Vehicle multimedia and Connected Car trend

CONTENT
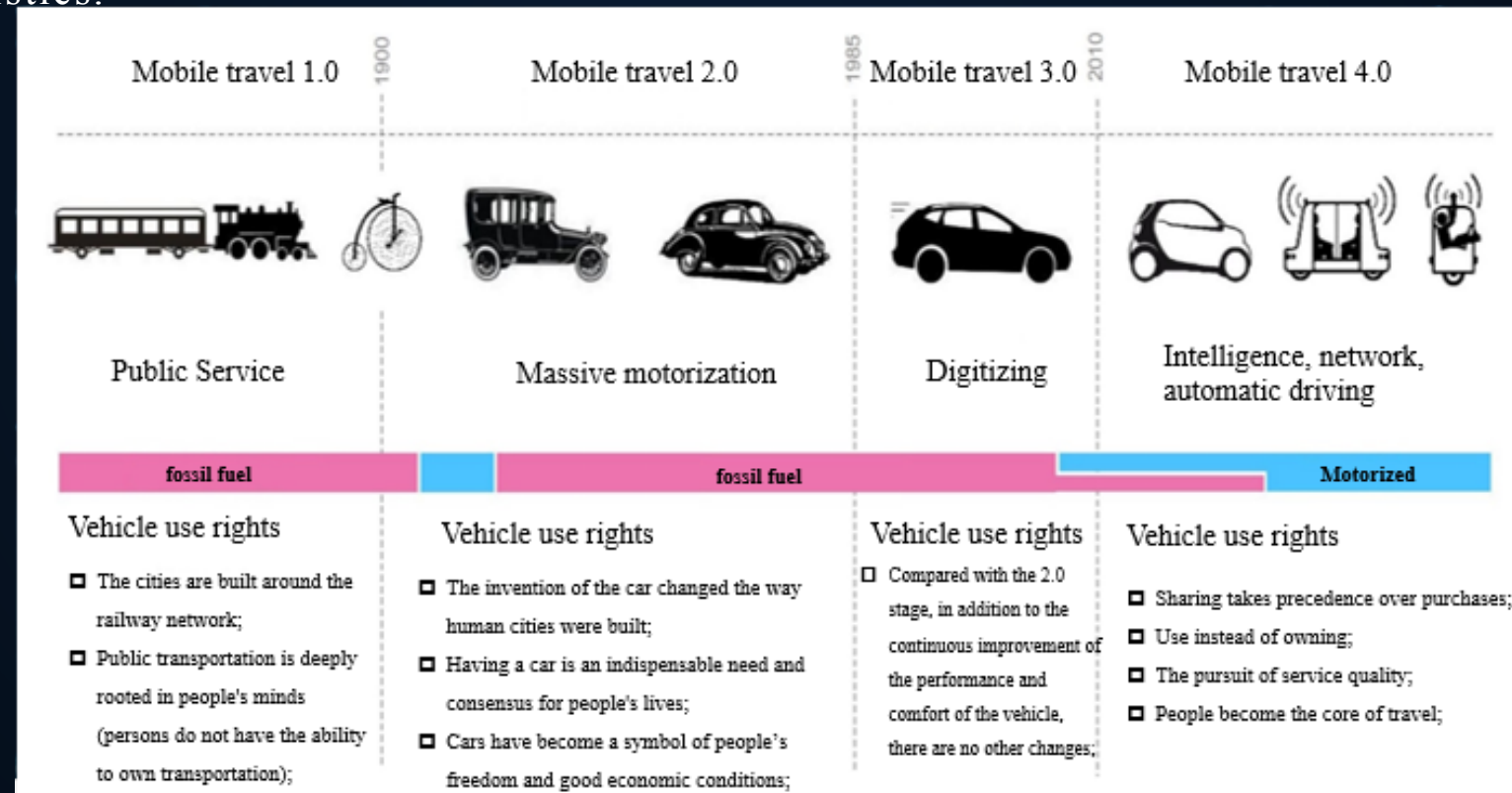
1

The trend of intelligent networked cars

Logic, Definition and Development Trend of Intelligent Network United Vehicle
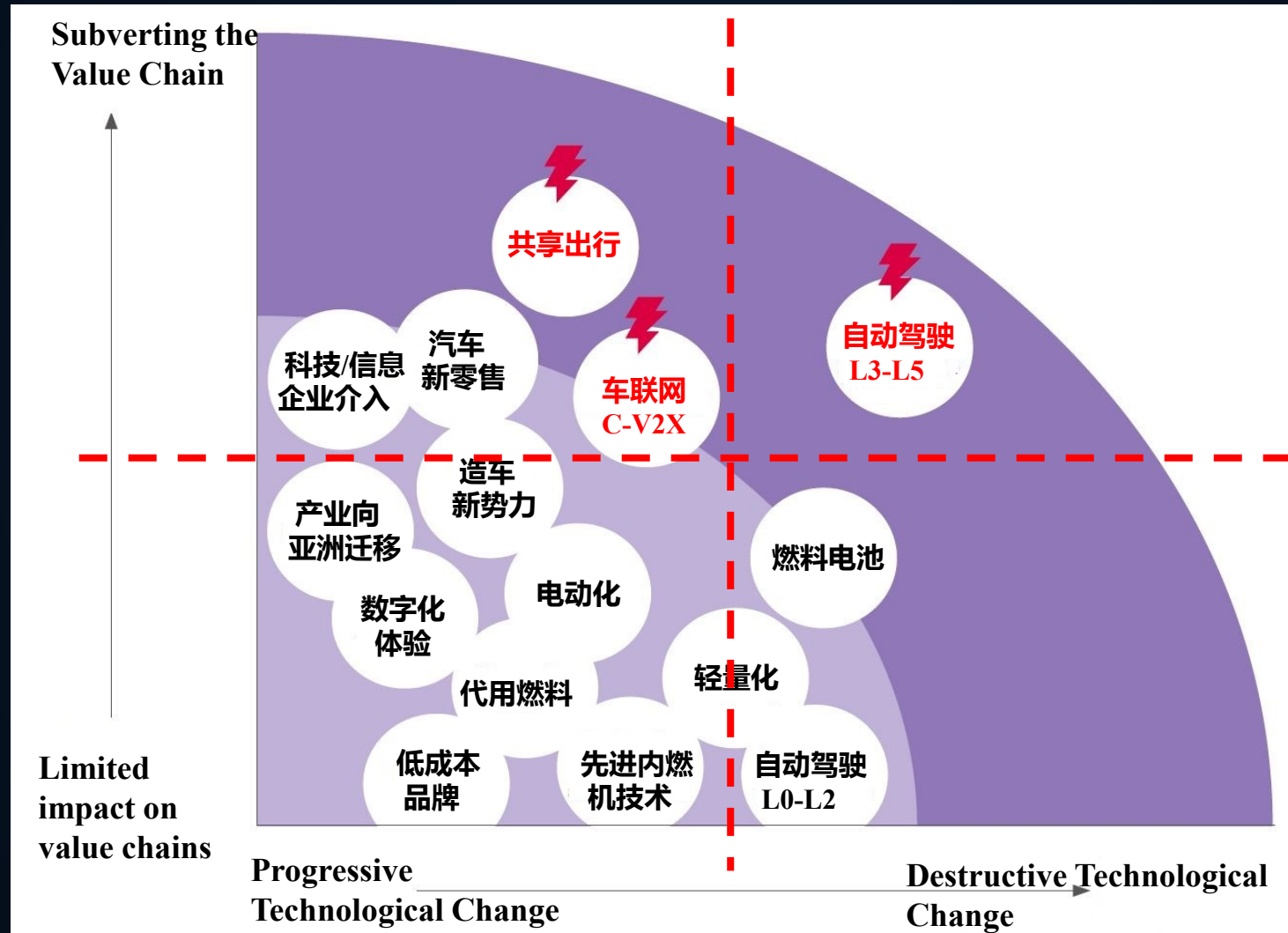
01

With the development of science and technology, the automobile industry will usher in a new round of change. From the perspective of three technological revolutions in history and the changes of human travel, science and technology are the main driving forces for the changes in the automobile transport industry. Each technological revolution is accompanied by the innovation of vehicles, the emergence of new industries and the changes of travel characteristics.

Mobile travel 1.0	1900	Mobile travel 2.0	1985	Mobile travel 3.0	2010	Mobile travel 4.0
Public Service		Massive motorization		Digitizing		Intelligence, network, automatic driving
fossil fuel		fossil fuel				Motorized
Vehicle use rights		Vehicle use rights		Vehicle use rights		Vehicle use rights
□ The cities are built around the railway network; □ Public transportation is deeply rooted in people's minds (persons do not have the ability to own transportation);		□ The invention of the car changed the way human cities were built; □ Having a car is an indispensable need and consensus for people's lives; □ Cars have become a symbol of people's freedom and good economic conditions;		□ Compared with the 2.0 stage, in addition to the continuous improvement of the performance and comfort of the vehicle, there are no other changes;		□ Sharing takes precedence over purchases; □ Use instead of owning; □ The pursuit of service quality; □ People become the core of travel;

◆ Major Trends of Change in the Global Automobile Industry


source ：Roland Berger

◆ Relations among Intelligent Vehicles, Vehicle Networking, Intelligent Transportation and Intelligent Networked Vehicles

Intelligent Networked Vehicle is the intersection of Intelligent Transportation and Vehicle Networking

They are four different concepts and cannot be confused.

