NexVantage

Discussion on Intelligent Driving Insurance Scheme of New Energy Vehicles (NEVs) :

Auto Enterprise Cases & Insurance Perspective

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Self Introduction

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Graduated from China Europe International Business School (Shanghai) with an MBA in Finance, and from Cass Business School (London) with an MSc in Actuarial Management.

Asia-Pacific Insurance Expert with 15+ years of focus on the automotive and property insurance ecosystem

Starting as an Auto Insurance Pricing Actuary at China Pacific Property & Casualty insurance (Shanghai), She has accumulated extensive experience across key roles including:

- Catastrophe Model Analyst, Reinsurance Actuarial Pricing at Guy Carpenter Reinsurance Brokers (Singapore)
- APAC Underwriting Technical Director at AXA Partners (Singapore)
- Head of Auto Line Underwriting & Actuarial Pricing at AXA International Re (Shanghai)

She has deep expertise in designing (re) insurancere solutions for the automotive insurance ecosystem, supporting numerous leading insurers in the development and design of auto-related insurance products.

2025, She founded NEXvantage Actuarial & Advisory Pte Ltd. (Singapore) , specializing in providing end-to-end localized insurance/reinsurance support for Chinese automotive enterprises expanding overseas—covering everything from strategic planning to 0-1 implementation.

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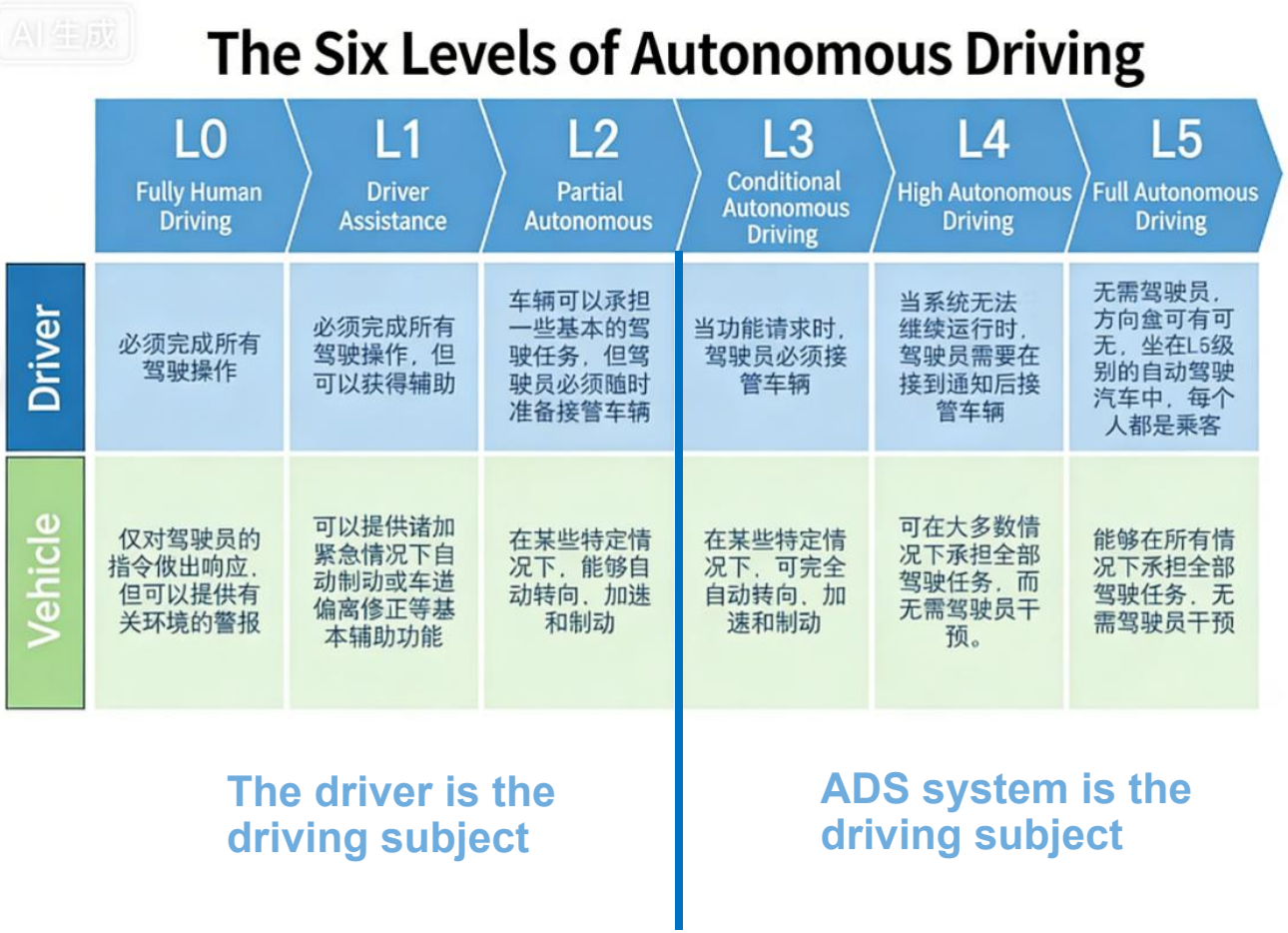
The Core Logic: Technological Evolution → Risk Transformation → Insurance Innovation → Reinsurance Value

