



中国汽车技术研究中心有限公司
China Automotive Technology and Research Center Co., Ltd.



Standards Guarantee the Safety of the Intelligent & Connected Vehicle (Connected & Autonomous Vehicle)



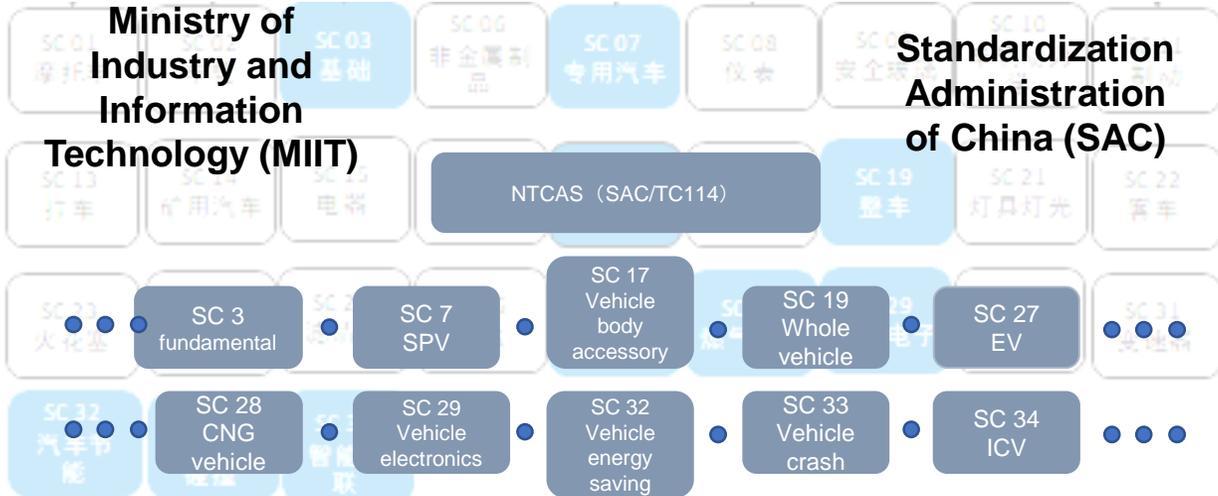
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Part One

Status and Trends of ICV Industry and Standards

CATARC is in charge of the centralized management of the national standardization and technical regulations of the national automotive industry.

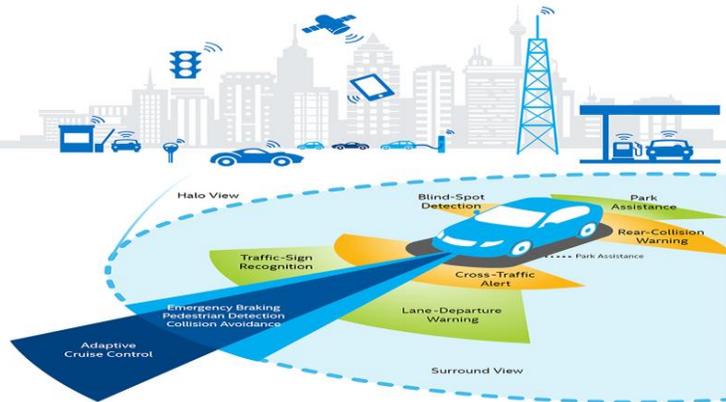


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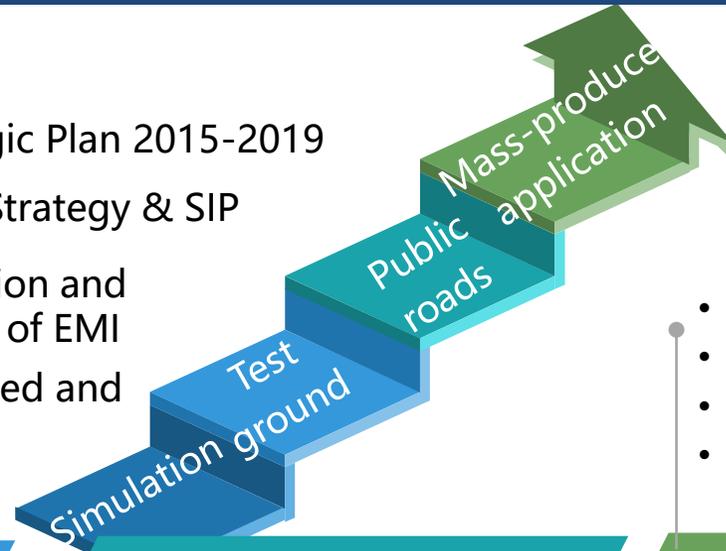
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CATARC plays the roles or conducts the work as below:

- 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
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- 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



- USDOT' s ITS Strategic Plan 2015-2019
- Japan Revitalization Strategy & SIP
- Plan for standardization and quality improvement of EMI
- Strategy for Automated and Connected Driving



- The development of ICV faces many challenges such as technical management, legal society and so on
- Production and cost
 - Function test and evaluation
 - Legal and regulatory standards
 - Ethical barriers in built-in logic

Industrial Cluster

Global Concern

Market Transition

Multiple Challenges

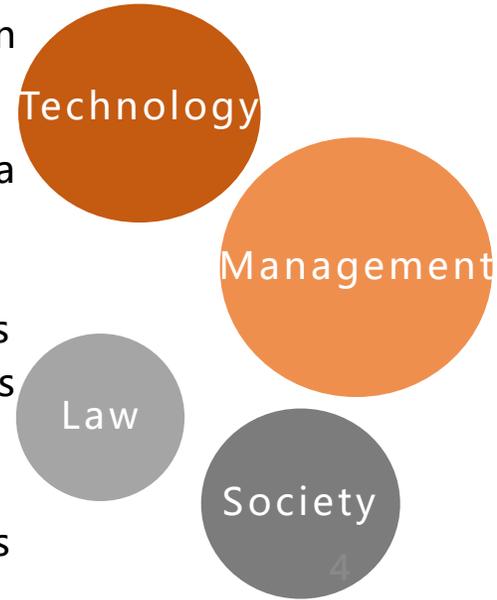
ICV is a new industrial cluster with multi-industry integration, innovation and development



- **Breakthrough:** ICV breaks boundary of cars with "man-cars-road-cloud"
- **Convergence:** cooperation between automobile, Internet, communication
- **Innovation:** intelligent, networked technology is widely applied
- **Development:** automobile industry enters a new era

ICV is in the key period of transition from laboratory to market

- Companies regard 2021-2022 as a key node of autonomous driving mass production
- Countries realize public road tests to meet the needs of autonomous driving
- Autonomous car traffic accidents will continue to become the focus of social attention





UN/WP29 established the GRVA WG for AD & Connected issues

UN/WP29 approved Framework document on automated/autonomous vehicles

Coordination on technical content in Cyber security and (Over-the-Air) Software updates