Intelligent transportation is a a concept. Intelligent vehicle and intelligent network combined vehicle are two genus concept of Intelligent Transportation.
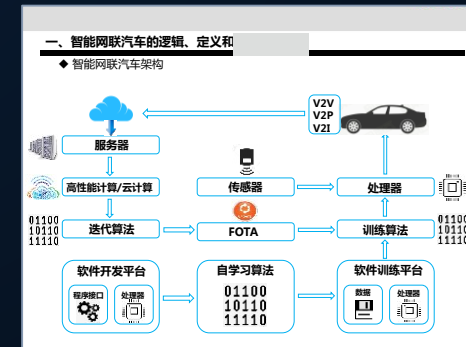
Intelligent Transportation and Vehicle Networking intersect with each other. This part is Intelligent Networking Vehicle.
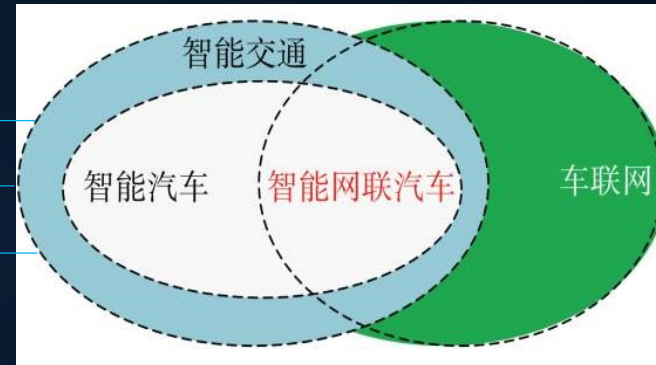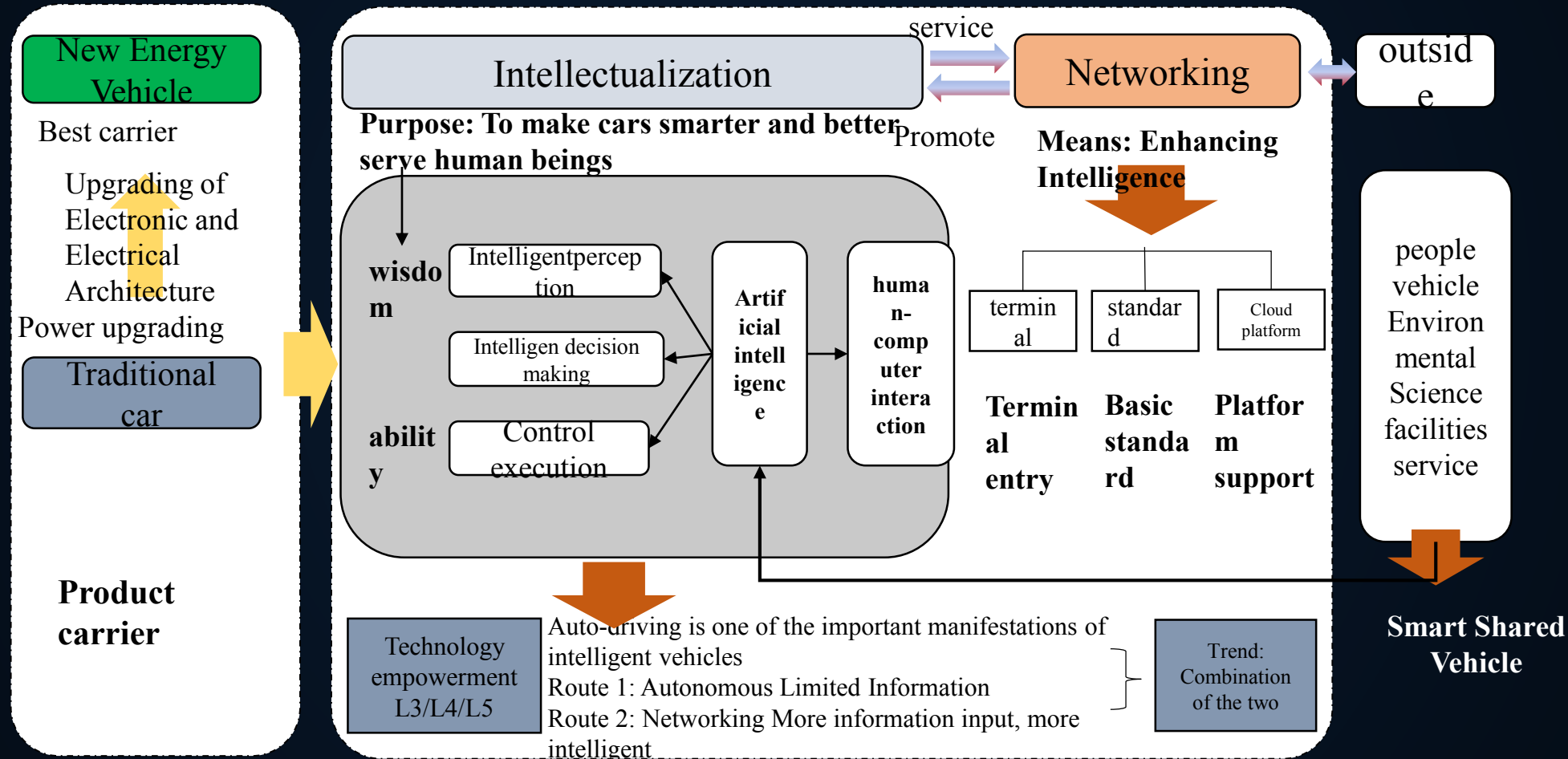

Autonomous Intelligent Vehicle Architecture

Network-connected Intelligent Vehicle Architecture

Intelligent Network Inter-vehicle Architecture

Logic, Definition and Development Trend of Intelligent Network Unified Vehicle

01

■ Vehicles are carriers with the aim of intellectualization, and the core means is networking to achieve smarter cars.

New Energy Vehicle
Best carrier

Upgrading of Electronic and Electrical Architecture
Power upgrading

Traditional car

Product carrier

service

Intellectualization	→ ←	Networking	↔	outside

Purpose: To make cars smarter and better serve human beings

Promote

Means: Enhancing Intelligence

wisdom

Intelligentperception

Intelligen decision making

ability

Control execution

Artificial intelligence

human-computer interaction

terminal	standard	Cloud platform

Terminal entry	**Basic standard**	**Platform support**

people vehicle Environmental Science facilities service

Technology empowerment L3/L4/L5

Auto-driving is one of the important manifestations of intelligent vehicles
Route 1: Autonomous Limited Information
Route 2: Networking More information input, more intelligent

Trend: Combination of the two

Smart Shared Vehicle

❏ On the one hand, a high degree of autonomous driving requires sufficient networking conditions to provide redundant protection and support, on the other hand, networking itself has a strong demand, through the external ecological access.

◆ Technology Evaluation of Intelligent Network Automation

Intelligent network automobile has two important attributes: intelligence and networking. They have their own characteristics and are inseparable. In the roadmap of China Intelligent Networked Auto Technology, which was launched by China Automobile Engineering Society in 2016, the maturity of the technology development of Intelligent Networked Auto was evaluated from two dimensions of "intelligentization" and "networking".

Intelligent Classification of Automobile

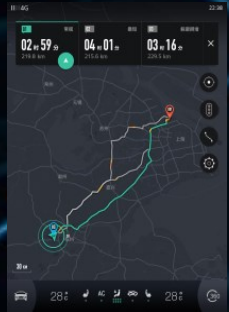| 智能化等级	等级名称	等级定义	控制	监视	失效应对	典型工况
		人监控驾驶环境				
1（DA）	驾驶辅助	通过环境信息对方向和加减速中的一项操作提供支援，其它驾驶操作都由人操作。	人与系统	人	人	车道内正常行驶，高速公路无车道干涉路段，泊车工况。
2（PA）	部分自动驾驶	通过环境信息对方向和加减速中的多项操作提供支援，其它驾驶操作都由人操作。	人与系统	人	人	高速公路及市区无车道干涉路段，换道、环岛绕行、拥堵跟车等工况。
		自动驾驶系统（"系统"）监控驾驶环境				
3（CA）	有条件自动驾驶	由无人驾驶系统完成所有驾驶操作，根据系统请求，驾驶员需要提供适当的干预。	系统	系统	人	高速公路正常行驶工况，市区无车道干涉路段
4（HA）	高度自动驾驶	由无人驾驶系统完成所有驾驶操作，特定环境下系统会向驾驶员提出响应请求，驾驶员可以对系统请求不进行响应。	系统	系统	系统	高速公路全部工况及市区有车道干涉路段
5（FA）	完全自动驾驶	无人驾驶系统可以完成驾驶员能够完成的所有道路环境下的操作，不需要驾驶员介入。	系统	系统	系统	所有行驶工况