01

Technological Evolution and Market Trends of Intelligent Driving

Six Levels of Autonomous Driving

The transformation of the driving subject is the core difference between assisted driving and autonomous driving.



The driver is the driving subject

ADS system is the driving subject

- **Advanced Driver Assistance Systems (ADAS) (Advanced Driver Assistance Systems）**
  - Level 0: Full Human Driving , limited ODD*
  - Level 1: Driver assistance, limited ODD
  - Level 2: Partial Autonomous with Limited ODD
- **Autonomous Driving System-ADS (Automated Driving Systems)**
  - Level 3: Conditional Autonomous , Limited ODD
  - Level 4: Highly Autonomous Driving, Limited ODD
  - Level 5: Fully Autonomous Driving, Unlimited ODD

***ODD (Operational Design Domain) is the core safety boundary definition for autonomous driving systems, which defines the the range of conditions under which the system can operate safely.**

Data source: Society of Automotive Engineers (SAE), National Highway Traffic Safety Administration (NHTSA)

Intelligent Driving Technology Path- Divergence of Sensor (Hardware) Technology Path

Perception Solutions for Intelligent Driving: A Trade-off Between Cost and Safety

- **Pure Vision (Camera-Centric) VS Sensor Fusion**
- Sensor fusion performs excellently in extreme scenarios (mainstream in China).
- The cost advantage and market popularization of the camera-centric solution are attractive (Tesla).

Pure Visual Solution

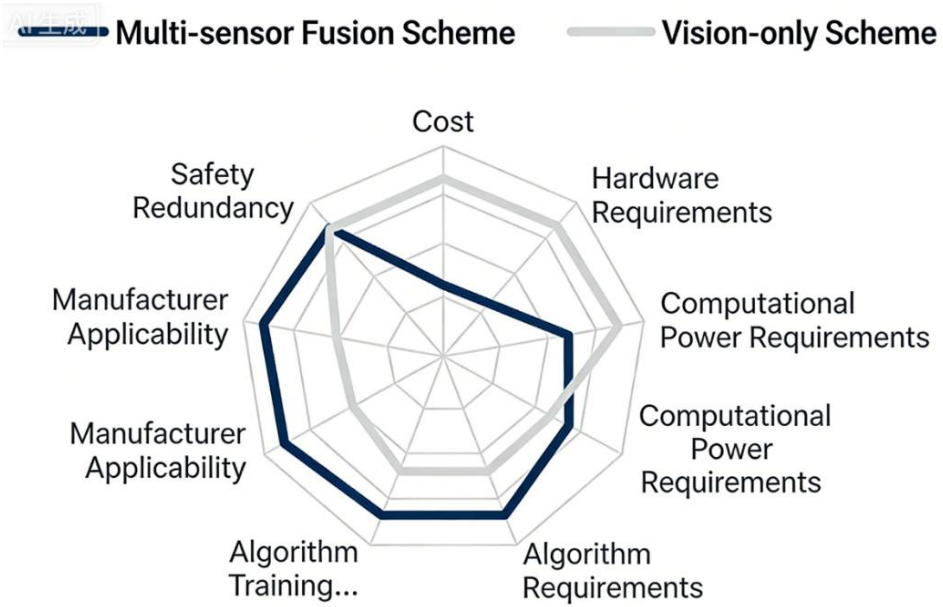
Fully rely on cameras and AI algorithms for perception and decision-making

- **Representative:** Tesla
- **Advantages:** low cost; high recognition accuracy under ideal lighting conditions.
- **Disadvantages:** Image quality degrades in environments such as rain, fog, strong sunlight, or at night, which affects the systems recognition capability.

multi-sensor fusion

Combine multiple sensors e.g. cameras, LiDAR, & millimeter-wave radar

- **Representative:** Baidu Apollo
- **Advantages:** Strong environmental adaptability and high system redundancy.
- **Disadvantages:** High hardware cost, complex system structure, and large demand for computing resources.