Coordination on Regulations for EDR and DSSAD

Focus on AD functional requirement and new evaluation and management methods



ADAG coordinated all AD related standards and proposals

PAS 21448 is available and a new IS is being developed for Sotif

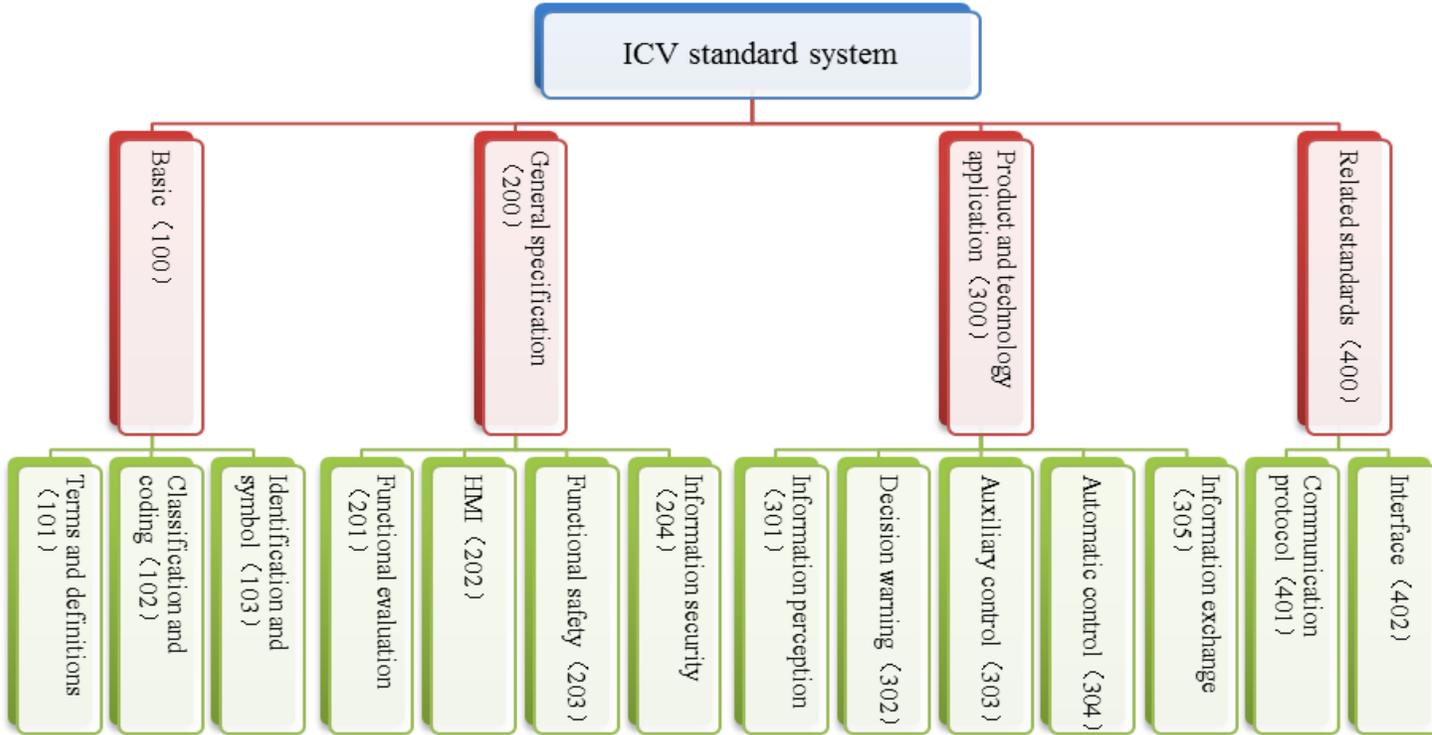
DIS stage of ISO 21434 for cyber Security Engineering achieved

New projects Ballot for 4 AD test scenarios standards finished

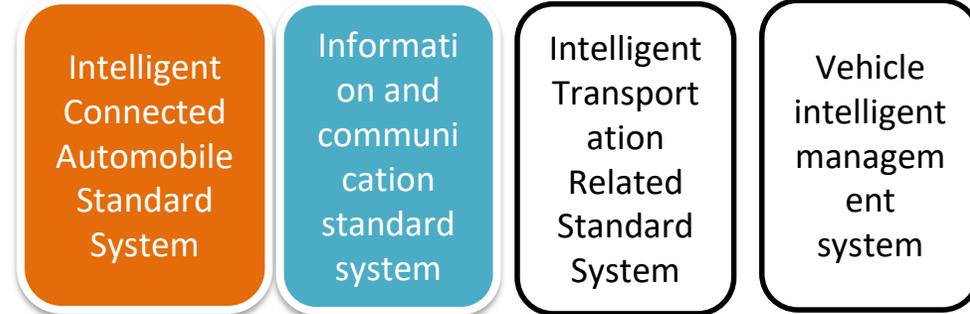
Data Fusion of different sensing sources standardization