Classification of Auto Network Linkage

网联化等级	等级名称	等级定义	控制	典型信息	传输需求
1	网联辅助信息交互	基于车-路、车-后台通信，实现导航等辅助信息的获取以及车辆行驶数据与驾驶员操作等数据的上传。	人	地图、交通流量、交通标志、油耗、里程、驾驶习惯等信息。	传输实时性、可靠性要求较低
2	网联协同感知	基于车-车、车-路、车-人、车-后台通信，在共享自车感知信息的同时，实时获取车辆周边交通环境信息，作为自车决策与控制系统的输入。	人与系统	周边车辆、行人、非机动车位置速度、信号灯相位、道路预警等信息。	传输实时性、可靠性要求较高。
3	网联协同决策与控制	基于车-车、车-路、车-人、车-后台通信，实时并可靠获取车辆周边交通环境信息及车辆决策信息，车-车、车-路等各交通参与者之间信息进行交互融合，形成车-车、车-路等各交通参与者之间的协同决策与控制	人与系统	车-车、车-路间的协同控制信息。	传输实时性、可靠性要求最高。

History of Vehicle Multimedia & the relationship between "in-vehicle multi-media" &. "connected car and telematics" industry

HMI+CLUSTER

Head-Up Displays

Cockpit Domain Controllers
Telematics
Audio
Infotainment
Information Displays

Instrument Clusters

1.X CLOUD BASED HMI

2.X CLOUD BASED COCKPIT

3.X INTELLIGENT CAR

4.X Intellgent Mobility Vehicle

IVI & Telematics

Navigation

Multimedia

Radio

Road Map for the Development of Intelligent Network Unified Vehicle

3
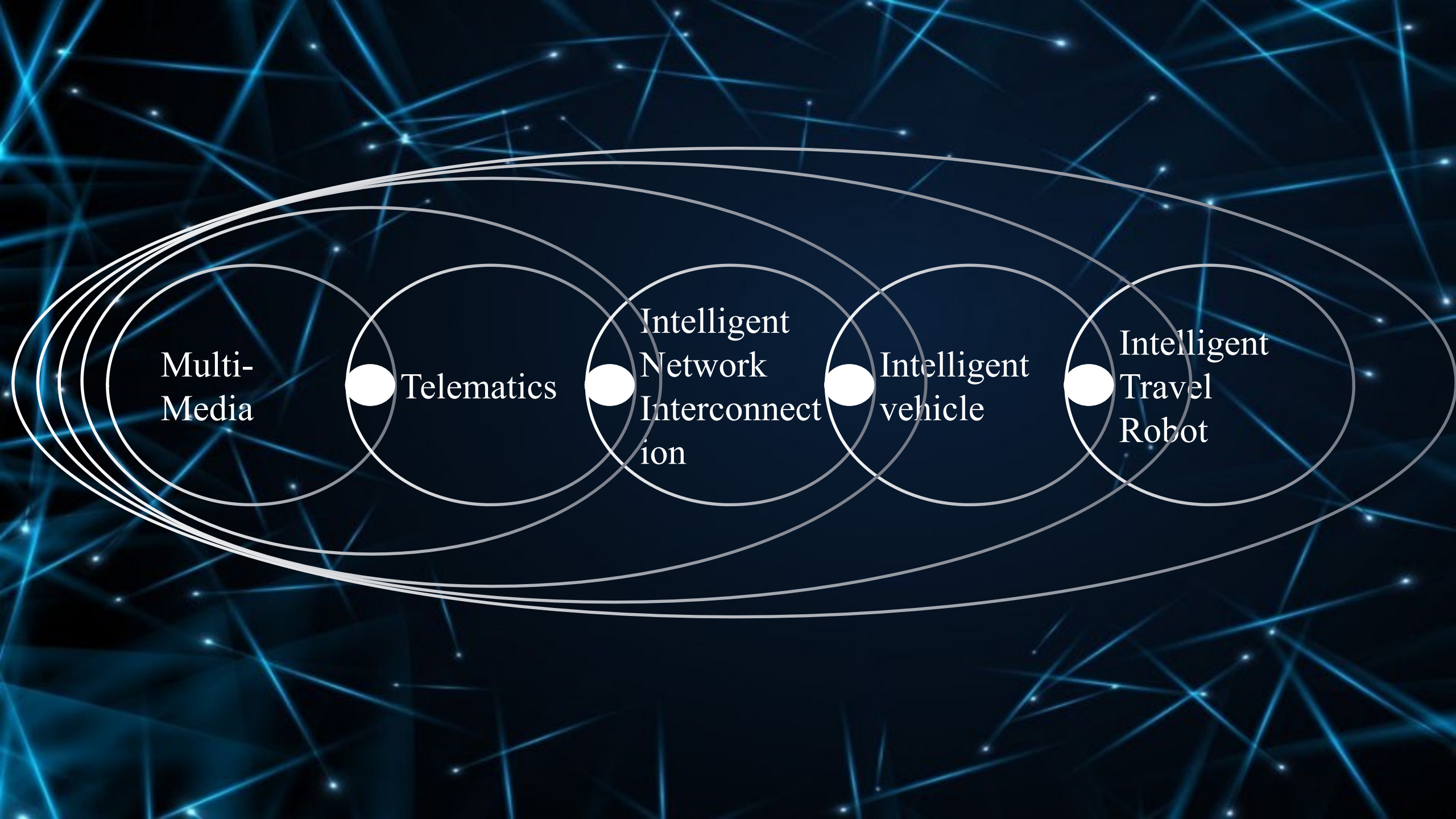
Impacts to connected car industry brought by changes of outer environment

The Significance of Auto Driving for the Reform of Automobile Industry in the Future
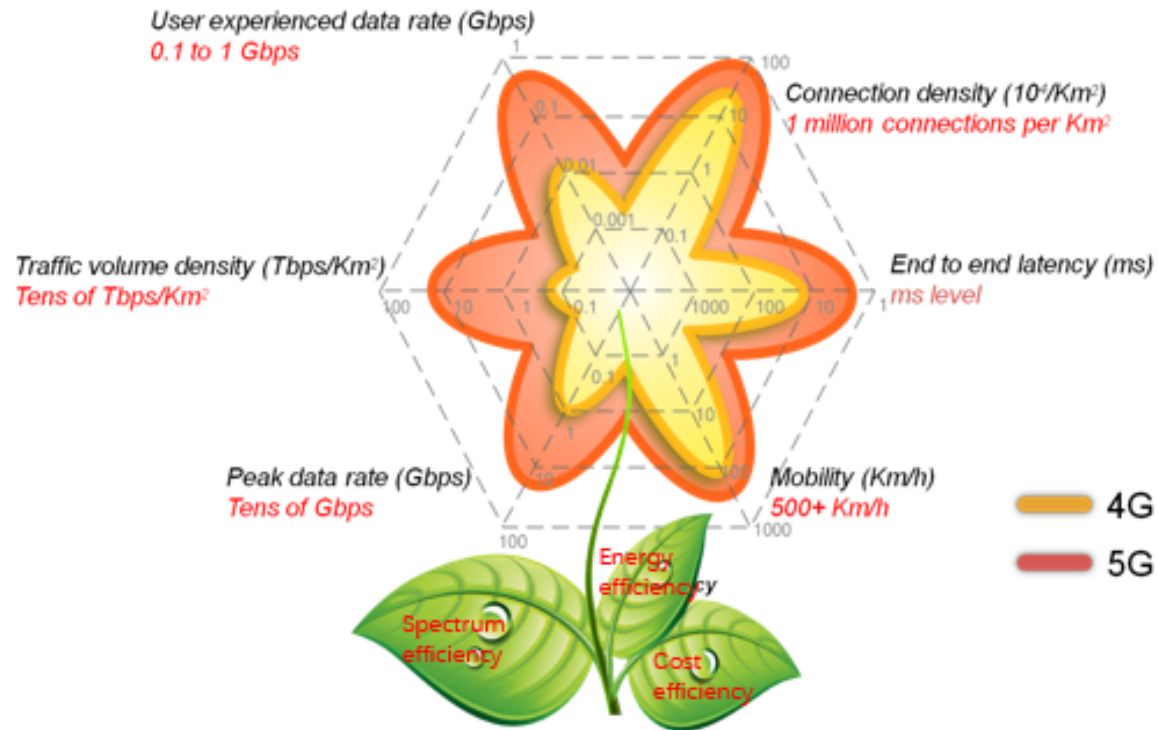
03

- With the advent of self-driving, cars are no longer driving tools, but riding tools.

- For the traditional automobile industry, the original emphasis on the sense of control, such as chassis, power, etc. is no longer so important, for the vehicle design, the sense of ride becomes more important than the sense of control.

- After the large-scale commercialization of self-driving, we all think that it is unnecessary to buy automobiles, because all automobiles have the same driving ability, parking is not convenient, compared with the sharing of travel, maintenance costs rise, but also a waste of public resources such as land.

