China's Tech-Driven Intelligent Connected Vehicles for the Next Decade

July 2020
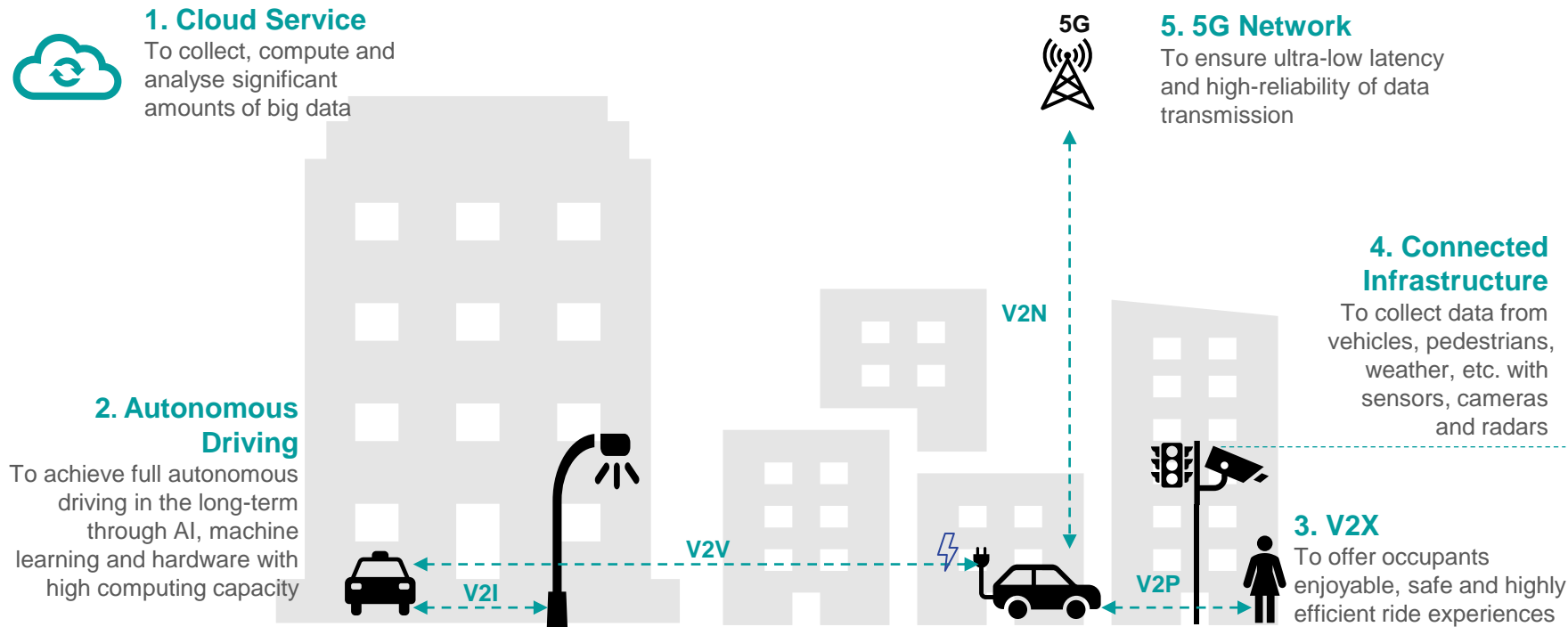
The car of the future is being redefined…

The automotive industry is increasingly seeing new waves of promising ICT technologies such as artificial intelligence, connectivity solutions, 5G, cloud service, and more. Over the next 5-10 years, auto + technology integration will be further enhanced

➢ How will new technologies further empower the auto industry?
➢ How will new technologies redefine "the car of the future"?
➢ More importantly, how should auto OEMs identify opportunities and leverage technological trends to take the lead…

ICT technologies are penetrating across mobility scenarios

1. Cloud Service
To collect, compute and analyse significant amounts of big data

5. 5G Network
To ensure ultra-low latency and high-reliability of data transmission

5G

4. Connected Infrastructure
To collect data from vehicles, pedestrians, weather, etc. with sensors, cameras and radars

2. Autonomous Driving
To achieve full autonomous driving in the long-term through AI, machine learning and hardware with high computing capacity