Test object monitoring and control for active safety and ADV testing

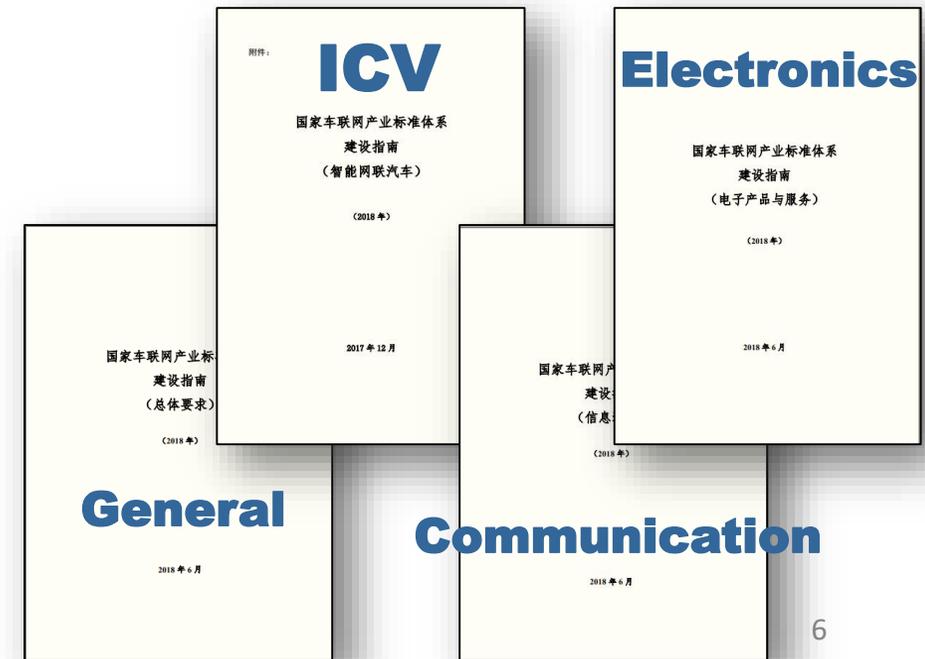
Human Performance and State in the Context of AD



Overall requirements



Electronic product and service standard system



2020 roughly establish the ICV standard system that can support the driver assistance and low - level automated/autonomous driving.

2025 establish an ICV standard system that can support high - level automated/autonomous driving.



Part Two

Four Key Points to Ensure Safety

● P1: Establish New Evaluation Method

- Methodology
- Test Scenarios
- Test procedures
- Tools
- Criteria
- Multi-pillar approach



P2: Provide Open Environment for Testing ●

- Grant open road for ADV test
- Test goals for ensure safety



Key
Points

● P3: Create New Management Scheme

- Manage the full life-span of the vehicle type
- Cooperation between industry and authority

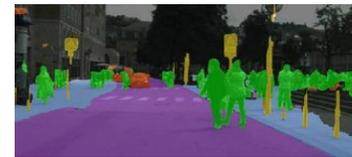


P4: Develop Safety Standards ●

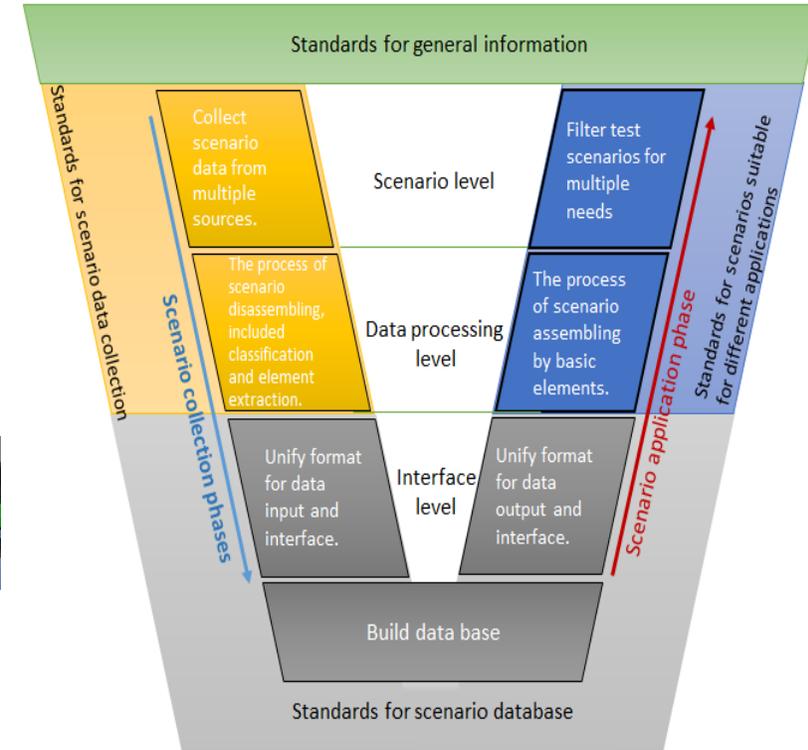
- Functional safety
- Cyber security
- ADAS basic function verification
- AD Functional requirement
- Connected function requirements