- When the whole city is self-driving, what are the brand differences coming from?

- When all cars are self-driving, their overall speed is determined by urban planning. There is no difference in driving ability between car and car. The main difference is the difference in ride experience, the difference in ride use and the difference in software experience.

- For example: after the account system is completed, no matter which car, the software interface and user preferences are the same.

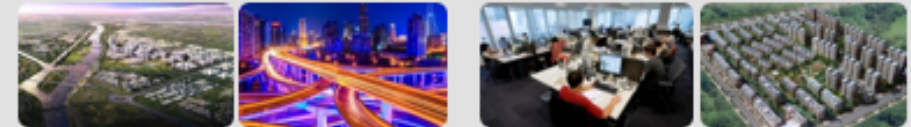City: Find available public parking, which all updates in real time — 62% / 29% / 4%

Automotive: See specific issues that may surface with the car and can be notified on another device — 61% / 30% / 6%

Home: Remotely access & control heating, air, lights & other appliances — 52% / 34% / 10%

Health: Keep track of calories burned & activities completed throughout the day, with little or no input — 41% / 39% / 11% / 6%

Wearables: Smartwatch can detect body temperature & adjust home or car temperature, regulating user temperature — 26% / 39% / 17% / 13% / 4%

HMI: Shopping assistant apps can be used to locate items & provide recommendations for related or similar products — 23% / 26% / 26% / 14% / 10%

Retail: Automatically complete retail purchases without swiping a car or touching a phone — 19% / 30% / 18% / 16% / 16%

■ Very interested ■ Somewhat interested ■ Neutral ■ Not very interested ■ Not at all interested
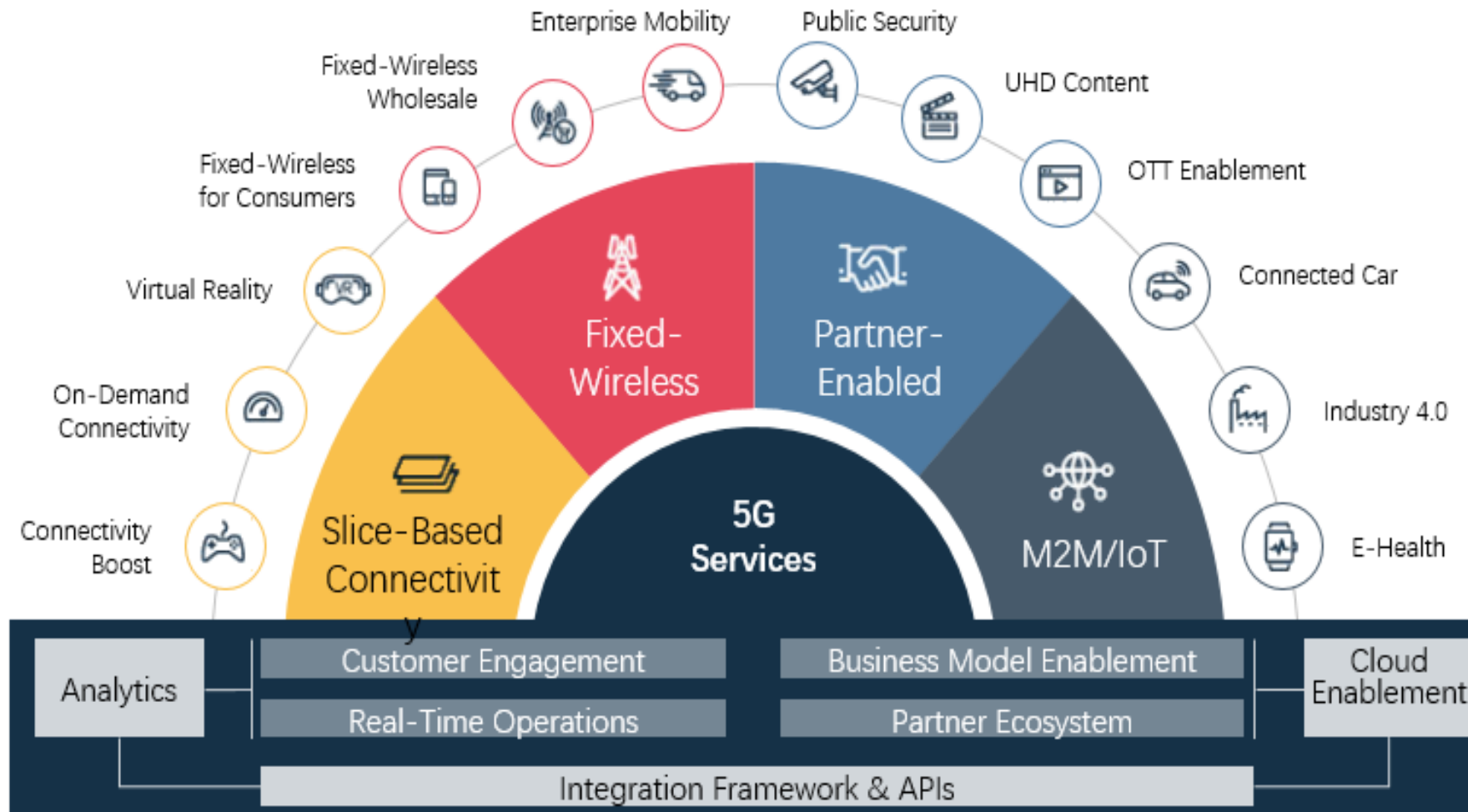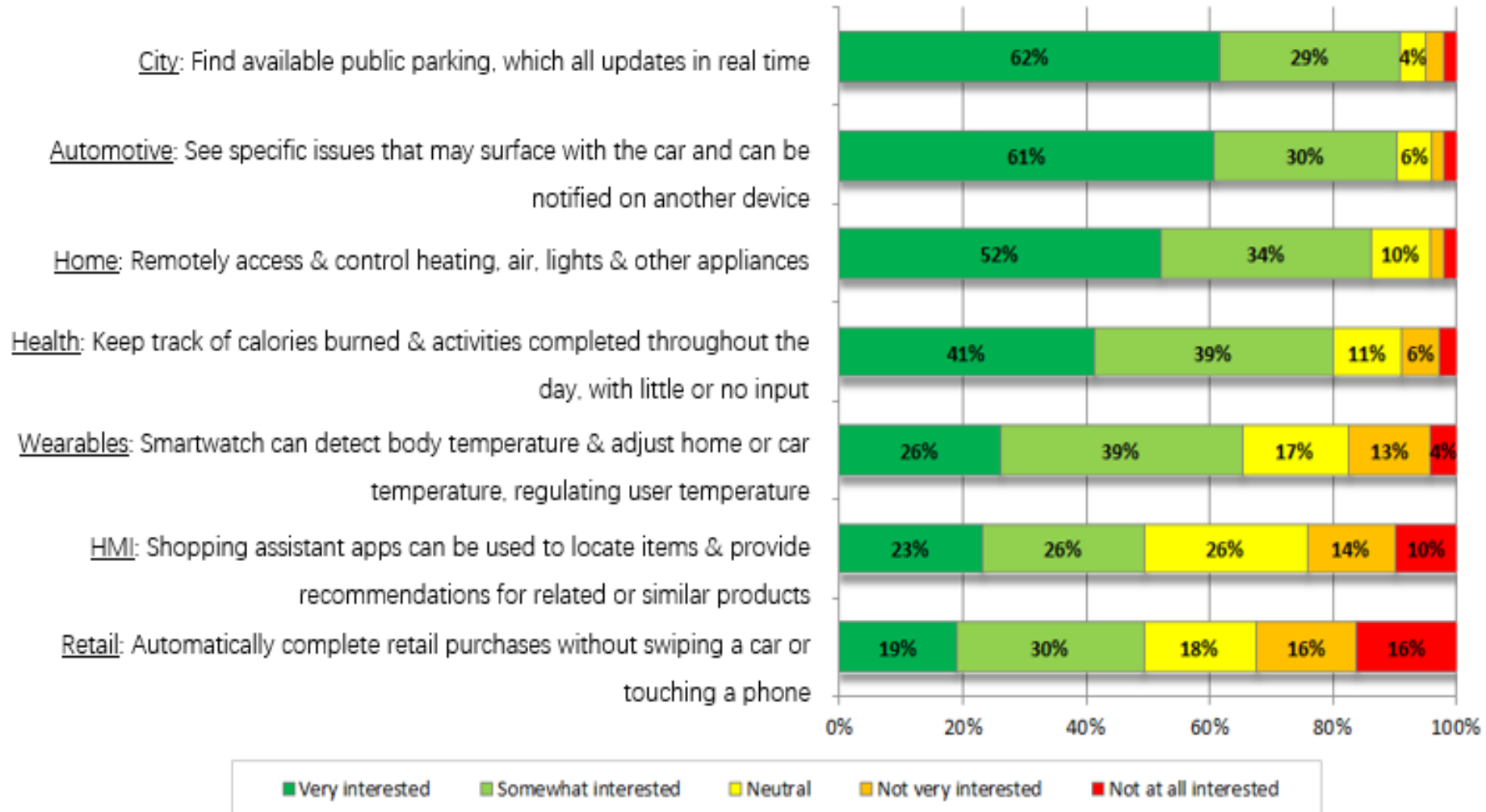
The Influence of V2X on Automobiles

V2X refers to the information exchange between vehicles and the outside world. It is equipped with advanced sensors, controllers and actuators, and integrates modern communication and network technology. It realizes the intelligent information exchange and sharing between vehicles and X (including V2V, V2I, V2P, V2N, etc.). It has complex environmental awareness, intelligent decision-making, collaborative control and execution functions. With V2X technology, cars can communicate directly with the outside environment, not only can detect the state, but also can do some feedback, such as: automatic overtaking, collaborative collision avoidance and so on.