3. V2X
To offer occupants enjoyable, safe and highly efficient ride experiences

V2N

V2V

V2I

V2P

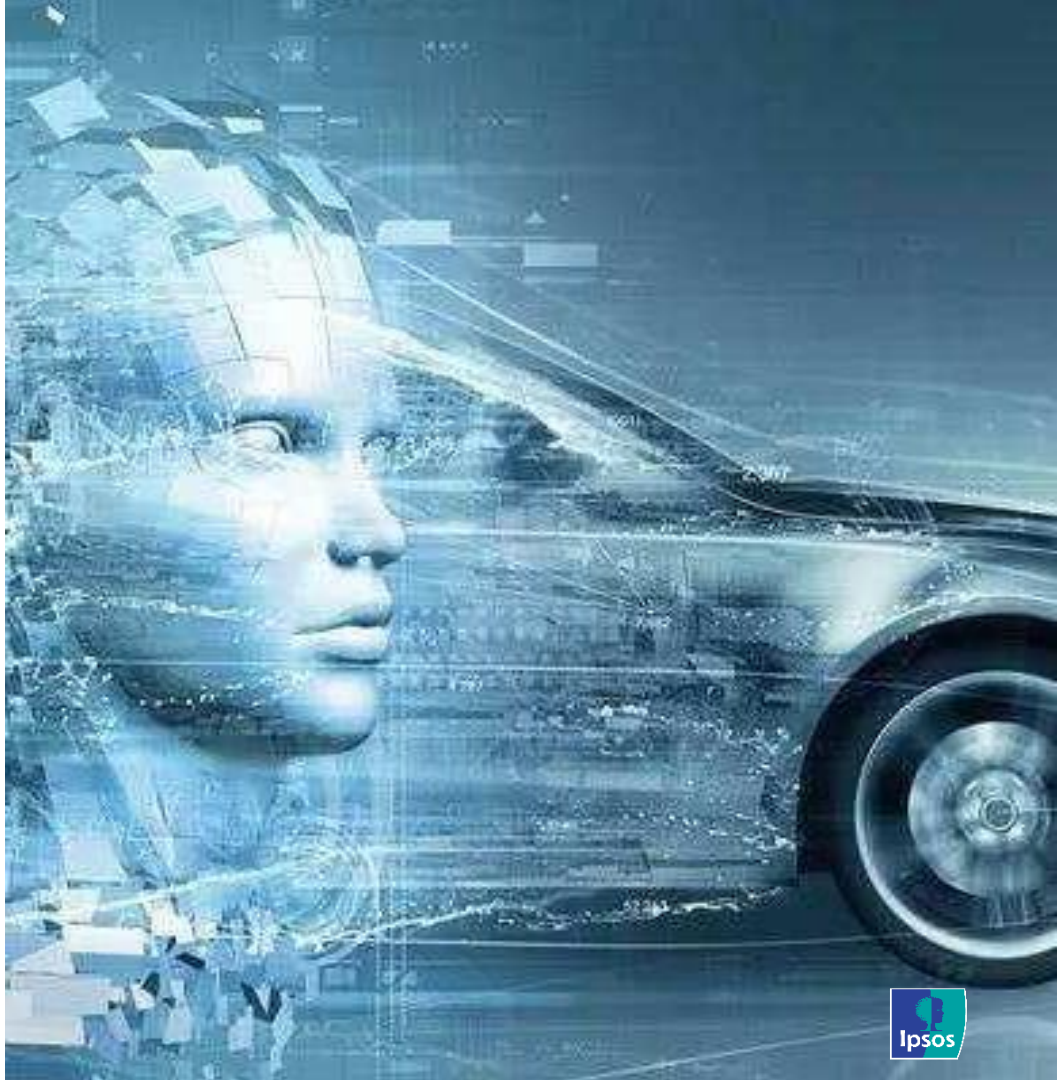Ipsos

KEY TOPICS

〉 **INTELLIGENT CONNECTED VEHICLES**

Key milestones for intelligent connected vehicles and future developmental directions

〉 **AUTONOMOUS DRIVING**

Current status quo and future trends of ICV-enabled AD in China

〉 **IMPLICATIONS FOR OEMs**

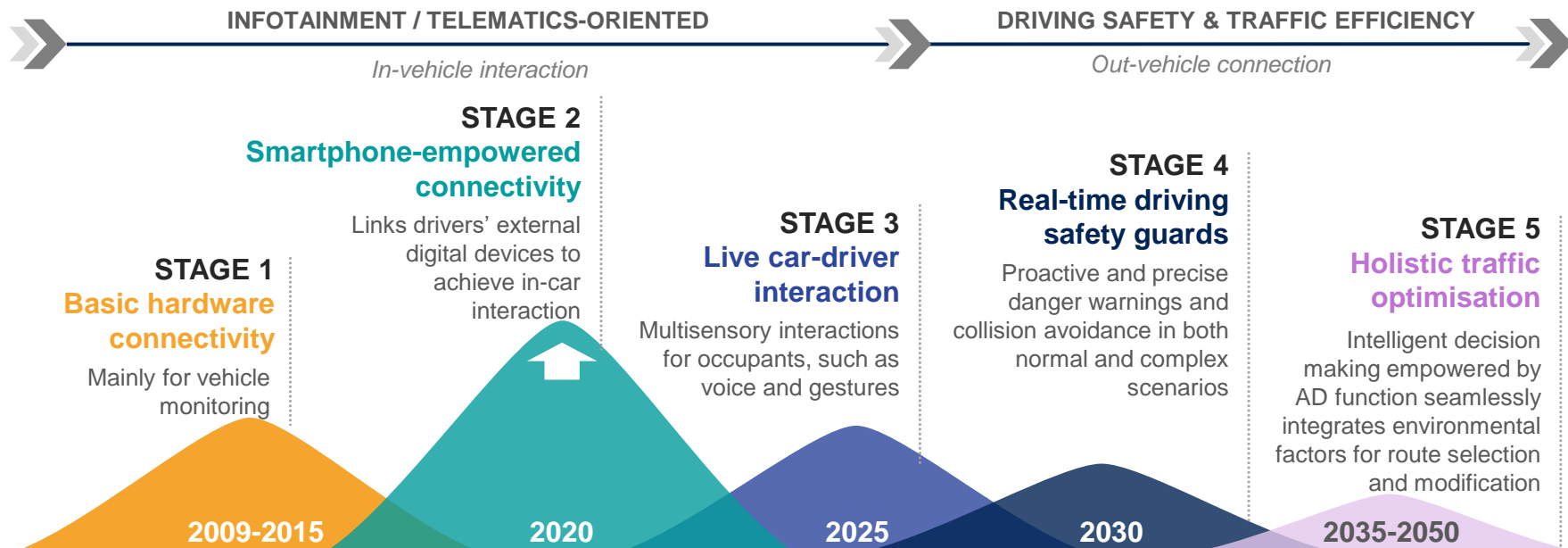Key opportunities and challenges brought about by new technology integrations