Source: Guoyuan Securities Research Institute

Intelligent Driving Technology Path-Algorithm (Software) Technology Revolution to Rise of End-to-End (E2E) Architecture

Technological upgrade of perception and decision-making systems from Modular to End-to-End (E2E)

Tesla FSD V13

Camera-Centric + Integrated E2E

- FSD v13 features an integrated E2E architecture, with code refactoring that doubles decision-making speed.
- It supports direct parking lot activation and pure vision-based reverse parking functions.

Hardware Iteration from HW3.0 to HW4.0

指标	HW3.0	HW4.0
Imaging	2D	3D
Cameras/Pixels	9/1.2MP	12/5MP
Maximum Detection Range	250m	424m
Chip Computing Power	144TOPS	720TOPS

Huawei ADS 3.0

Lidar/Visual Fusion Solution + Modular E2E

- ADS 3.0 implements GOD neural network in a modular end-to-end manner.

Evolution of Huawei ADS Versions for Assisted Driving

Version	Huawei ADS 1.0	Huawei ADS 2.0	Huawei ADS 3.0
Hardware Configuration	Finafiiguration Customization	Finalization for Native Hardware	Lidar Upgrade Again
Sensor Configuration	3L-6R-13V	1L-3R-11V	1L-3R-11V
Algorithm Model	BEV	BEV+GOD	GOD Large Network

Source: Guoyuan Securities Research Institute

Xpeng X Brian

Pure Visual + Modular End-to-End

- It consists of three components: the perception large model XNet, the regulation and control large model XPlanner, and the regulation and control large model XBrain.

XPeng XPNG Modular End-to-End Architecture

Perception Large Model	XNet 1.8 football fields, 50+ objects recognized instantly
Large Language Model	XBrain Map inference, waiting area, tidal lane, road sign text
Planning Large XPlanner	Veteran driver's approach, achieving driver-interpretable anthropomorphism

The Technology Path of Intelligent Driving Shows a "Spiral Ascension"

Final Technical Path: the optimal solution for balancing the "cost-performance-safety" Triangle in specific scenarios

Hardware Technology Level-Sensors

Sensors are the eyes and ears

- Provide the physical foundation for environment perception and determines the lower limit of system performance.
- Sensor fusion school (Baidu Apollo) uses hardware redundancy to support algorithms.

Software Technology Level-Algorithm Structure

Algorithmic structure is the "brain"

- Realize the qualitative change of cognitive decision-making and determine the upper limit of performance.
- Camera-centric school (Tesla) makes up for hardware shortcomings with algorithms.

The Essence of the Relationship between Hardware and Software

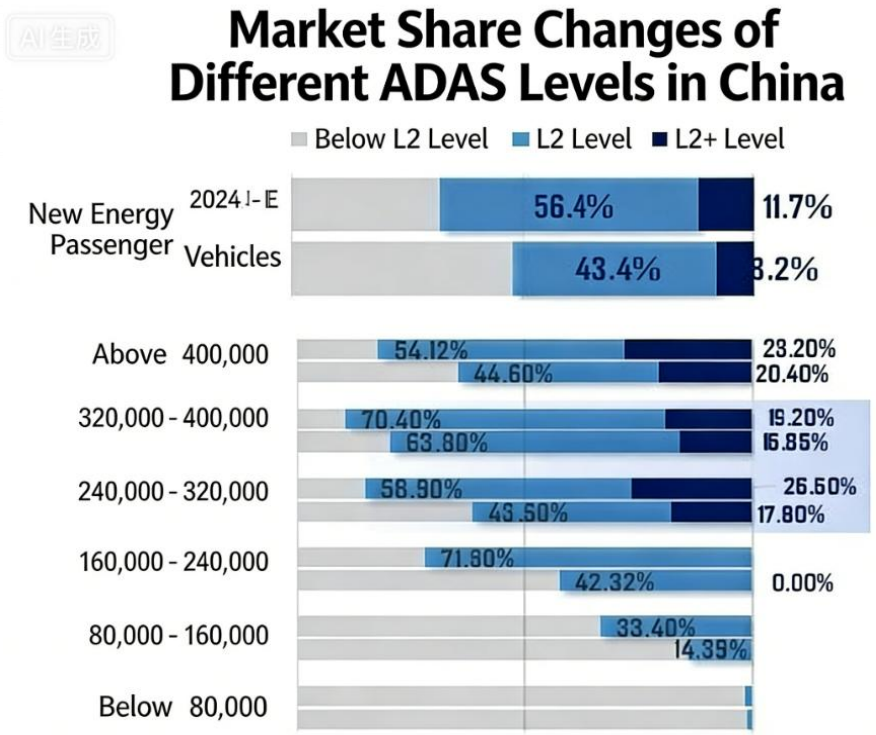
Hardware fuels algorithms, while algorithms create value for hardware.