Newly develop comprehensive AD evaluation system based on scenarios where AD vehicle considered as a robot instead of an acting machinery controlled by a human.



AD Test Scenario



P1: Establish New Evaluation Method

Multi-pillar evaluation method is being discussed internationally

Public road test

- Overall impression of behavior
- Assess the ability of the system to respond to real-world traffic conditions
- "Driving license test"

Field test

- Match audit/assessment results to real vehicle behavior
- Evaluate system behavior through challenging scenarios
- Scene reproducibility

Audit and Assessment

- Review development process
- Assess safety concepts and measures taken
- Check the integration of general safety requirements and traffic rules
- Use simulation results
- Evaluation of development data / field testing, OEM self-declaration

Simulation

Public road license test

Autopilot function road test

Public road test

ADAS site testing

Autopilot test

field test

Simulation scenario library construction

Driving simulator

Decision layer test

Perceptual layer test

Simulation test: SIL and driving simulator DIL, HIL test

Consulting and certification, confirmation test

Penetration testing, virus database construction

Functional safety and cyber security testing and certification



Sweden

Completed the first draft of the "Automatic Driving Public Road Test Specification"

Denmark

Amend the Danish Road Traffic Act to allow autonomous vehicles to test on the road

Canada

Ontario announces permission to test on public roads

United States

33 states open autopilots, California and Arizona allow autopilots without drivers to travel on the road

United Kingdom

Proposed the Automatic and Electric Vehicles Act, focusing on insurance issues; legalization of driverless driving on public roads

France

The first draft of autopilot legislation will be finalized by the end of 2018

Germany

Automated Driving Test Act

Finland

Approved auto-driving buses to test on public roads

Netherlands

Open self-driving road test, allowing autopilot vehicles to be accompanied without a driver

Japan

Promulgated the "Autonomous Vehicle Road Test Guide" to allow autopilot car road test

Korea

The Korean Motor Vehicle Management Act was introduced to allow self-driving cars to test on urban roads.

China

22 cities introduced auto-driving road test policies and successively opened relevant road tests