GLOSSARY

Abbreviation	Explanation
AD	Autonomous Driving
AOS	Automotive Operating System
AI	Artificial Intelligence
CV	Computer Vision
CVIS	Cooperative Vehicle Infrastructure System
ECU	Electronic Control Unit
E/EA	Electrical/Electronic Architecture
ICV	Intelligent Connected Vehicle
LiDAR	Light Detection and Ranging
MaaS	Mobility as a Service
NLP	Natural Language Processing
Radar	Radio Detection and Ranging
TSP	Telematics Service Provider
V2X	Vehicle to Everything
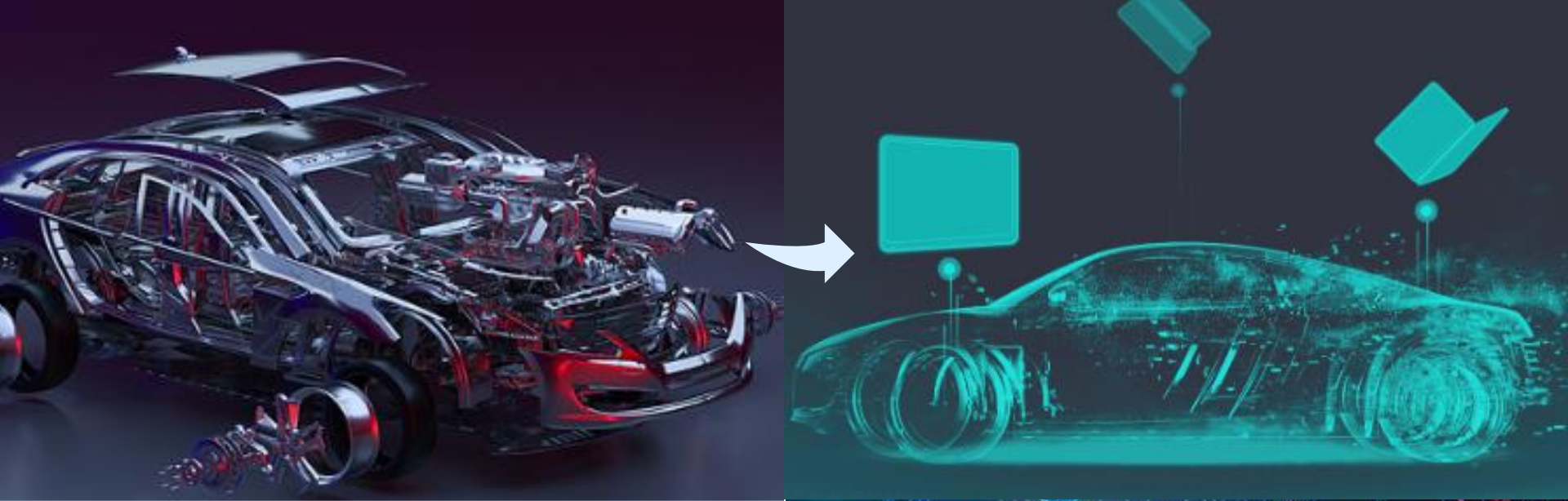
Intelligent Connected Vehicles
fuel the future of the automotive industry by transforming mechanical products into intelligent connected terminals

Stage 2 have currently achieved wide-spread adoption mainly via individual digital terminals, while Stages 3 and 4 are expected to gain more prominence in the next decade

INFOTAINMENT / TELEMATICS-ORIENTED

In-vehicle interaction

DRIVING SAFETY & TRAFFIC EFFICIENCY

Out-vehicle connection

STAGE 2
Smartphone-empowered connectivity

Links drivers' external digital devices to achieve in-car interaction

STAGE 4
Real-time driving safety guards

Proactive and precise danger warnings and collision avoidance in both normal and complex scenarios

STAGE 3
Live car-driver interaction

Multisensory interactions for occupants, such as voice and gestures

STAGE 1
Basic hardware connectivity

Mainly for vehicle monitoring

STAGE 5
Holistic traffic optimisation

Intelligent decision making empowered by AD function seamlessly integrates environmental factors for route selection and modification

2009-2015

2020

2025

2030

2035-2050

Ipsos

Auto operating system upgrading and AI-driven multisensory function continue to drive ICV* development

AUTO OPERATING SYSTEM

As one of the key elements of the HMI (Human-Machine Interface) system, the AOS (Auto Operating System) plays an important role in addressing driver and occupant requirements.

Most AOS (e.g. Apple CarPlay and Android Auto) currently still leverage external digital terminals such as smartphone maps to achieve basic functions and interactions.

Further modular integration, application ecosystem development and adoption of new AI-derived technologies will enable independent, highly efficient and multisensory connections between cars, drivers and occupants.

AI-DERIVED TECH ADOPTION

The evolution of AI will be very similar to that of the internet over the past 20 years, but it will happen faster: In 10 years, AI is expected to penetrate every aspect of human life and become a daily tool – a must for work, commuting, and life

– Baidu, Business Intelligence Consultant

To achieve multisensory interactions, AI-empowered applications (such as computer vision, voice and nature language processing) are expected to be widely adopted by the auto industry

*Remark: *ICV refers to intelligent connected vehicles*

AOS is still at the development stage; further function comprehension and integration are expected by both OEMs and tech companies

Key development trends of AOS in China

A multi-functional applications ecosystem is emerging

- **More infotainment functions** will be launched in AOS to enable enjoyable ride experiences (e.g. integration of e-commerce platforms)
- Functions to further ensure **driving safety and efficiency**, such as emergency alert as well as route selection and modification, will be launched synchronously with the process of AD development

Hardware and software modules will be further integrated

- **Both hardware** (e.g. vehicle control, power system) and **software modules** (e.g. infotainment/telematics) linked to AOS will be integrated into a few domains, which may help reduce energy consumption
- In the long run, an AOS-empowered digital cockpit with efficient human-machine interaction will be achieved

OEMs and tech companies are competing in the AOS market

- Tech companies (such as BATH*) are developing AOS by leveraging their mobile application ecosystem
- OEMs have also started developing their own AOS to ensure data ownership and business independence

Key AOS providers/OEMs

ANDROID

LINUX

QNX

*Remark: *BATH refers to Baidu, Alibaba, Tencent and Huawei*

Mercedes-Benz and Alibaba are exploring different ways to develop AOS

To ensure autonomy, Mercedes-Benz is investing heavily in AOS & software development

Ola Kallenius, CEO of Mercedes-Benz, believes that AOS really matters for an OEM's future. Mercedes-Benz set up Mbition (a software development company) for MB.OS development in 2017 with the aim of applying it in all MB car models by 2024.