- Without sensor data acquisition, the end-to-end system is like water without a source.
- Without a significant end-to-end efficiency improvement, multi-sensor solutions will remain at the L3 level due to cost constraints.

Market Trend: Intelligence has become the core decision of car purchase

Policy Pilot Accelerates L3 Commercialization

The penetration rate of new energy passenger vehicles (NEV) at L2 level or above has reached 67.8% @ 2025 June



The policy of vehicle-road-cloud integration provides a global view for intelligent driving vehicles

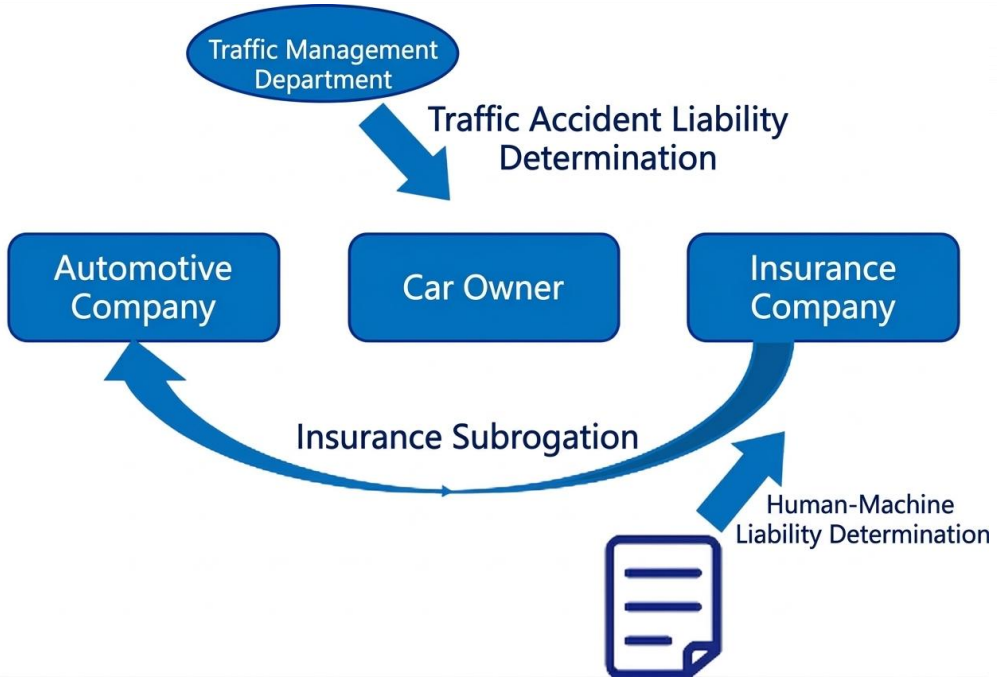
Time	Department	Policy	Main Content
July 2023	Ministry of Industry and Information Technology, Standardization Administration of China	National Guidelines for the Construction of the Industrial Standard Internet of Vehicles (Intelligent Connected Vehicles) (2023 Edition)	Construction stages and objectives: By 2025 in the first stage, a standard system for intelligent connected vehicles that can support assisted driving will be systematically formed; by 2030 in the second stage, a standard system for intelligent connected vehicles that can support the coordinated development of single-vehicle intelligence and network-enabled empowerment will be fully formed
November 2023	Ministry of Industry and Information Technology, Ministry of Public Security and other four ministries	Notice on Carrying out Pilot Work on the Access and Road Traffic of Intelligent Connected Vehicles	It is planned to carry out pilot work on the "vehicle-road-cloud integration" application of intelligent connected vehicles from 2024 to 2026, promote the connection of functions of autonomous driving technology, vehicle-road coordination, cloud, and network
January 2024	Ministry of Industry and Information Technology, Ministry of Public Security and other five departments	Notice on Carrying out Pilot Work on the "Vehicle-Road-Cloud Integration" Application of Intelligent Connected Vehicles	China has initially determined a consortium composed of 9 automobile production enterprises and 9 user entities, which carried out multi-scenario application projects on the access and road traffic and the access and road traffic of intelligent connected vehicles in 7 cities including Beijing, Shanghai, and Guangzhou
July 2024	Ministry of Industry and Information Technology, Ministry of Public Security and other five departments	List of Pilot Cities for the "Vehicle-Road-Cloud Integration of Intelligent Connected Vehicles	China will carry out pilot projects on the "vehicle-road-cloud integration" application of intelligent connected vehicles in 20 cities (consortiums) including, Shanghai, Chongqing, Nanjing, Suzhou, and Wuxi

