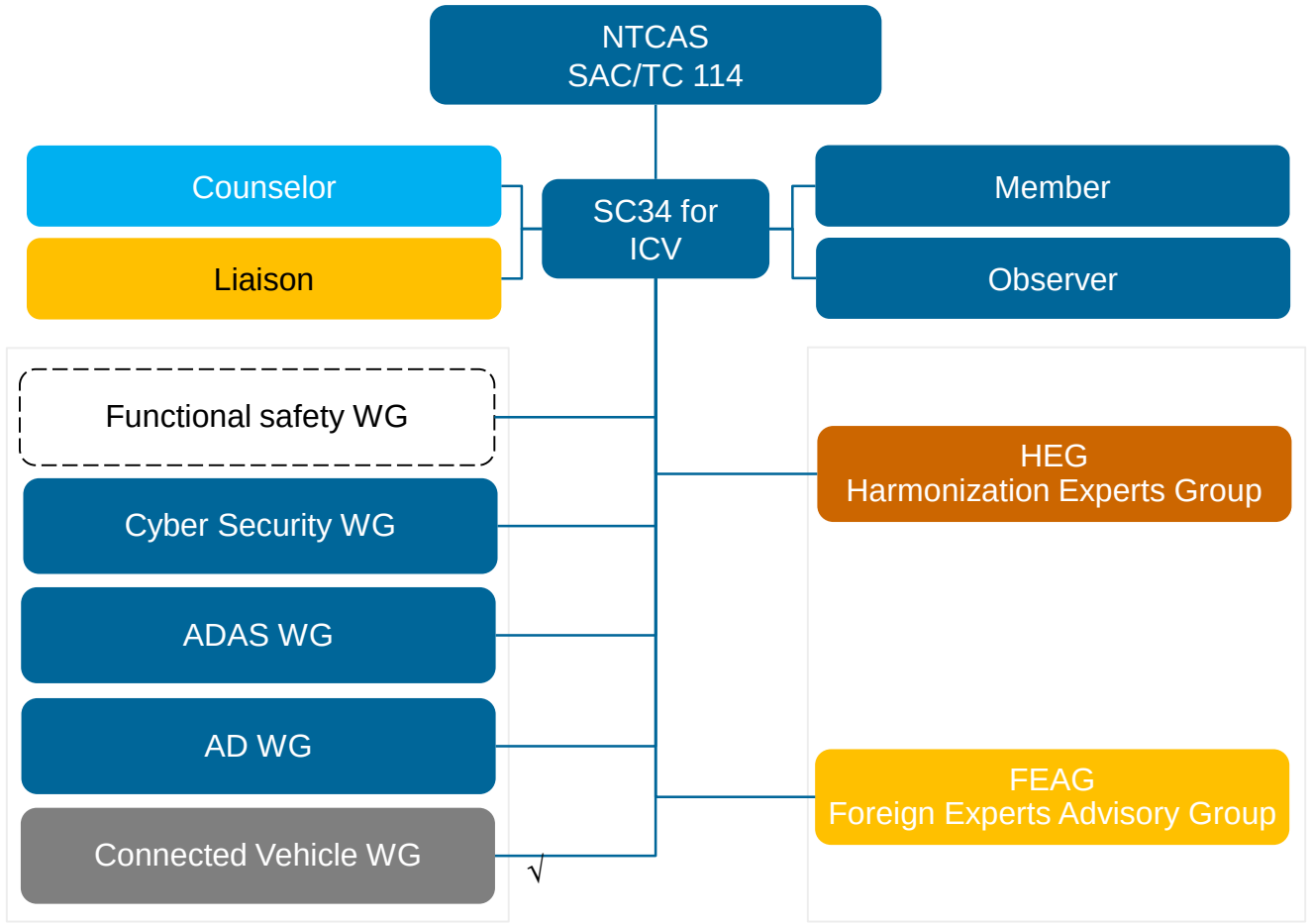


Issued jointly by MIIT and SAC in Dec. 2017

1. By 2020, set up a preliminary ICV standard system to support ADAS and low-level automated driving.
2. By 2025, set up a comprehensive ICVs standard system to support high-level autonomous driving.

TC114/SC 34 for ICV

SAC/TC 114/SC 34 :
Mainly covers the driving environment perception and early warning, driving assistance, automatic driving, and on-board information services directly related to car driving.



ICV Standards under development

ADAS

AEBS	Full speed cruise	Smart speed limiter
Blind spot detection	Around view monitor	Night vision
Rear crossing alert	Door opening alert	Driver attention monitoring
Lane keeping Assist	Emergency steering Assistant	TJA
Intelligent Parking Assist		

Autonomous driving

AD Classification	
AD on normal road	AD on express way
Platooning	

Functional Safety

Introduce FS into Annex to ADAS standards

Cyber security

General requirements	Risk assessment at vehicle level	Emergency response
Onboard communication devices	Gateway	OBD interface
Remote service for EV	Charging	OTA