Through applying its own AOS, MB aims to offer better driving experiences, and enhance ownership of its customers' driving data. MB also has plans to explore new revenue models via big data analysis, software upgrades, etc.
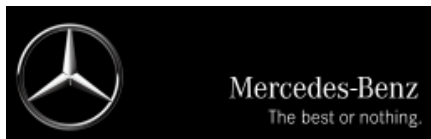
Alibaba chose "AOS + TSP*" integration to realise user-friendly HMI and to aggressively build up its ecosystem

AliOS integrates the applications in Alibaba's ecosystem with its TSP server to realise one ID for all applications via Alipay verification. This provides consumers with more convenience and enables comprehensive consumer data collection.

In addition, Alibaba is developing AOS-based applications to achieve an in-car ecosystem that will also fully link with its existing ecosystem by leveraging one user ID.

Car models that apply AliOS are Roewe RX5, i6, Ei5, etc.

*Remark: *TSP refers to telematics service providers*

AI-derived technology applications are poised to further empower ICV multisensory live interactions

AI technology implications for ICV

AI tech	Purpose	2020 scenario	2030 scenario
CV	To extract info based on imagery, e.g. facial/image recognition *Tech maturity is high: Accuracy rate hit ~99% (Sense Time)*	In-car: Face/gesture detection Out-car: Traffic light, traffic sign and pedestrian detection	Wide-adoption
Voice Recognition	To identify, distinguish and authenticate the voice of an individual speaker *Tech maturity is high: Accuracy rate hit ~98% (Baidu)*	Intelligent voice assistant that follows basic voice instructions	Wide-adoption
NLP	To automatically translate human language into specific actions *Tech maturity is medium: Accuracy rate hit ~70% (iFlytech)*	Can conduct human interactions at very basic levels; bottlenecks still exist, requiring further improvements	With breakthrough in NLP, the intelligent voice assistant will interact with the driver in more humanised ways

3 types of AI application providers are expected to co-exist and enhance cooperation in the future

1. Universal Giants

Baidu 百度   阿里巴巴 Alibaba.com

Tencent 腾讯   HUAWEI

2. AI Application Specialists

科大讯飞 iFLYTEK   思必驰 AISPEECH

商汤 sensetime   依图 YITU

3. Industry-Focused Players

pony.ai

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Autonomous Driving

is the biggest thing since the Internet

——— General Motors, 2017

Source: Global Perspective & Solutions (GPS) - Car of the Future - Citi

AD in China is aggressively moving from stage L2 to L3; L4/L5 are expected to be achieved in the next 5 to 10 years

|	LEVEL 1 (Hands/eyes on)	LEVEL 2 (Hands/eyes temporarily off)	LEVEL 3 (Hands/eyes off)	LEVEL 4/5 (Minds off/unmanned)
Timeframe of AD Commercialisation	**2007-2015**	**2014-2020**	**2023-2025**	**2025/30-2040**
Current Development Status	Commercialised and popularised	ADAS is mature and widely adopted	• Realised while only used in testing sections • Several local OEMs have launched models	Adopted in trial operations of a few car models in pilot areas only
Suppliers and model examples	*Realised by most OEMs*	• *Tesla-Autopilot-Model3* • *SAIC-ADAS-MAXUS D90* • *CCAG-Bosch-CS55* • *Geely-ICC Intelligent Navigation-Perry*	• *VW Audi-zFAS-A8** • *GACNE-ADiGO-Aion LX**	• *FAW-Apollo-Hongqi EV* • *BYD-xUrban-Qin Pro*
Number of players				

Less ➝ More

Remark: *As L3-level policies in China are not yet implemented, VW Audi plans to give up loading L3 system in the next-generation A8 model, GACNE-Aion Lx cannot fully function

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Continuous technology development, supportive regulations and consumer education are necessary to further drive AD commercialisation

TECHNOLOGY DEVELOPMENT
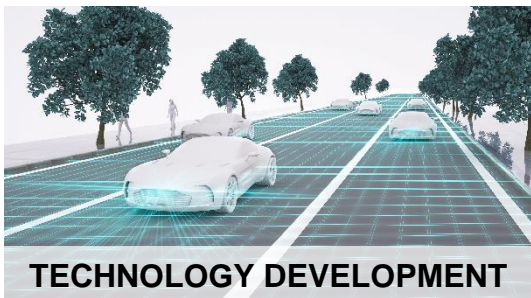
Internet giants and OEMs will enhance collaborations and further push technology development in the following 3 directions:

1. **Environment Sensing** >
2. **Computing** >
3. **Car Control** >

SUPPORTIVE REGULATION

AD commercialisation also faces challenges caused by unsystematic regulations:

- Lack of intelligent infrastructure/road classification and standardisation
- Unclear liability mechanism for accidents and unclear qualification requirements for AD drivers/occupants
- No market access rules for imported ICVs

CONSUMER EDUCATION

Overall, end-users still show low confidence in machine capability and have zero tolerance for mistakes that endanger human safety

Privacy protection and data security will emerge as another concern along with AD/AI development

Appropriate consumer education by OEMs on AD safety features is expected to relieve concerns

"Camera + Radar + CV" solution aggressively promoted by Tesla continues to lead the market; wider adoption of LiDAR will depend on cost reduction

There are many important robocar sensors, but for primary perception, the two most researched and debated are LiDAR and cameras.