Compared with cameras and lidars commonly used in automatic driving, V2X has a wider scope of application. It has the ability to break through visual dead angle and cross obstacles, and can share real-time driving status information with other vehicles and facilities.

In addition, V2X is the only vehicle sensing technology that is not affected by weather.

The Influence of V2X on Automobiles

In the future, there will be a variety of communication requirements, involving a variety of protocols or standards, including DSRC or LTE-V standards for inter-vehicle communication, GPS protocols for positioning, 5G or WLAN standards for Internet communication. The frequency band, anti-interference mode and transmission distance of these standards or protocols are different. This puts forward a very high requirement for the receiving equipment of vehicle networking, especially the vehicle antenna. The multi-frequency conformal antenna can also be integrated with T-BOX to become a "smart antenna".   According to the research of SAE-China, the wide application of V2X can improve the traffic efficiency of ordinary roads by more than 30%. According to official data from the National Highway Traffic Safety Administration (NHTSA), Vehicle-to-Vehicle Communication Technology (V2V) can predict impending traffic accidents and provide real-time warning of potential hazards. Its wide application can help avoid up to 81% of minor crashes.

The Impact of VR AR on Automobile

03

With the development of VR/AR technology, it can be applied in the design and production of automobiles. It can also enhance the participation of consumers in the sales process and the entertainment experience of automobiles.

AR is the real environment and virtual information real-time overlay to the same picture or space, users can see the real world and virtual information at the same time, AR navigation is the application of AR technology in the vehicle environment. In addition, AR can also be used in assistant maintenance, assistant fault handling and other fields.

VR simulates a whole new world (such as a virtual test drive of a car) through real-time rendering of the device. Compared with automobile marketing, VR technology has a stronger immersion and better application effect. In addition, VR technology can also provide unique entertainment experience in the car scene.

Eco-Driven Technology: Hypervisor

Under traditional E/E architecture , adopting independent and individual physical computing devices was usual way to process calculation task inside each ECU; and all ECUs were connected by in-vehicle communication net like CAN bus/LIN bus;

However, with rapid growth of total numbers of computing units , cost and complexity of system is also rising dramatically;Thus "Hypervisor technology" solution comes out.By "Hypervisor technology", several different operation system can be run on same physical computing device simultaneously ;and the communication way between two different systems is by sharing same database . By this way, both cost of system design and hardware architecture complexity can be cut down efficiently ; and user experience can be enhanced obviously.
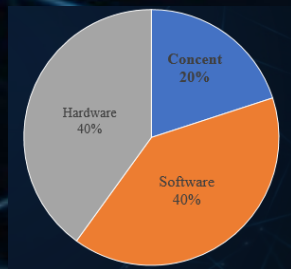
03

Change of technology chain structure
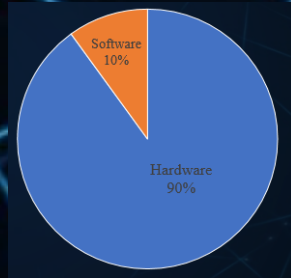
Intelligent   informationization

Changes in business models

Intelligent network automobile will gradually change the connotation of automobile products. With the gradual development of vehicle intelligence and information technology, the core components and product form of automobile products will undergo significant changes, which poses new challenges to the industrial technology structure.

The automotive industry will not only focus on technology and products, but also on complete travel solutions. With the increase of users and the change of utilization mode, the traditional automobile enterprises need to gradually change to a new traffic service provider, which challenges the business model and application scenario of the automobile industry.

◆ Restructuring Industrial Value Chain and Reshaping Business Model

1）automobile

- The positioning of automobile products has changed from simple transportation to mobile multi-purpose space.
- Cars become people's home, and the important "third space" car outside the office is the new retail, mobile real estate, such as mobile office entertainment rooms and bedrooms.
- Hardware, the automotive industry will appear more customized application models for use scenarios, to meet the needs of commuting, business contacts, parent-child transfer, short-distance outings and other space needs, and allow users to customize. Crowdsourcing.

2）man

- The target customer base of automobiles has expanded several times.：
  Old people, minors, disabled persons–
  Any terminal consumer with the demand of automobile travel service will be called the decision maker and marketing target of automobile purchase in the era of automobile driving.
- The boundaries between drivers and passengers will disappear and the industry ecosystem will change.

3）Man-vehicle relationship

- In the era of automatic driving, end-users do not have to own cars. The business model of the industry has changed to charge for mileage per trip and service items used on the way. Every customer's service experience will affect the next trip choice.。
- Operationally, automobile enterprises no longer meet consumers'needs only by introducing new products and hardware, but by continuously optimizing content and maximizing user travel experience on existing software service platforms, designing and improving service content around user's whole journey experience, and forming dynamic and sustainable business closed-loop 。

4）Service Operation and Service Brand

- In operation, it is very important to establish and operate the brand of Intelligent Networking Service of Automobile Enterprises
- Light assets operations will become increasingly common

5）profit model

- From Low Frequency and High Unit Price Consumption to High Frequency and Low Unit Price Consumption

Changes Brought About by The Development of Intelligent Network United Automobile
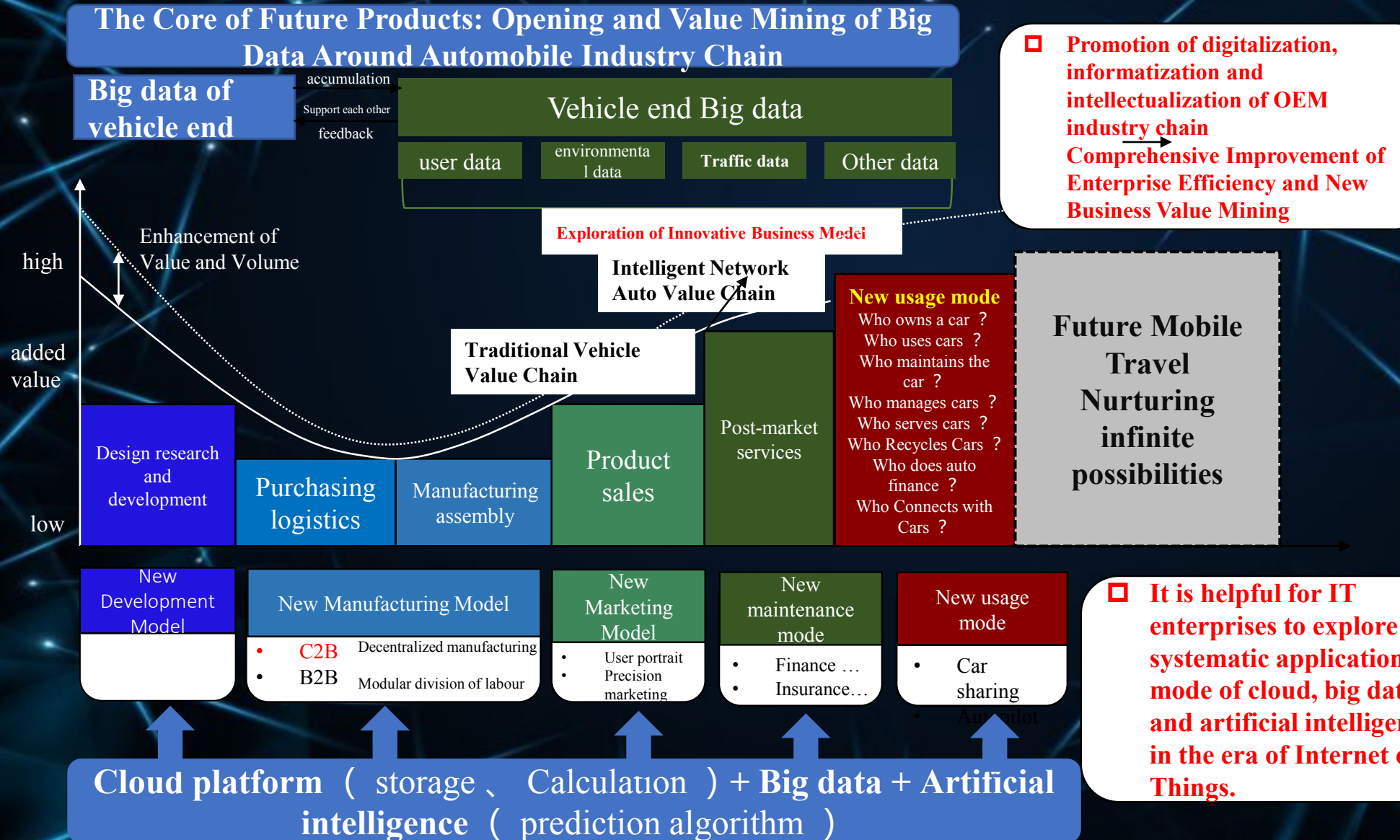
Changes in products and technologies

- New product form and experience, vehicle shape change, new human-computer interaction mode. For example, new media such as smart glass will replace traditional glass. Visual technology such as smart windows, holographic images, multi-mode interaction, expression recognition, AR, VR, AI and so on will gradually become the future development trend of human-computer interaction.

