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**Automotive Functional Safety
and Safety Of The Intended
Functionality (SOTIF)
Research Report, 2024
Jan. 2024**

functional safety and SOTIF have caught more attention in the field of autonomous vehicles

As intelligent connected vehicles boom, the change in automotive EEA has been accelerated, and the risks caused by electronic and electrical failures have become ever higher. As a result, functional safety and SOTIF (safety of the intended functionality) have caught more attention, especially in the field of autonomous vehicles.

In 2023, standards and policies have speeded up the development of automotive functional safety and SOTIF in China. In addition to the latest functional safety standard GB_T 34590 2022 officially taking into effect on July 1, 2023, related Chinese departments also issued multiple policies concerning functional safety and SOTIF.

For example, in July 2023, the Ministry of Industry and Information Technology of China (MIIT) issued the "Guidelines for the Construction of National Internet of Vehicles Industry Standard System (Intelligent Connected Vehicles) (2023)", which clearly plans and guides the construction of standards for functional safety and SOTIF. In August 2023, the MIIT and other three departments jointly issued the Notice on the New Industry Standardization Pilot Project Implementation Plan (2023-2035), of which the Intelligent Connection Technologies in the New Energy Vehicle Industry stipulates the terms and definition of intelligent connected vehicles, functional safety and SOTIF processes, audits and evaluations, automotive cyber security, data security, software upgrades and other product and technology application standards.

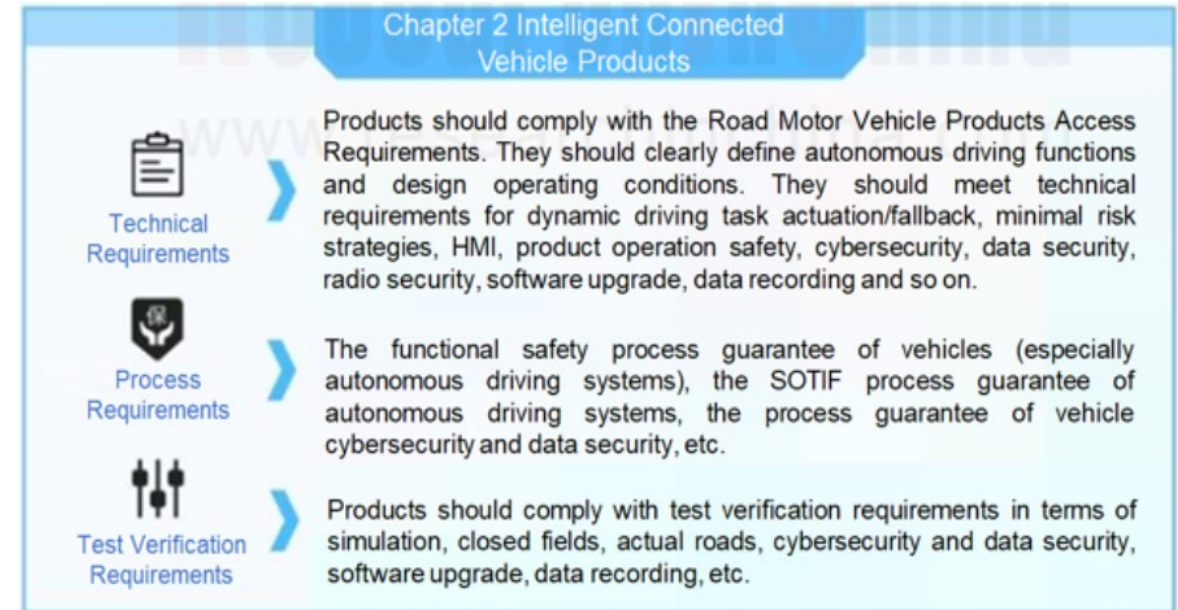
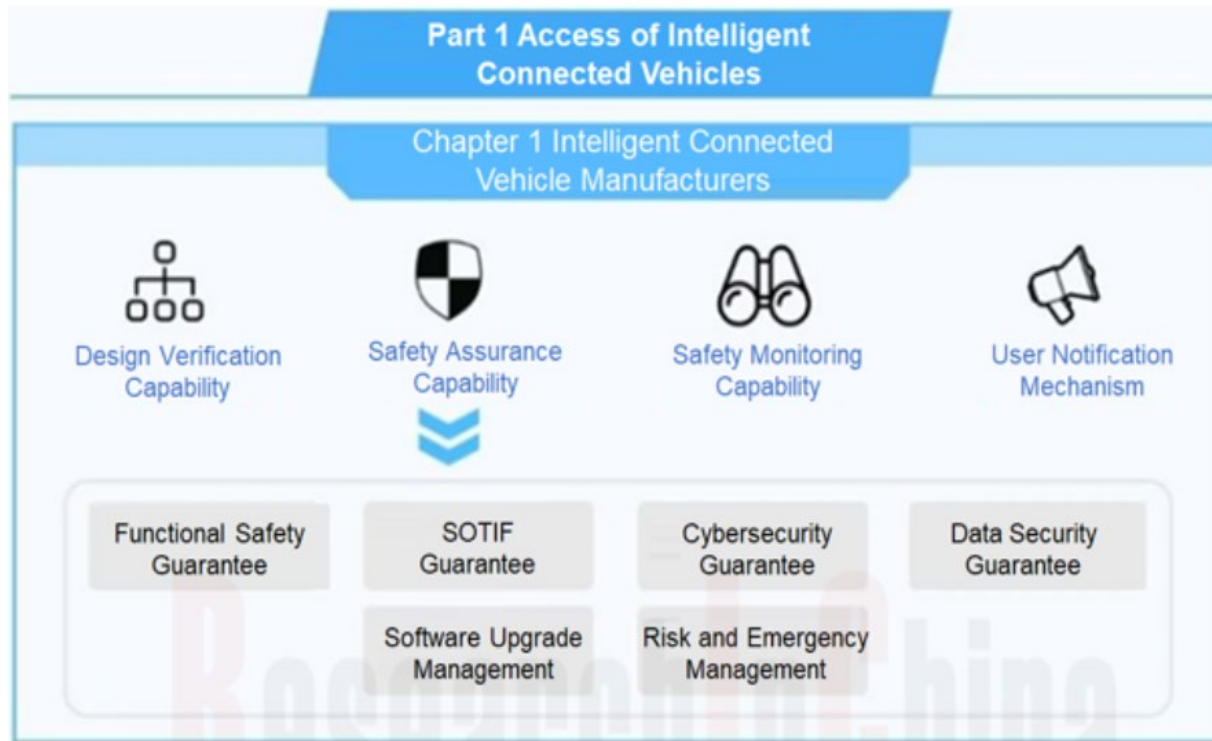
On November 17, 2023, the MIIT, the Ministry of Public Security, the Ministry of Housing and Urban-Rural Development and the Ministry of Transport jointly issued the Notice on the Pilot Program for Access and On-road Passage of Intelligent Connected Vehicles, which officially suggests access specifications for L3/L4 autonomous driving and clarifies the responsibilities in high-level intelligent driving accidents for the first time, and simultaneously started the selection of the first batch of enterprises.