Data source: KERUI data, Frost & Sullivan, and a white paper on intelligent connected vehicles by a reinsurance company

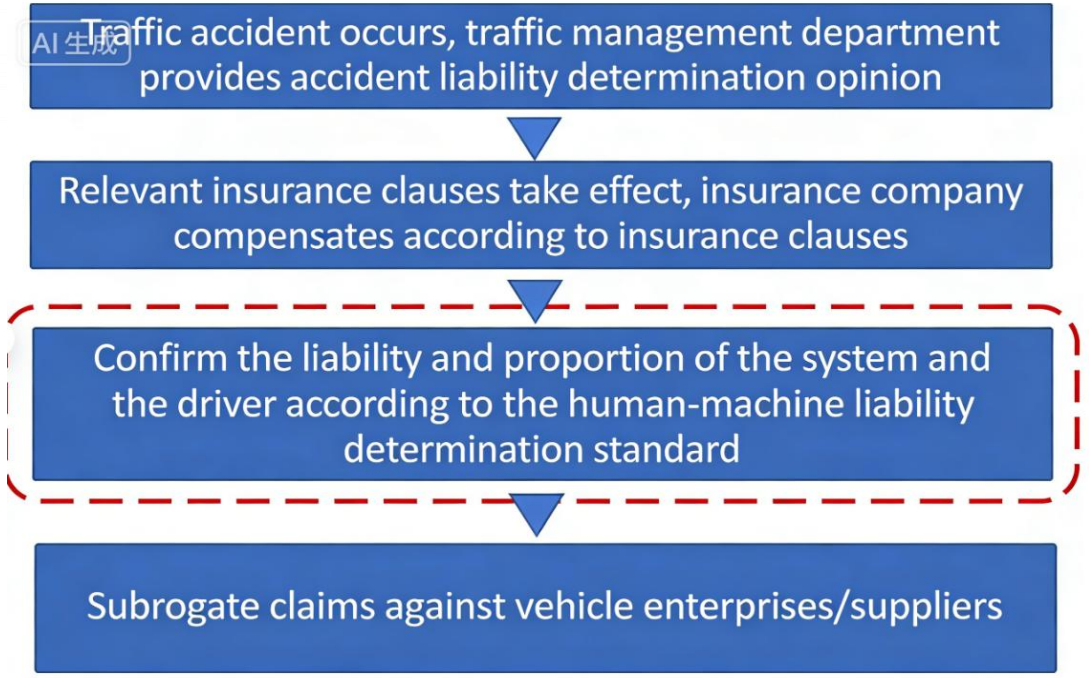
In the autonomous driving mode, the insurance compensation for automobile traffic accident liability will undergo tremendous changes

L3 Autonomous Driving Liability Transfer Critical Point – The Necessity of the Intervention of Third-Party Liability Determination Institutions

Technical Specification for Insurance Compensation Determination of Traffic Accidents Involving Intelligent Connected Vehicles



The general process of traffic accident insurance compensation for intelligent connected vehicles



Source: China Automotive Engineering Research Institute-Introduction to the Standard "Technical Specification for Determination of Insurance Compensation in Intelligent Connected Vehicle Traffic Accidents"