— Brad Templeton, Founder of *ClariNet*

Comparison of Representative Sensing Solutions

Level: ▮▯▯ Low ——→ ▮▮▮ High

	Camera + Radar + CV （e.g., Tesla）	Camera + Radar + LiDAR （e.g., Audi A8）	
Data collection speed	▮▮▯	▮▮▮	In the next 5 years, Camera + Radar + CV will continue to be the mainstream solution due to high cost-effectiveness and lower sensing requirement of L2
Data comprehension*	▮▯▯	▮▮▮	
Data accuracy	▮▮▯	▮▮▮	With AD-L3 full commercialisation, LiDAR will be considered a must-have
Energy consumption for computing	▮▮▮	▮▯▯	With more companies entering the market, LiDAR tech maturity and cost reduction can be expected
Cost	▮▯▯	▮▮▮	

*Remark: Source: Columns at Forbes.com of Brad Templeton, founder of ClariNet and former Chairman of Electronic Frontier Foundation; *Data comprehension refers to an object's size, location, distance to vehicle, moving speed, etc.*

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The AD platform market is highly fragmented and led by foreign tech and hardware players

Future trend

The AD platform market in China is highly fragmented. Tech companies and hardware manufacturers show the most strength.

Most leading platforms and hardware suppliers are foreign companies. This trend will continue in the next 5-10 years.

Four dimensions to evaluate AD platforms

Processor Kit
- High performance, low energy consumption and multi-scene applicability are believed to be an evolving trend of processors.
- Platforms' R&D capabilities for processors are also deemed essential considering self-developed chips may better adapt to platforms for optimal functioning.
- The processors of NVIDIA and Intel-Mobileye are widely adopted by other AD-related products (e.g. Audi's zFAS). Google, Baidu and Tesla have shifted from using external chips to self-developed chips.

Sensor Kit
- Most platforms use a combination of LiDAR (optional) + radar + camera.
- Most platforms use 6-15 cameras (e.g. NVIDIA uses 7, Tesla uses 8, Intel-Mobileye uses 12, etc.), but Google has 29 cameras with a detection range of 500 m.

Algorithm
- High scene compatibility and high road test performance (low disengagement rate) are perceived as must-haves for advanced algorithms.
- Baidu's and Google's algorithms are compatible with various scenarios, and their disengagement rates* were low (Baidu: 0.034 times/1000 km; Google: 0.047 times/1000 km).

Auto Industry Experience
- Early and in-depth involvement in the auto industry (e.g. Tesla and Visteon) facilitate platforms' knowledge of car structures, use scenes and industrial pain points.

Key AD platform players

Tech Giants
Baidu 百度   Google

Hardware Manufacturers
NVIDIA   intel   NXP

Auto Parts Supplier
Visteon®

OEM
Tesla

– *Source: DMV 2019 Autonomous Vehicle Disengagement Reports*

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OEMs are exploring different business models to develop AD technologies and adapt to the increasingly competitive industry landscape

Less   *No. of OEMs involved*   *More*

ALLIANCE BUILD-UP

ACQUISITION

SELF-DEVELOPMENT

Leading OEMs have been involved in two kinds of alliances to overcome AD tech barriers
- Cooperation with other OEMs to share R&D costs and exchange technologies
- Cooperation with tech companies to build a comprehensive development system

OEMs have acquired tech SMB/start-ups (including chip providers and AD service firms) to leverage their tech savviness to expedite AD development

A few OEMs have established new business units or companies to develop AD without cooperating with tech companies

OEM + OEM

Since 2017, VW and Ford have cooperated in their global AD/EV R&D and have utilised channels together

OEM + Tech

BMW and Intel-Mobileye started developing AD in 2016 and plan to reach mass production by 2021

In 2020, Volvo and Waymo will cooperate to promote BEV application of AD tech

In March 2016, GM acquired Cruise Automation (founded in 2013), a self-driving service provider, for $600 million - 1 billion, asking it to run independently for further AD technology research

In March 2018, Toyota invested $2.8 billion to establish a new firm, Toyota Research Institute-Advanced Development, which will focus on AD software R&D

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E/EA* integration and centralisation are evolving alongside AD development; mass application for OEMs, however, may still be a long way off

E/EA centralisation is believed to be critical for energy saving, especially for NEVs facing driving distance challenges

Compared with NEV start-ups, E/EA transformation is more difficult and costly for traditional OEMs to realise

1 *Distributed E/EA (Today)*

2 *Centralised E/EA (Future)*

- High energy consumption due to limited functions per ECU, with every ECU processing its raw data and communicating with others in the network

- Lower energy consumption due to reduction in total number of ECUs (e.g. from 30~40 to 3~5 for a NEV car)
- Replacing ECU with cloud computing will be the ultimate goal

1 *NEV start-ups leads E/EA integration*

2 *Seek short-term profitability*

- NEV start-ups intend to design car models and build plants adapted to centralised E/EA structure from the onset, thus building up their key competency in the market

- With majority market share, most traditional OEMs still hold a wait-and-see attitude for E/EA integration given profitability concerns. Delayed implementation will likely weaken such OEMs' future competitiveness in ICV

*Remark: *E/EA refers to Electrical/Electronic Architecture*

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E/EA integration is believed to be necessary for ensuring efficient interaction between computing and car control while optimising energy consumption
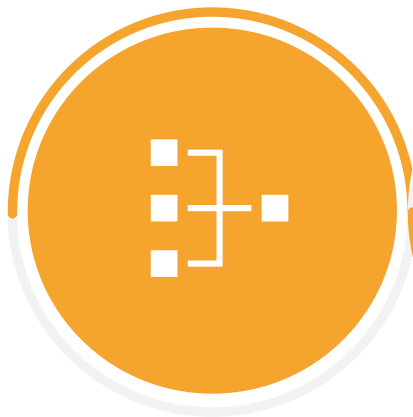
E/EA UPGRADING

Traditional distributed E/EA needs to be further integrated in the next 3-5 years