The Notice specifies the requirements for the access of automotive enterprises and vehicles, especially for their safety guarantee capabilities. Enterprises are required to have the ability to guarantee functional safety, SOTIF, cybersecurity, data security, software upgrade management, and risk and emergency management.

The requirements for process guarantee of intelligent connected vehicle products include the functional safety process guarantee of vehicles (especially autonomous driving systems), the SOTIF process guarantee of autonomous driving systems, and the process guarantee of vehicle cybersecurity and data security.

Therefore functional safety and SOTIF have become the access requirements for L3 autonomous vehicles in China, and the introduction of functional safety and SOTIF standard processes into L3 and higher-level autonomous systems has become the layout focus of OEMs and suppliers.

Requirements for Intelligent Connected Vehicle Access in the Implementation Guide for the Pilot Program for Access and On-road Passage of Intelligent Connected Vehicles (Trial)



Source: Ministry of Industry and Information Technology of China

OEMs and suppliers greatly increase automotive functional safety processes and product certifications, and embark on the layout of SOTIF process certification.

Although ISO 26262 is not a global mandatory standard, it has been widely accepted in the automotive industry and has become the threshold for automotive supply chain players. OEMs and Tier 1 suppliers will have to reject products or vendors that are not ISO 26262-certified. As intelligent vehicles develop, both autonomous driving companies and OEMs attach ever more importance to functional safety and SOTIF.

In recent years, both international mainstream OEMs and Chinese automakers have paid more attention to and invested more heavily in functional safety and SOTIF. In particular, Chinese independent automakers such as Great Wall Motor, SAIC, Geely, GAC, Changan and BYD have all raised the requirements for functional safety development of important systems. Besides setting up functional safety teams, they actively participate in functional safety training, cooperate with third-party institutions, strictly control self-developed products and vehicle functional safety products and processes, and take suppliers' functional safety development capabilities and product functional safety capabilities as the criteria to enter their supply chains.

OEMs or suppliers put ever more emphasis on functional safety certification. According to public statistics, from January to November 2023, Chinese companies passed 114 functional safety certifications, including 41 product certifications and 73 process certifications, far more than in 2022 (about 40).

In addition to functional safety certification, the official implementation of SOTIF standards has spurred many OEMs and suppliers such as Great Wall Motor, FAW Hongqi, Changan Automobile, GAC, Horizon Robotics, Jingwei Hirain, Huawei, Desay SV and SenseAuto to deploy SOTIF processes. They have passed SOTIF process certifications in advance, laying a safety foundation for the further layout of autonomous driving systems.