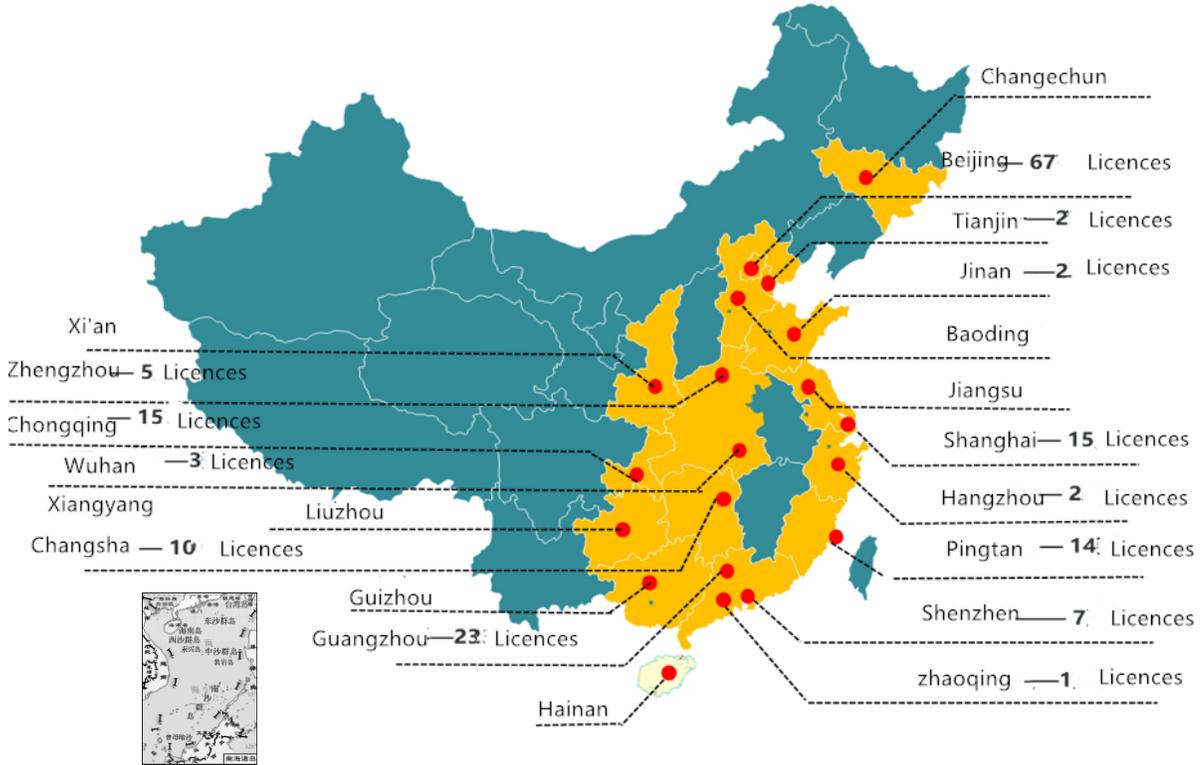
Australia

Is developing national laws and regulations for self-driving cars

Singapore

Passing the Road Traffic Act Amendment to allow autonomous vehicles to test on public roads

How to manage it?



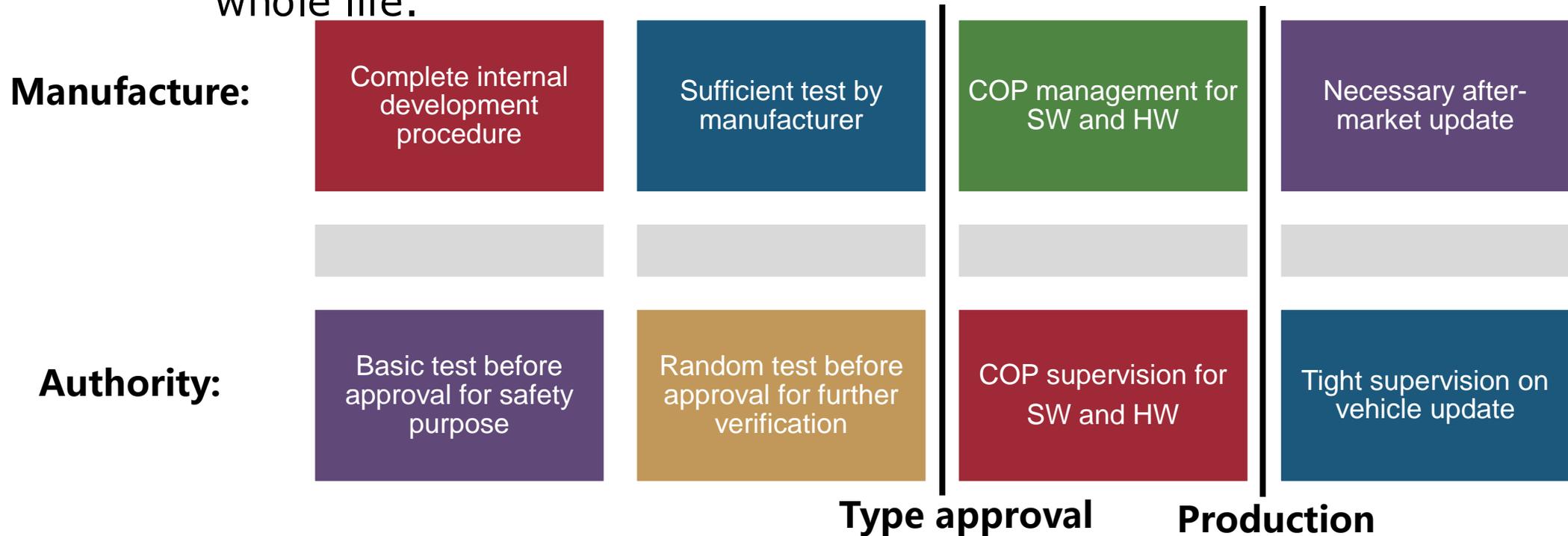
How to make assessment?