- Software defined cars, it is estimated that the number of L5 automatic driving vehicles will reach 1 billion rows. Therefore, the focus of vehicle research and development will be transformed from hardware development and integration to joint planning, development and integration of hardware, software and services.

- The change of vehicle development mode is mainly reflected in the need for express iteration and trial and error in vehicle development. Even after the vehicle is offline, the software can be updated through OTA (air upgrade). Defect repair, function upgrade and performance improvement will accompany the whole life cycle of the vehicle. Data and artificial intelligence play an important role in this process.

- Vehicle factories pay more attention to ride/service experience. Auto-driving technology weakens the driver's core position in the decision-making of car purchase. Driving experience emphasized by past major automobile factories, including gear, brake, acceleration and other functions, will no longer be so important. Users'concerns, from driving experience to ride experience, service experience, ride/service experience is far more important than driving experience.

## The thinking mode and mentality of automobile enterprises need to be changed

- From Technical Thinking and Product Thinking to Service Thinking and Experience Thinking
- Internet thinking emphasizes efficiency, trial and error, and leaves it to users to decide.
- **Customization and Participation, C2X2C**

The Core of Future Products: Opening and Value Mining of Big Data Around Automobile Industry Chain

Big data of vehicle end

accumulation

Support each other

feedback

Vehicle end Big data

user data	environmental data	Traffic data	Other data

□ **Promotion of digitalization, informatization and intellectualization of OEM industry chain** → **Comprehensive Improvement of Enterprise Efficiency and New Business Value Mining**

Exploration of Innovative Business Model

Intelligent Network Auto Value Chain

Enhancement of Value and Volume

high

added value

low

Traditional Vehicle Value Chain

Design research and development

Purchasing logistics

Manufacturing assembly

Product sales

Post-market services

New usage mode

Who owns a car ?
Who uses cars ?
Who maintains the car ?
Who manages cars ?
Who serves cars ?
Who Recycles Cars ?
Who does auto finance ?
Who Connects with Cars ?

Future Mobile Travel Nurturing infinite possibilities

New Development Model	New Manufacturing Model	New Marketing Model	New maintenance mode	New usage mode
	• **C2B** Decentralized manufacturing • B2B Modular division of labour	• User portrait • Precision marketing	• Finance … • Insurance…	• Car sharing • Autopilot

□ **It is helpful for IT enterprises to explore the systematic application mode of cloud, big data and artificial intelligence in the era of Internet of Things.**

Cloud platform（storage、Calculation）+ Big data + Artificial intelligence（prediction algorithm）

- Future automakers: These companies will stick to the traditional core areas and continue to strengthen the design, core components, production and other links to build a brand. This type of manufacturer will produce high-quality mobile products that are irreplaceable by other companies through technological innovation. Product profit.
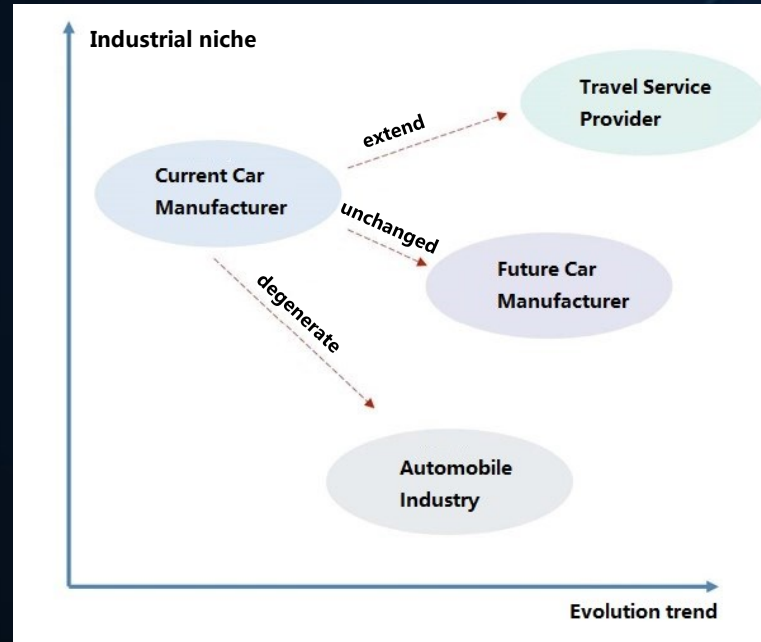
- Service-oriented manufacturing enterprises: This type of enterprise gradually transforms into services. The development of the Internet, mobile Internet and Internet of Things will promote the new business model of "manufacturing + service" of vehicle manufacturers, and it will be with pure service companies such as network car. Competition in travel services.

- Foundries. There are also some traditional scale-driven and gradual development of vehicle companies that may lose their initiative in car design because they cannot accurately grasp the needs of consumers. They become weak parties in the supply and demand relationship of automobiles, and gradually become the first two. The foundry of the company, the production profit is further compressed, and it loses its dominant position in the automobile industry. This type of manufacturer will gradually be positioned as a large-scale manufacturing in the future, and the products are mainly cost-effective and low-end products.

New meaning of the word "in vehicle multi-media" after autonomous driving technologies being commercialized

4

In the Future, Cars will Become the Third Space for life

04

- The car will become the mobile bedroom: Volvo's 360C is being promoted to replace the short-distance train of about 300 kilometers and the intercity high-speed rail

- The car will become a mobile office ： Like Renault EZ-ULTIMO

- Users need to enjoy information and audio and video entertainment content conveniently in the car.
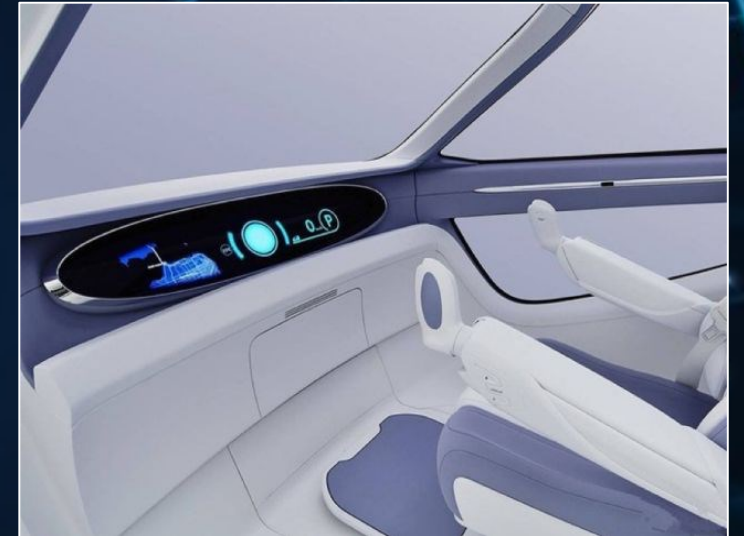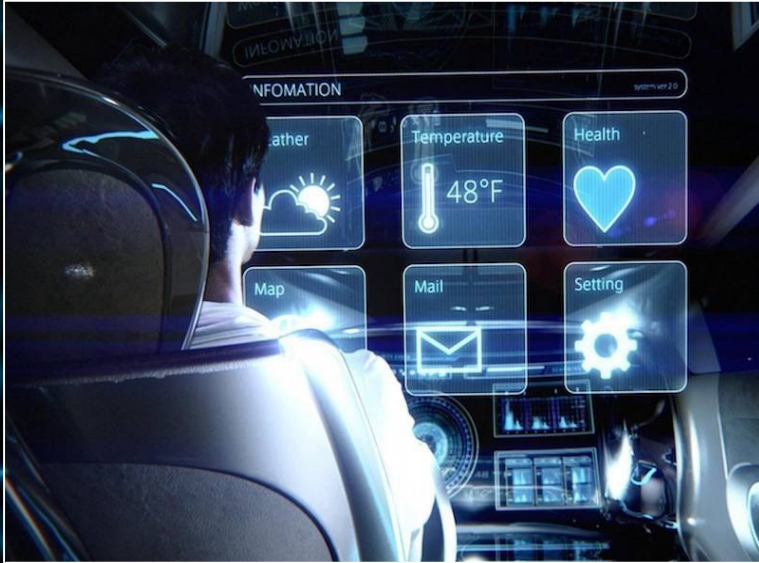
04

From localized to online movies and music

- The transformation of local content services to online content services allows passengers to access richer content resources

- Realize seamless switching between TV terminal and mobile phone mobile terminal in the home, multi-screen linkage

In-vehicle Medical and Games

- Real-time monitoring of the driver's health and the environment of the car through sensors such as heart rate, carbon monoxide, and alcohol concentration installed on the steering wheel and seat of the car, and timely transmission to the matching mobile APP

- When an abnormal situation occurs, the driver's mobile phone will be reminded by voice or the like. When the situation is urgent, the contact phone set in advance will be automatically dialed to minimize traffic accidents.