02

Risk Restructuring of Auto Insurance by Intelligent Driving

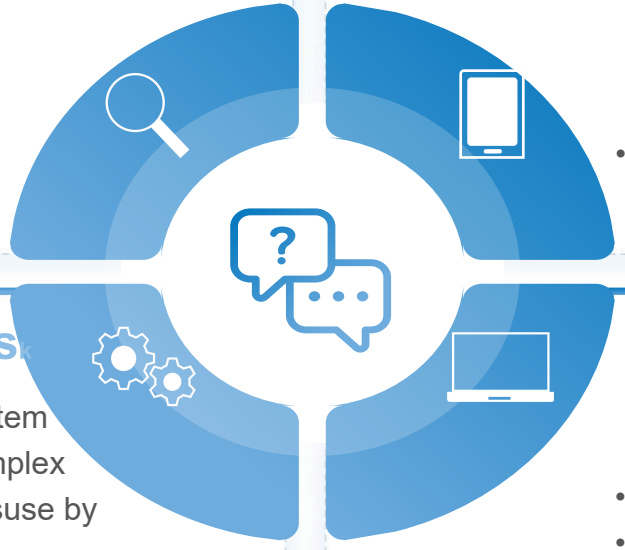
Four-dimensional Matrix of Intelligent Driving Risk: Blind Spots Not Covered by Traditional Auto Insurance

Functional Safety Risk

- Unreasonable risks caused by vehicle electronic and electrical failures, which are the risks of system failure due to imperfect safety functions of on-board hardware and software.
- For example, a failed chip may cause the system to crash.

Cyber Security Risk

- Including vehicle networking communication security, vehicle networking mobile terminal security, and vehicle networking service platform security.
- Example: Hackers remotely unlock vehicles through vulnerabilities in on-board 4G modules.



Expected Functional Safety Risk

- Risks arising from the limitations of driving system algorithms, insufficient system functions in complex environments, and reasonably foreseeable misuse by drivers.
- Example: False triggering of AEB (Automatic Emergency Braking) by visual algorithms under low visibility.

Data Security Risk

- The privacy, integrity and reliability of data.
- Example: Leakage of sensitive driving behavior data.

Source: A white paper on intelligent connected vehicles by a reinsurance company

Transfer of Risk Subject of Intelligent Driving: From " Human Liability " to "System Liability "

Bringing subversive changes to the three core elements of auto insurance actuarial science (frequency, severity, liability).

Evaluation of System Security (Risk Identification Capability)

- Sensor Capability
- Algorithm Reliability
- AEB Success Rate
- ...

New Risk Factor
Judgment Capability

Support Insurance Actuarial Model Iteration

Liability Definition and Guarantee (Product Design Capability)

Starting from L3, the liability transitions from the driver to the manufacturer

The current stage is a human-machine shared liability stage, and the difficulty of liability definition is high

Source: Internal data of an insurance company

03

Analysis of Automaker’s Insurance Innovation Solutions

Many domestic automakers have deployed insurance products related to intelligent assisted driving.

Automakers believe that intelligent driving insurance is a prerequisite for the future commercialization of L3 autonomous driving.

Jiyue （极越） Automobile

Smart Driving Protection

Seres(赛力斯） Automobile

Smart Driving Worry-Free Service Benefits

Xpeng （小鹏） Automobile

Intelligent assisted driving safety service

Xiaomi （小米） Automobile

ADSS (Advanced Driver Assistance System)

GreatWall （长城） Automobile

Smart Driving Protection Premium Service Package

Overview of Assisted Driving Insurance Product Solutions of Major Automakers

The scope of protection is gradually expanding, with the upgrade of the intelligent driving protection system from "risk underpinning" to "joint liability"。

Automobile Manufacturers	Underlying Risk	Core Guarantee	Coverage Scenario	Innovation Highlights
Jiyue	motor vehicle expense indemnity insurance	• Minor accident compensation (1,300 yuan per incident) • Paint repair (1200 yuan)	High-speed, city, and parking scenarios	Industrys first dedicated driver assistance protection
Seres	artificial intelligence system liability insurance	• Up to 5 million in compensation (personal injury + property)	8 major scenarios including intelligent parking and navigation assistance	Industrys first assisted driving liability insurance
Xiaopeng	addition clause of third party liability insurance/ vehicle damage insurance	• Property damage (1 million per accident) • Personal injury compensation (200,000 per seat)	NGP/LCC/APA* and other driving and parking functions	Industrys first NGP* exit still guaranteed within 5 seconds
Xiao Mi	product liability insurance	• Personal injury and third-party liability share the maximum compensation of 3 million yuan	Intelligent driving/parking	Combining in-house developed end-to-end large models with third-party accountability mechanisms
Great Wall	product liability insurance	• 500,000 yuan per vehicle • Third-party liability: 5 million per vehicle	Intelligent Driving and Parking	T-3 Second Intelligent Driving Activation Status Determination
BYD	**zero insurance intervention Direct sales**	• repair cost of vehicle • third party property damage and personal injury	The Divine Eye A/B/C System model was involved in an accident during an intelligent parking scenario.	Does not trigger commercial auto insurance procedures and does not affect the NCD coefficient of auto insurance