ENERGY ALLOCATION OPTIMISATION

Try to minimise energy/battery consumption to handle normal/standardised traffic conditions, while saving reserve energy for complex computing
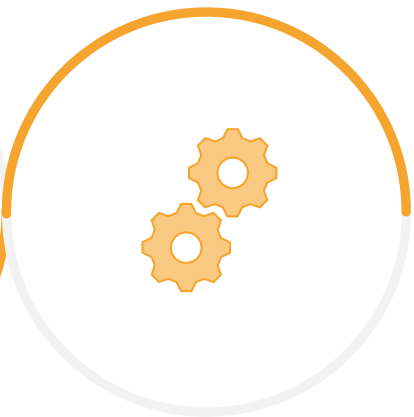
COOPERATIVE VEHICLE INFRASTRUCTURE SYSTEM

Avoid excessive use of data computing capacity by leveraging CVIS, which can allocate part of data computing to out-vehicle cloud

- Currently, some OEMs such as Geely and Tesla have taken proactive steps on E/EA upgrading

- To maintain competitiveness, it is critical for traditional OEMs to complete the transformation

- A clear roadmap/plan for R&D investment, production plant modification and product selection will be key
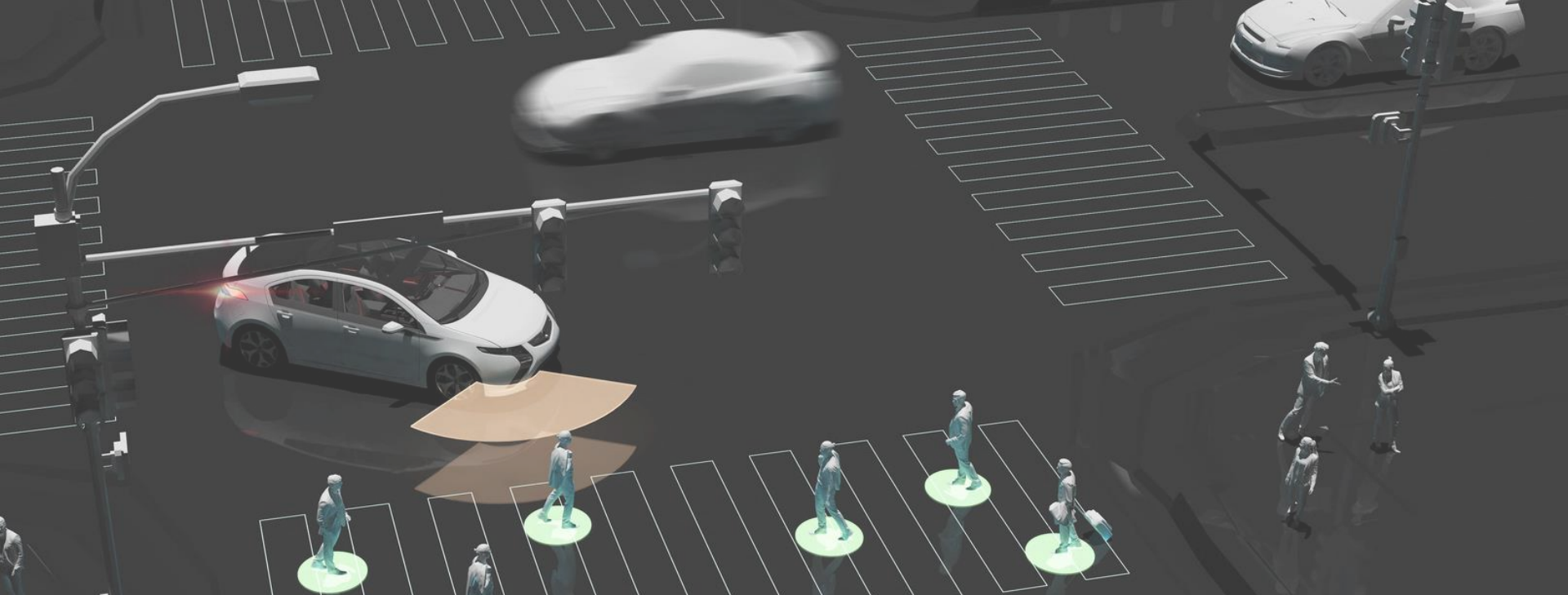
In the long run, the driver can sit back and let AI do the driving while communicating with the voice assistant to invoke other functions and enjoy enhanced in-vehicle entertainment. Combined with MaaS, general transportation will reach a higher level of efficiency.

Market Intelligence Director of a renowned mobility service provider

Source: Ipsos expert interview

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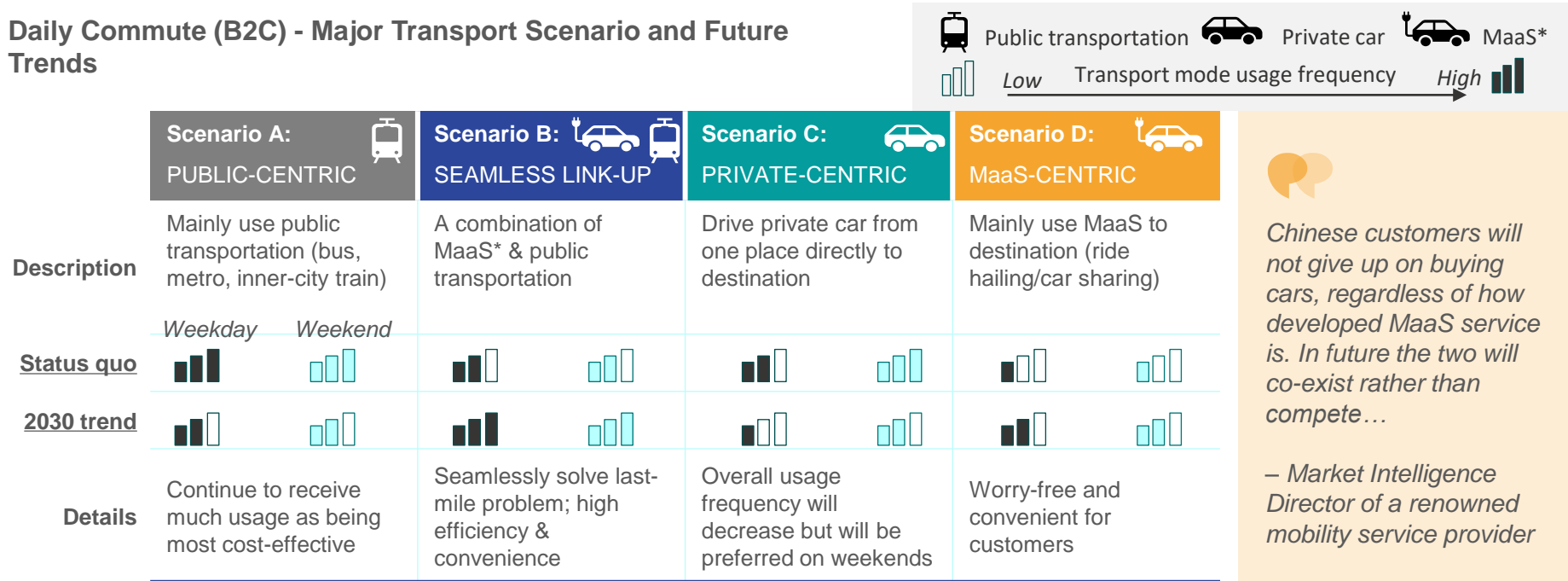# Over the next 5-10 years, seamless link-up scenario will be mainstream while MaaS-centric scenario will be popular; car ownership will continue with less actual usage