- Matching entertainment content for passengers wearing VR glasses, such as when the vehicle is turning, the aircraft in the virtual reality experience will follow.

- When the vehicle accelerates or decelerates, the aircraft in the virtual reality will accelerate or decelerate accordingly.

5

New trends of display's way and displaying media of "in-vehicle multi-media"

05

Interactive Media Multi-screen

Data interworking，
Seamless switching between mobile screen, car screen, and home screen

05

Interactive Media Diversity

Smart glass will be one of the trends in the development of automotive information media, the emergence of smart glass will redefine the window
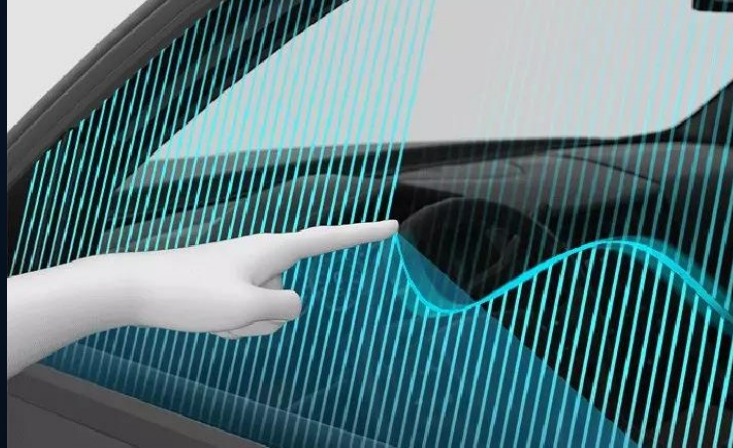

Smart glass represents a new technology that changes glass properties based on external conditions such as temperature, light, pressure or electricity, including flat glass, curved glass, touch-responsive glass, and many more.

05
Future Window

The future window can be a magnifying glass

The future window can be a sun visor

The future window can be a friend and video player that communicates with you.

05
Multi-screen Interactive

By customizing specific gestures, interaction between the central control screen and the LCD instrument panel in the car, real-time transmission of display content

05

Future Mainstream Interaction

Holographic projection, gesture control, eye movement control, etc. will gradually become one of the mainstream interaction methods in the future.

Diversified Multimedia Use

05

Future multimedia is not only entertainment, but also diverse content such as office, social, and interactive games.

6

Intelligent **it's FIVE**
Categories of EXPERIENCES

06

Vision-Holographic projection

FAW Pentium's SUV-T77, which is equipped with a 3D holographic imaging system above the center console, is the world's first product in the automotive field. There are 3 kinds of virtual characters for you to choose, 5 kinds of personalized dresses to switch freely, and 3 kinds. The talents skills are appreciated, and the system supports voice interaction, which enhances the great interest in human-computer interaction, especially attracting people who like the second element.

Hyundai Group unveiled the world's first AR navigation system at the CES's premium car Genesis 80 in 2019, a strategic product jointly developed by WayRay and AG. This technology can project a virtual image of 1,310 mm x 3,152 mm in a position approximately 15 meters from the driver's eyes.

VISION-Naked eye 3D technology

06

In October 2018, LG Display (LGD) successfully produced the world's first 12.3-inch FHD (1920 x 1080) naked-eye 3D digital instrument panel. Hyundai's 2019 Genesis G70 is equipped with this screen. This also means that LGD will lead the automotive screen market with leading technology products.

At the CES show in 2019, Baytone announced to the world the front-end internal design and user interface of the BYTON M-Byte production car. The 48-inch shared curved screen, which will take on a variety of functions such as displaying meter information, entertainment functions, and displaying vehicle information. A 7-inch driver touch screen is still placed above the steering wheel.

At CES 2019, TI demonstrated a pixel headlight solution using DLP technology. The DLP system creates the ideal conditions and projects images onto the road to communicate with drivers or pedestrians.

Continental exhibited OLED flexible screens and irregular shaped screens at CES, which have the following advantages：

1）Radian design can solve the problem of birefringence；

2）The characteristics of the tactile feedback enable the driver to operate blindly with one hand while driving；

3）It does not make the screen, only the film above; acrylic material, piano black texture; can have tactile feedback, low cost, strong shape, low defect rate is the advantage of acrylic material；

Disadvantage：

Poor light transmission; glass material can only be cold formed to have good consistency, large camber, can not achieve hyperboloid, touch feedback is not good.

In terms of voice interaction in the cabin, from the single-tone zone to the multi-tone zone, the Flying Fish os of the Keda Xunfei can provide a multi-zone interactive scheme based on the whole vehicle. The products released in the first generation can be based on four microphones.

More natural support for user-defined TTS, interactive schemes that support user-defined wake-up words in multi-zones: Keda Xunfei's Flying Fish os can provide multi-zone interactive solutions based on the entire vehicle . And its first-generation products can be released , based on four microphones.

Hearing - In-car multi-person call management system: Harman

During the 2019 CES International Consumer Electronics Show, Harman International launched the Advanced Communications Solution, the industry's first unique modular technology designed to improve today's in-vehicle communications environment. With world-leading sound reinforcement, voice processing and noise cancellation technology, Harman's high-end solutions allow all occupants to talk freely, whether they are talking to each other, using digital voice assistants, or answering and making calls.

06

Hearing - interior vocalization replaces loudspeaker technology

At present, the more advanced technology utilizes the technical principle of auditory-bone conduction, replacing the traditional loudspeaker technology with interiors such as seats , as the sounding hardware, which not only reduces the weight of the vehicle, reduces the driving cost, but also brings new products and interactive experience to the user.

Smart skin: Smart surface material has elasticity and light transmission, behind the buttons and lights, behind the infrared detector to sense the distance; hidden touch surface, can sense the distance, at different distances, the display content is different: distance is far , only the display class information is displayed; when the distance is near, the control class information is displayed; the button is raised and there is tactile feedback. The disadvantages are life and durability.

Smell - Car Fragrance Emotion Regulation System

IAA国际香氛车载香氛系统

Mercedes AIR-BALANCE air purification system ：

Purify the air inside the car with a fragrance device and a negative ion generator .

Characteristics ：

1, Mercedes original perfume is divided into 6 kinds, you can choose according to your own preferences, the general use cycle of four months to six months or so.

2. Unlike any car perfume in the traditional form, the fragrance generating device absorbs the aroma through the micro pump, and the circulation of the vehicle through the ventilation ducts does not make people feel too "rushing".

3, Mercedes-Benz fragrance system can be opened or closed according to passenger needs. However, there is no one-button switch, you need to choose to open or select the concentration in the options, so it seems a little inconvenient.

The car refrigerator refers to a refrigerated cabinet that can be carried in a car, generally located behind the central armrest of the rear seat, and the car refrigerator of some cars is located under the central armrest of the front row. Cool dining is always at your fingertips. The rear refrigerator allows passengers to enjoy the taste at any time. It is perfectly integrated into the rear armrest and has a volume of approximately 8.5 litres.

Taste Sense - the Car Tea Room

In the Mercedes Fit&Healthy concept car, the tea mode is part of the whole concept. The area of the central channel in the back row has been transformed into a tea sea that can be lifted and lowered. It has the function of automatic tea making, and the most intimate thing is to choose between Pu'er, Oolong and black tea.

Tea ceremony - is the way to appreciate the beauty of tea. Drinking tea can calm down and calm the mind, helping to cultivate sentiment and remove distracting thoughts. But the traditional tea ceremony is to sit indoors and taste quietly. For this Fit & Healthy, these can be done. It is equipped with a tea ceremony area cover that automatically opens and closes, as well as the water temperature suitable for three different tea leaves. There is definitely a fight between the tea and the professional tea room.

7

HMI development trends

HMI Trends – Driver Monitoring System

Fatigue Monitoring

The system uses infrared technology to track the small movements of the user's eye and face. When the user is likely to be in fatigue driving, the user is reminded by sound.

Expression and Emotion Recognition

The system uses a technique similar to fatigue monitoring. It not only monitor the user's fatigue status, but also identify changes in the user's expression and provide appropriate services.

Aerial Handwriting Technology

Use visual technology to monitor the user's hand movement trajectory and complete text input.

Gesture Recognition

Use visual and infrared technology to monitor user gesture changes and manipulate the system.