- 1. Safely**
 - AD maneuver shall comply with traffic safety rule
 - AD maneuver shall be with road traffic and without safety risks
- Timely**
 - AD maneuver shall be in 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.



Future administration on ADV shall cover the full life-span of the vehicle type based on the facts that ADV has the following key features.

1. ADV shall operate safely under various complicated scenarios.
2. Vehicle will be defined more by software than hardware.
3. Vehicle function and performance may be updated by OTA in the whole life.



ADAS-20

Parking assistance	FSRA	Intelligent Speed limit	TJA
BSD	around view monitor	Night Vision	ADAS Terms and definitions
RCTA	DOW	DMS	ESC
P-LKA	C-LKA	P-AES	C-AES
P-AEB	C-AEB	symbols for controls, indicators and tell-tales	warning signals priority level

Cyber security-11

CS General Requirement	Risk Assessment	Cyber Security Engineering	Vehicle test Method
T-Box	Gateway security	OBD security	Emergency Response
EV- Remote Service	EV-charging Security	OTA	

Automated Driving-7

Taxonomy of Driving Automation	Functional evaluation	DSSAD
AD General Function	ICV Terms and Definitions	
Platooning function	Urban driving functions	

Functional safety

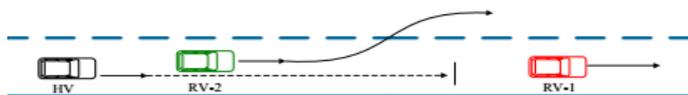
ADAS standards appendix

Connectivity application-3

ExVehicle-1	ExVehicle-2
LTE-V Application requirements	

41 National standards under development in China

1	ICV's demands for communication
2	Demands for HD maps and relevant standards
3	Demands for driverless logistic delivery vehicles standards and the standards system
4	Evaluation method of sensor fusion



ICV's demands for communication, Completion of the requirements for assist warning, executive control, and AD scenario communication.

Report on HD maps and relevant standards demand

5	Standardization demands of the information interaction function between the ICV and the mobile terminal
6	ICV's demands for Message Set Classification standards
7	ICV's demands for Test Equipment standards
8	Demands for Intelligent Parking Function standards system
9	Demands for MDC relevant standards
10	Research on Technical Requirements for Automobile (ECU) Cyber Security protection
11	Demands for Autonomous vehicle transition and HMI relevant Function standards
12	Demands for Autonomous vehicle on road testing standards
13	Demands for ADV simulation testing standards



Completed



On-going



New project



Part Three

Summary



Safety is of vital importance for AD

Safety is a key issue for evaluating the performance of automated driving vehicles, and countries all over the world are focusing on solving this problem.



China has actively addressed safety issues by standards development

China has done some work in the construction of policies, standards, regulations and researches for facilitating the development of ICV industries, mainly focus on the safety-related standards development.



Challenges are still existed

Challenges in front of us include: regulations, technology, social acceptance, moral concerns.



Cooperation of relevant industries pave the way to promote security

In a fusion and open attitude, we look forward to cooperating with relevant industries and countries.



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Thanks for your attention!



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