Source: industry public information

*NGP stands for Navigation Guided Pilot, a navigation-assisted driving system.
LCC is the abbreviation for Lane Centering Control, a lane-centering assist system.
*APA is the abbreviation for Auto Parking Assist, which is an automatic parking assistance system.

Analysis of the Iteration and Upgrading of Intelligent Driving Insurance Product Solutions of Major Automakers

Improve users' confidence in using intelligent driving systems and increase the activation rate of users' intelligent driving systems.

1. Expansion of Protection Scope

- **From small property damage**
  - ✓ For instance, Jiyues lacquer repair service provides fixed-amount compensation.
- **Expanded to personal injury and death + major property damage**
  - ✓ For example, Seres – up to 5 million (personal injury + property damage)
- **Matching autonomous driving risk level L3 or above**

2. Refinement of Liability Definition

- **Stage 1.0 : Car Manufacturers Lead the Judgment**
  - ✓ For example, Ji Yues system automatically identifies non-human intervention through backend data analysis, covering only minor property losses.
- **Stage 2.0: Introducing a third party**
  - ✓ For example, Xiaomi partnered with the National Innovation Center to establish technical standards.
- **Distinguishing Human and Machine Liability, with Reference to Technical Specification for Determination of Compensation in Intelligent Connected Vehicle Traffic Accident Insurance**

3. Business Model Innovation

- **Extension from B-end to C-end: Initially insured by automakers → directly subscribed by users**
  - ✓ For example, the Jiyue B2B insurance policy is purchased by automakers at zero cost to users.
  - ✓ For example, Xiaopengs C-end subscription model requires users to pay an annual fee of 239 yuan.

Source: industry public information

04

Collaborative Value of Insurance and Reinsurance

Insurance/Reinsurance: From Risk Takers to Ecological Builders

Jointly build liability standards for L3 and above autonomous driving and break data silos

01

- **Risk Modeling**
  - An insurance company explores the introduction of assisted driving into auto insurance pricing
  - A reinsurance company launches a three-tier pricing model of "Mechanism-Dynamic-Insurance"

02

- **Data integration**
  - Cross-automaker/insurance company testing + accident database
  - Cooperation with third-party institutions

03

- **Product Innovation and Underwriting Capacity Support**
  - Artificial Intelligence System Liability Insurance
  - Vehicle-Road-Cloud Collaborative Risk Protection

Data source: industry public information

Core Capability of Reinsurance: Risk Modeling - Three-Tier Progressive Risk Model (Patented by a Reinsurance Company)

Logic Line: Mechanism Research→Dynamic Verification→Insurance Mapping

The 1st layer - The mechanism scenario model

- Evaluate the hardware capabilities of the intelligent driving system, i.e., the innate genetic characteristics of the vehicle.
  - ✓ E.g. sensors, chips, and brake performance in simulated scenarios.
- The output of this tier is the genetic score of vehicle risk.
  - ✓ For example: outputting the score
  - ✓ 1.Single-function scores, for example: following ability 85 points, risk avoidance ability 78 points
  - ✓ 2.Comprehensive performance index, for example: the weighted average total score is 82 points

The 2nd layer - The dynamic detachment model

- To evaluate the system failure of autonomous driving systems in real-world roads, we use the term detachment rate — the percentage of times the system requires human intervention.
- This layer incorporates real-time driving data and machine learning models, ultimately generating a frequency map of intelligent driving system failures.
  - ✓ For example, output the predicted 100-kilometer separation rate
  - ✓ 1.Scene separation rate, for example: urban roads 2 times per 100 kilometers
  - ✓ 2.High-risk period departure rate, for example: the evening peak departure rate increases by 30%, i.e., 2*1.3=2.6 departures per 100 kilometers

layer 3 risk transformation model

- The accident conversion rate caused by the error of the intelligent driving system is evaluated.
- The number of times this level of response caused system failures that led to actual accidents can be used to determine the accident rate.
- Finally, the pure risk cost is obtained by considering the average cost of indemnity.
  - ✓ For example: output insurance risk indicators
  - ✓ 1.Expected accident rate: 0.9 incidents per 10,000 kilometers on urban roads (calculated as 2 incidents per 100 kilometers × 100 kilometers × 75% accident conversion rate × 60% liability proportion)
  - ✓ 2.Pure risk premium: 2,250 yuan/year (=0.9 claims × average claim amount of 25,000 yuan)