Daily Commute (B2C) - Major Transport Scenario and Future Trends

🚊 Public transportation   🚗 Private car   🚗 MaaS*

▂▃▅ _Low_ Transport mode usage frequency _High_ ▅▃▂

	Scenario A: PUBLIC-CENTRIC	Scenario B: SEAMLESS LINK-UP	Scenario C: PRIVATE-CENTRIC	Scenario D: MaaS-CENTRIC
Description	Mainly use public transportation (bus, metro, inner-city train)	A combination of MaaS* & public transportation	Drive private car from one place directly to destination	Mainly use MaaS to destination (ride hailing/car sharing)
	Weekday _Weekend_			
Status quo	▂▃▅ ▂▃▅	▃▅▂ ▂▃▅	▃▅▂ ▂▃▅	▅▃▂ ▂▃▅
2030 trend	▃▅▂ ▂▃▅	▅▃▂ ▂▃▅	▅▃▂ ▃▅▂	▃▅▂ ▂▃▅
Details	Continue to receive much usage as being most cost-effective	Seamlessly solve last-mile problem; high efficiency & convenience	Overall usage frequency will decrease but will be preferred on weekends	Worry-free and convenient for customers

Chinese customers will not give up on buying cars, regardless of how developed MaaS service is. In future the two will co-exist rather than compete…

– Market Intelligence Director of a renowned mobility service provider

Remark: *MaaS here refers to car sharing and ride hailing services

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Full AD is not expected to be applied in MaaS until 2030; Non-OEM B2C MaaS model is expected to become dominant and will provide high-quality services

Full autonomous driving for MaaS will be difficult to achieve by 2030

While full autonomous testing have commenced in selected pilot areas (e.g. Didi chose specific areas of Shanghai as pilot for its test operations), nationwide application of full autonomous driving for MaaS on open roads will be difficult to achieve in the next decade. Further technology developments, systemic regulations and consumer education / confidence remain key areas to be addressed

For MaaS, employment of a large number of drivers in China poses as an additional barrier to its adoption

* Drivers will be concerned with "replacement by robots" and will lobby the government to protect their jobs
* From the government's perspective, AD adoption in MaaS may also be controlled to maintain employment rates and ensure social stability

Non-OEM B2C MaaS model is trending

Non-OEM B2C MaaS model refers to drivers employed by MaaS platforms (e.g. Didi premium and luxe)

* B2C model will gain further market share and gradually take over C2C in next 5-10 years:
  - Market standardisation will require more professionally-trained drivers
  - The ultimate goal is for unmanned driving to replace humans in the long-term; MaaS fleets will be operated by platforms/companies instead of individuals
* OEMs may consider increasing the role from solely manufacturing to cooperating with/offering MaaS

IMPLICATIONS FOR OEMs

COMPETITIVE COOPERATION

In a high-tech-driven industry, cooperation (alliance and M&A), especially for core technologies such as AD, AI and cloud services, is believed to be the more viable solution (as opposed to self-development) for developing a competitive edge

Evaluate internal talents/resources and optimise organisational structure (talent recruitment vs. development) to ensure smooth/efficient development and effective transition

E/EA INTEGRATION AND PRODUCT UPGRADING

Along with ICV development, E/EA integration will be a necessity for OEMs. A roadmap with a clear timeframe for E/EA integration and a product strategy for E/EA application is of the utmost importance

On the other hand, emissions reduction/energy saving will still be key directions for product improvement in areas such as component weight & size reduction

IMPLICATIONS FOR OEMs

SHIFTING CUSTOMER FOCUS

With MaaS becoming increasingly mature, new mass segment car sales will be mainly driven by mobility service providers. OEMs should reconsider their target customer groups and increase marketing efforts on MaaS fleet operators

OEMs should also assess internal resources and capabilities to decide if they should venture into offering their own MaaS services or cooperate with MaaS operators via customised offerings

CONSUMER-TAILORED ICV DESIGN

In addition to driving behaviour, it is also critical to understand in-car HMI behaviours such as voice interaction and AOS function preferences to achieve smart human-machine interactions

OEMs should aim AOS and application ecosystem efforts towards specific target audience groups (e.g. B2C-individual drivers and B2B-mobility service platforms) to increase value-add and differentiation

An Introduction

A brief introduction to Ipsos Strategy3, a business and growth advisory firm powered by the research and data capabilities of Ipsos

Strategy3 is Ipsos' business and growth advisory firm

We believe that in order for any business strategy, marketing plan, brand positioning, or new innovation to be successful, it must do **three** things: be rooted in the organisation's strategy, be informed and inspired by customer research, and drive through to actual in-market activation. While there are many firms that advise on growth, very few deliver on all **three**: traditional management consultancies rarely delve deep enough into the world of the customer; creative firms don't truly leverage the power of data; research agencies can sometimes lose the big picture in the midst of analysis. That's why we are Strategy**3**.