Connectivity

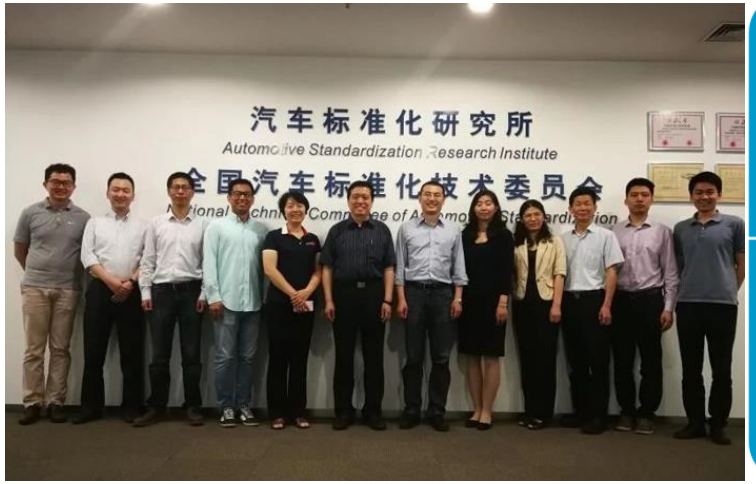
Ex-vehicle based on ISO 20077

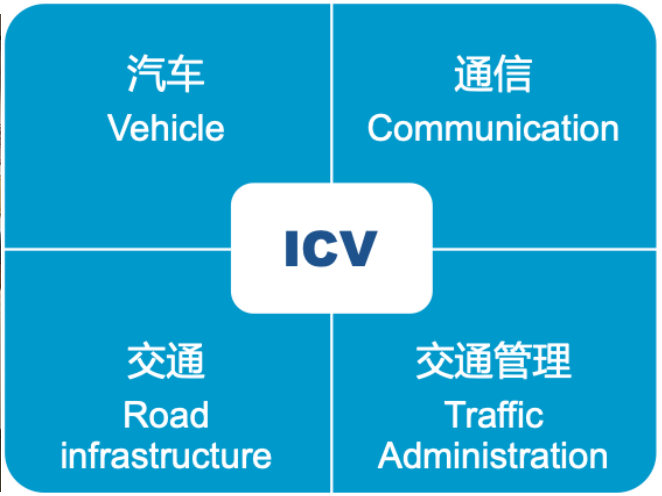
Requirements for LTE-V application

Researches relevant to ICV standards

1	ICV’s demands for communication and relevant standards
2	ICV’s demands for road infrastructures and relevant standards
3	Demands for Autonomous Driving maps and relevant standards
4	Demands for driverless logistic delivery vehicles standards
5	Evaluation method of sensor fusion technologies
6	Evaluation of ICVs’ effect in energy-saving
7	Investigation on consumer’s acceptance for ICVs

Cooperation among and cross-industry





NTCAS

GB QC

CAICV
China Industry Innovation Alliance for the Intelligent and Connected Vehicles

C-SAE

1 Basics understandings about ICV and autonomous driving

2 Updates of ICV standards research and development in China

3 International harmonization and cooperation on ICV standards

Participation into UN/WP29 activities

Active and positive participation into WP29 activities

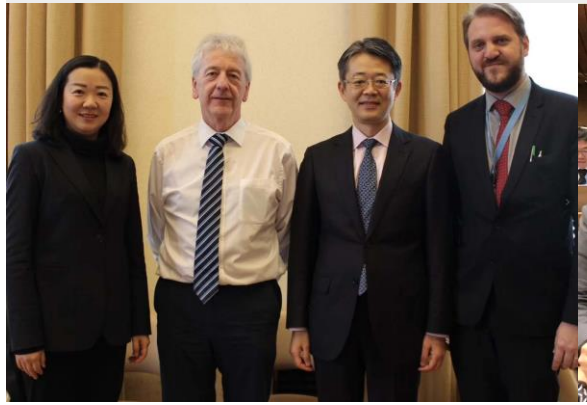
1. GRVA-01-32 - (China) China's comments on the structure, work program and meeting arrangement
2. GRVA-01-16 - (China) China's General Comments and Suggestions on Working Party on Automated/Autonomous and Connected Vehicles (GRVA)
3. GRVA-02-41 Informal Working Group on Functional Requirements for Automated and Autonomous Vehicles

Work together with other CPs to develop framework documents on ADVs

1. The development and harmonization of technical provisions and resolutions for ADVs shall ensure the **collective and equal participation of the contracting parties to 1958 agreement or 1998 agreement**.
2. The technical provisions and resolutions for ASVs shall be **technically neutral**.
3. The technical provisions and resolutions for ADVs shall be **based on current development of the industry**, but **avoid restriction on new technologies in the future** at the same time.

Host IWG meetings on automated/autonomous driving

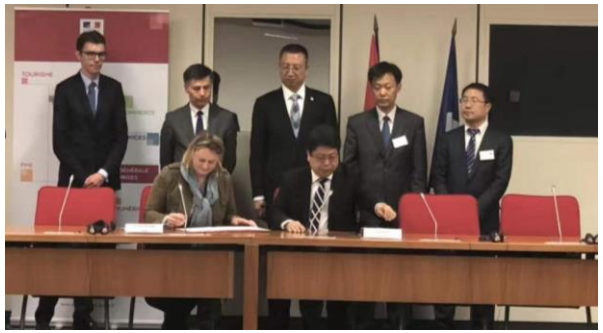
Chinese expert from MIIT elected as vice-chair of GRVA



Participation into ISO activities

International exchange and cooperation

- 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



Thanks for your attention!

www.catarc.org.cn