Enterprises with SOTIF Process Certification, as of Dec. 2023

Enterprise	Release Time	Certification Agency	SOTIF Process Certification
Great Wall Motor	Aug. 2022	UL Solutions	UL Solutions issued its world's first ISO 21448 SOTIF Certificate for Road Vehicles to Great Wall.
FAW Hongqi	Sept. 2022	CAQC	CAQC issued ISO 21448 SOTIF Management Process Certificate to China FAW Group Corp., Ltd.
GAC R&D Center	Nov. 2022	TÜV Rheinland	ISO 21448 SOTIF Management System Certificate
Changan Automobile	Feb. 2023	CAQC	CAQC issued two certificates to Changan Automobile: ASIL-D Functional Safety Process Certificate and SOTIF Process Certificate.
Horizon Robotics	Apr. 2023	UL Solutions	UL Solutions issued ISO 21448 SOTIF Standard Process System Certificate for Road Vehicles to Beijing Horizon Robotics.
Jingwei Hirain	Apr. 2023	DEKRA	DEKRA issued ISO 21448:2022 SOTIF Process System Certificate for Road Vehicles to Jingwei Hirain.
SenseAuto	Nov. 2023	DEKRA	SenseAuto obtained ISO 21448 SOTIF Management System Certificate, and keeps building an intelligent vehicle functional safety system.
Huawei	Nov. 2023	SGS-TÜV	SGS issued ISO 21448:2022 SOTIF Process Certificate to Huawei Intelligent Automotive Solution (IAS) Business Unit (BU), which is also the first SOTIF process certificate SGS issues in the world.
Desay SV	Dec. 2023	UL Solutions	UL Solutions issued ISO 21448 SOTIF Process Certificate for Intelligent Vehicle Solutions to Desay SV.

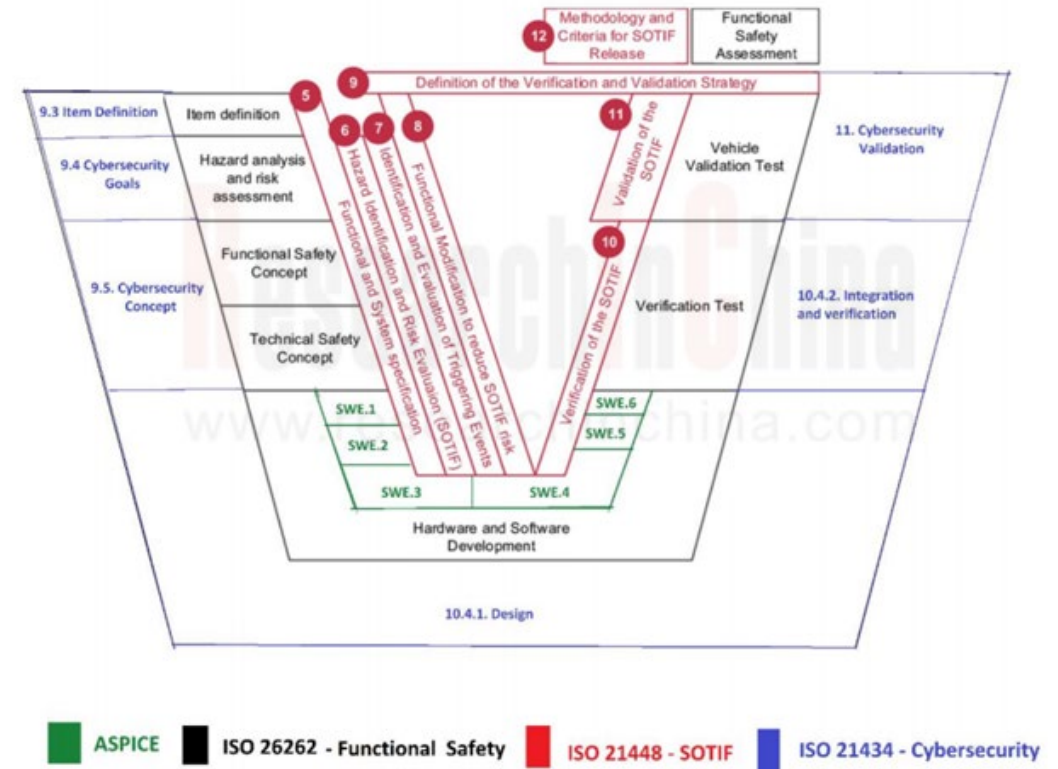
Source: ResearchInChina

Functional safety, SOTIF, cybersecurity, etc. tends to be developed in from an independent way to an integrated way

In addition to functional safety, the development of vehicles will have to face other safety challenges in the future, such as SOTIF and cybersecurity. Functional safety and SOTIF focus on system design and verification to ensure that the system can work safely in all situations. Cybersecurity centers on external threats and attacks. In practical application, functional safety, SOTIF and cybersecurity often cross over. In the future, intelligent connected vehicles should solve all the risks related to vehicle safety before they can be delivered in large quantities. The integrated development of the three safety systems has become a major development trend of vehicle safety in the future. Multiple companies like KOSTAL, Neta, Baolong Technology and Pan-Asia Technical Automotive Center are exploring integrated development of safety.

As vehicles carry more complex embedded electronic systems, the risks incurred by software system damage and random hardware damage are increasing. Integrating the ISO 26262 functional safety standard into the Automotive Software Process Improvement and Capability dEtermination (ASPICE) to guide automotive software development will greatly improve automotive system software development quality, development efficiency and product safety.

Integrated Development Process of Functional Safety, SOTIF, Cybersecurity and ASPICE



Source: ISO

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