Source: A reinsurance company released the White Paper on Innovation in Intelligent Connected Vehicle Insurance.

Building an Ecological Cooperation Model of Auto Company-Insurance Company-Reinsurance Company

Data-Driven → Risk Sharing → Product Co-creation

OEM

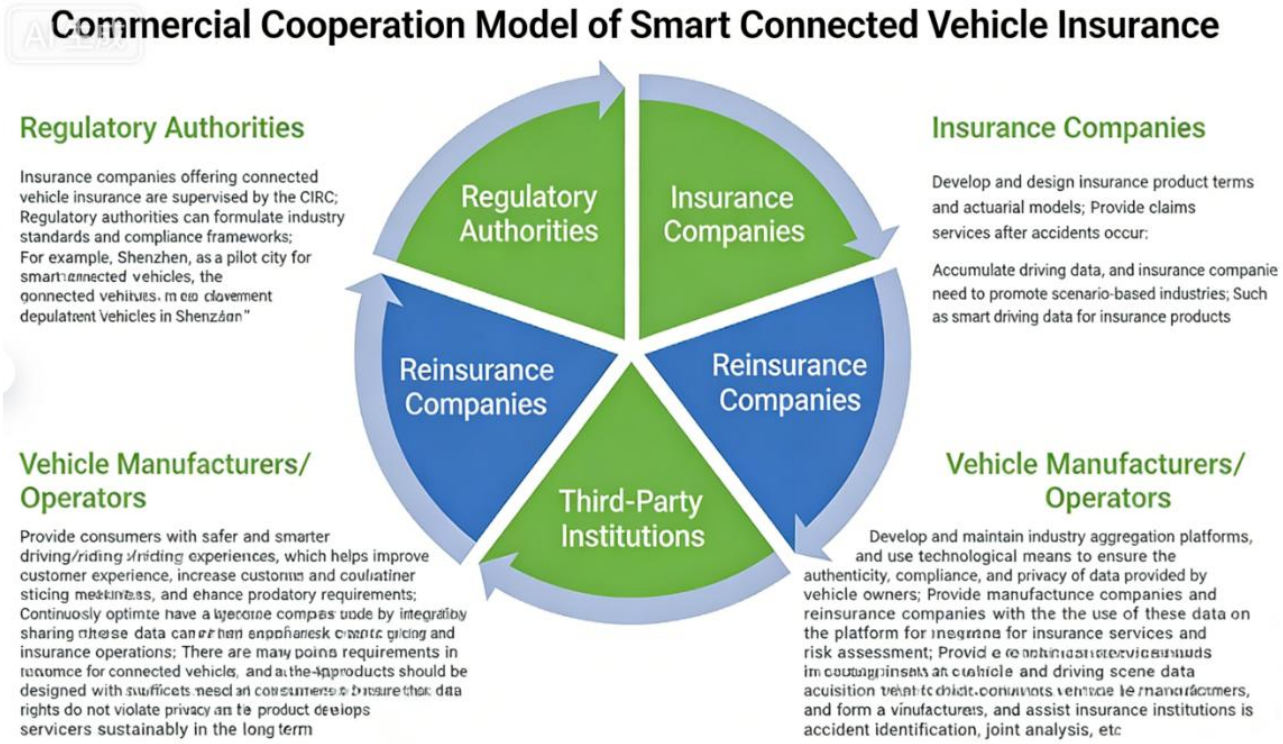
- Provide real-time vehicle data
- User behavior portraits and iterative feedback of intelligent systems

3rd party institution

- China Automotive Engineering Research Institute – Provide evidenced accident chains
- National Innovation Center – Determine accident liability, build risk modeling (pricing standards)

Direct Insur/Re

- Product innovation support and risk diversification underwriting



Source: industry public information

Contact Us

Get in touch to let us know how we can help.

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