We approach every challenge through **three** lenses

1
Strategy-Led

2
Research-Driven

3
Activation-Focused

What We Do

Drawing from our global network of consultants across four practice areas, we work with clients to
Build • Grow • Compete

Corporate/Business Strategy
Determining the right markets in which to play, and how to win
Market Sizing • Go-to-Market Strategy • Distribution/Channel Strategy • Competitive Benchmarking • Due Diligence

Brand Strategy
Developing strategies to help your brand and products stand out
Brand Stretch • Brand Architecture/Portfolio Optimisation • Brand Positioning • Brand Purpose • Brand Valuation and Investment ROI

Customer/Consumer Strategy
Understanding and reaching the right customers
Strategic Segmentation • Customer Prioritisation • Consumer Journey • Omnichannel Strategy • Value Proposition Development

Innovation Strategy
Planning for and conceptualising new products and offers
Trends/Futures Scenario Development • Early Stage Innovation Development • Innovation Scouting • Innovation Strategy and Process Development

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Who We **Are**

We are a diverse, multi-disciplinary team who brings our unique backgrounds and expertise together on every challenge. We believe that approaching every subject from different angles gets us a more accurate picture. Our team has consultants who have in prior lives been:

- Management Consultants
- Quantitative Researchers
- Sociologists
- Brand Strategists
- Start-Up Entrepreneurs
- Marketing Executives
- Journalists
- Social Media Experts

What we all share is a passion for businesses, their strategies and customers, understanding behaviour, transforming organisations, and telling great stories.

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CONSULTING EXPERIENCE: 15 Years

CONSULTING SPECIALTIES: Market entry and expansion strategy, competitive strategy, market segmentation and forecasting, distribution channel strategy

SECTOR SPECIALTIES: Automotive, TMT, Industrial

- Wijaya heads up the consulting practice for Ipsos in China and takes the lead for major clients and multinational engagements relating to growth consulting. Leveraging his extensive international experience, Wijaya helps clients develop their regional market expansion strategies.

- Prior to his transfer to China nine years ago, Wijaya was the senior manager of Ipsos Singapore's consulting practice where he worked on multiple regional engagements across Asia-Pacific for six years.

- With a strong focus in the Automotive, Industrial and Technology sectors, Wijaya has partnered with industry-leading clients to support a full spectrum of solutions ranging from the prioritisation of market opportunities, to the development of key value proposition and actionable strategies for clients' 5-year business planning, to the implementation of key initiatives.

- Wijaya speaks fluent English, Mandarin and Cantonese, and holds a Bachelor of Commerce degree from the University of British Columbia in Vancouver, Canada

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Kate GAO
高夙晔

Principal, Shanghai

CONSULTING EXPERIENCE: 12 Years

CONSULTING SPECIALTIES: Market entry strategy, industry benchmarking and analysis, voice of customers

SECTOR SPECIALTIES: Automotive and TMT

- Kate joined Ipsos Business Consulting in 2016, following 7-plus years working for a multinational consulting company with a key focus on market entry development, industry benchmarking analysis and voice of customers.

- As a Principal, Kate is primarily in charge of project planning, client internal high management stakeholder interviews, project bottleneck break, deliverable quality control and client communication.

- Kate has a rich consulting experience in the automotive industry. She has been working for auto/transport-related clients (such as OEMs, auto parts/system suppliers, IAM players, mobility service giants and logistics service providers) since 2010. In addition, Kate has led a number of TMT (Technology, Media and Telecom) projects in the past four years, along with the rapid development of the industry. She is also the Client Officer of one of the leading tech giants for business in mainland China. She synthesises auto industry experience and TMT knowledge to support clients in finding cutting-edge solutions in the current changing era.

- Kate speaks fluent English, Japanese and Mandarin and holds a Bachelor's degree from Shanghai International Studies University, China.

Jack CHIU
邱清儒

Managing Director,
Ipsos Automotive China

CONSULTING EXPERIENCE: 20 Years

CONSULTING SPECIALTIES: Brand and communication research, new product development and business opportunities identification and realization

SECTOR SPECIALTIES: Automotive

- Jack started marketing research career in 2000 and he joined Ipsos China as the Managing Director in 2017. He is responsible for development of automotive business in Shanghai office. Before joining Ipsos, Jack was the Head of Brand and Product research of TNS China who was in charge of automotive business in both Beijing and Shanghai.

- Jack specialises in brand and communication research, and was responsible for driving best practice brand & communications research, through training and coaching as well as working directly with key clients. Jack also has focused on new product development and has worked extensively on large-scale strategic studies, helping clients not just identify opportunities but also realise them through relevant innovations and communications.

- Recently, Jack shifts his focus on a few disruptive developments in automotive industry, including the new energy vehicles, connected cars, autonomous driving, mobility and sharing economy. Jack also specialises in workshop facilitation, regularly executing activation workshops, which helping the clients to turn insights into business plans.

- Jack holds a MA Degree in Business Management from the University of Birmingham, UK.

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Hello.
Let's start a conversation.

Whether you already have a clearly defined brief, or have a broad business challenge you'd like us to work with you to frame, we'd love to have a conversation with you.

From helping you to better understand your market from a customer lens, to deciding whether to enter a new market with your business, to building and evaluating your innovation pipeline, to painting a picture of how your category is evolving, we thrive on thinking about these challenges, and truly enjoy serving as thought partners.

We would honour the opportunity to embark on an exploration together.

Thank you