HMI Trends – Voice Combined with Other Technologies

Voice Combined with AR Technology

When the user sees a building outside the window and asks "What is this?", the system tracks the user's line of sight, identifies the corresponding building, and informs the user by voice and on-screen display.
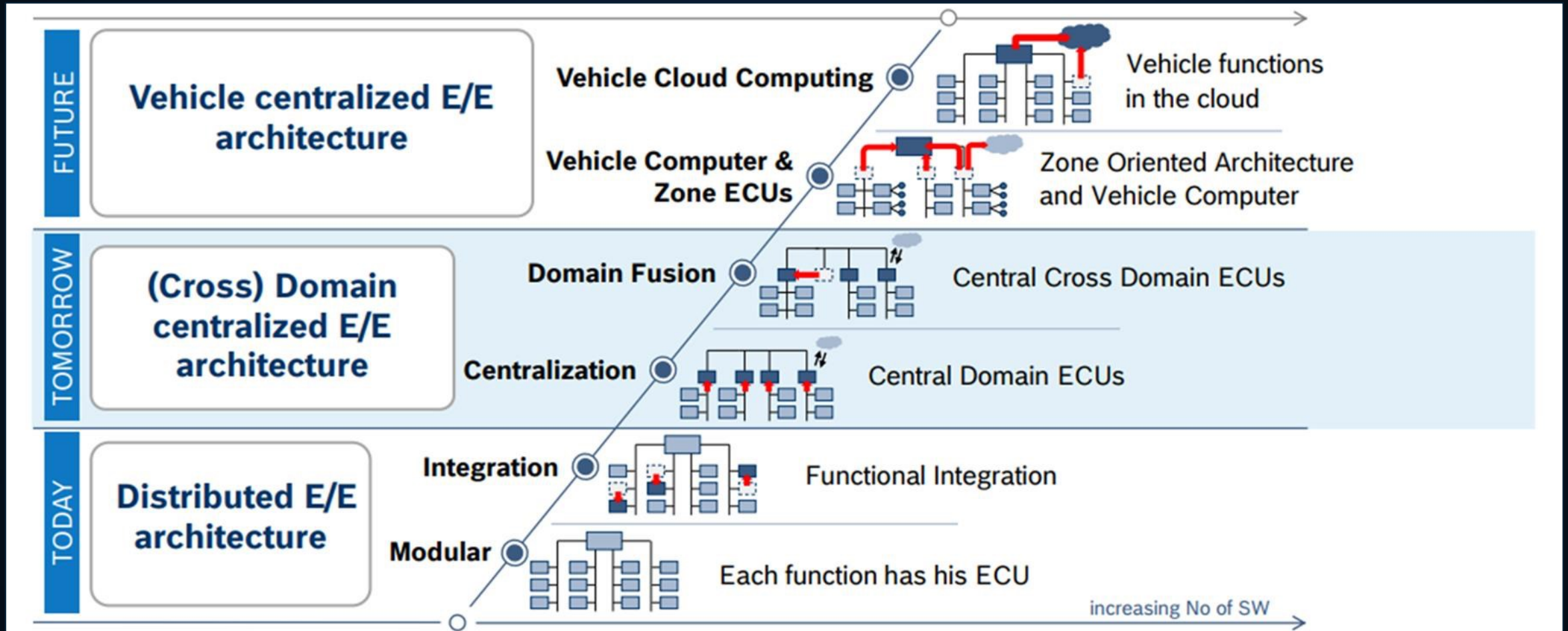

Voice Combined with Eye Movement Control

The front windshield is also used as a display device, the system tracks the user's line of sight, and the operating focus automatically falls on the content or options that the user is paying attention to.
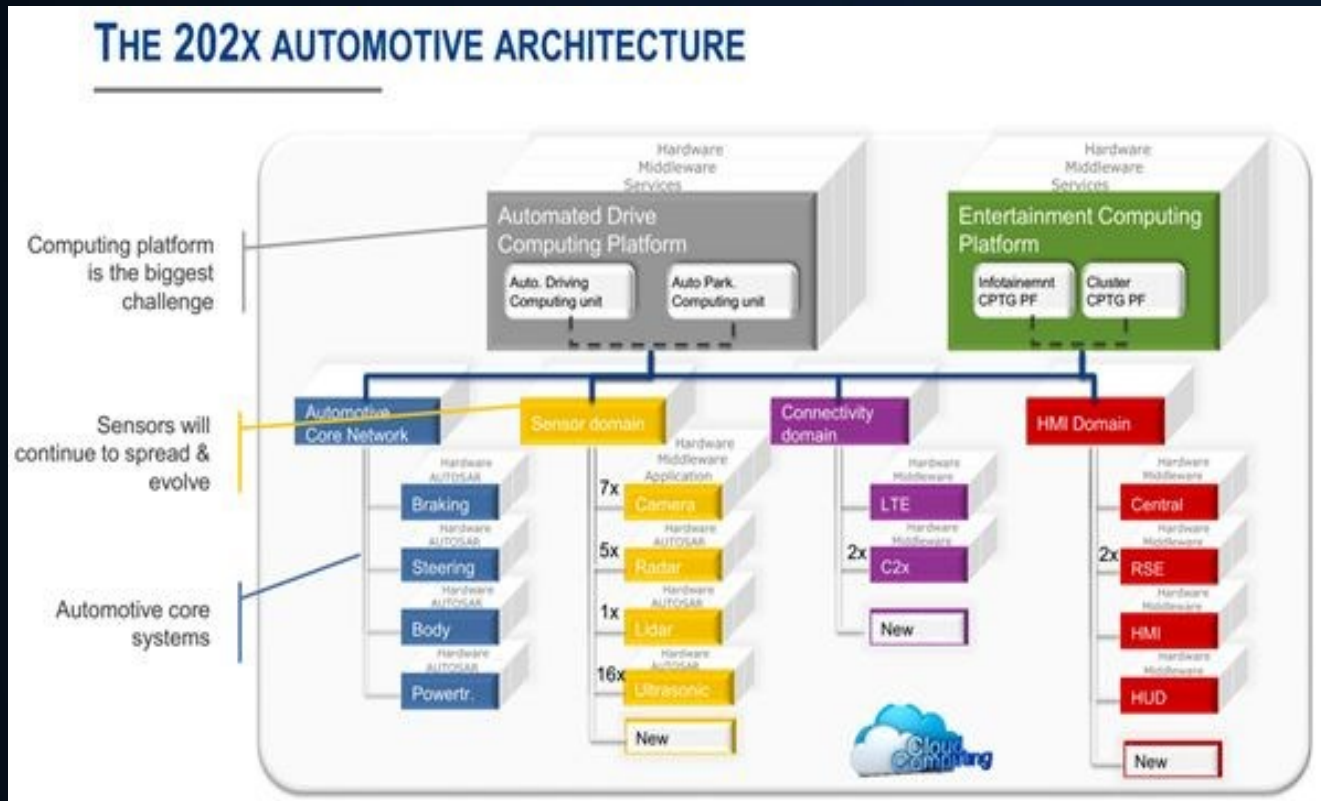
8

Other development trends on EE(Electrical and Electronics) basement architecture

Vehicle centralized E/E architecture

FUTURE
- Vehicle Cloud Computing — Vehicle functions in the cloud
- Vehicle Computer & Zone ECUs — Zone Oriented Architecture and Vehicle Computer

TOMORROW

(Cross) Domain centralized E/E architecture
- Domain Fusion — Central Cross Domain ECUs
- Centralization — Central Domain ECUs

TODAY

Distributed E/E architecture
- Integration — Functional Integration
- Modular — Each function has his ECU

increasing No of SW

THE 202x AUTOMOTIVE ARCHITECTURE

With the increasing complexity of automotive E/E architecture, especially the introduction of infotainment systems and video-based ADAS systems and autopilot systems, the problem of insufficient transmission bandwidth of the original in-vehicle network is highlighted, and the next generation of in-vehicle network technology and architecture is urgently needed. The car Ethernet technology came into being.

In addition to the bandwidth problem, the use of car Ethernet technology can also greatly reduce the weight of the entire vehicle harness and the cost of the harness, and improve vehicle economy.

The car factory introduces car Ethernet, which may be divided into three stages:**1）Subsystem level 2）Architecture level 3）Domain level**

The Car Ethernet

08

OEM	Production time	Description
BMW	2021 Q1	Gigabit Ethernet
VW	2021 Q2	Gigabit Ethernet
Volvo	2022 Q2	Gigabit Ethernet
GM	2019 Q4	Gigabit Ethernet
Chrysler	2020 Q3	Gigabit Ethernet
Great Wall Motor	2020 Q1	Gigabit Ethernet
Geely Auto	2021 Q2	100M Ethernet reserved Gigabit

Waymo is a Google-based driverless technology company. In the L4 driverless design, Waymo faces the following challenges：

- Need super computing power, because it is oriented to L4 ；

- But such a strong computing chip, only Intel and NV have, if you pass the car rules, you need to increase the time cost and capital cost, and because Waymo's demand and other unmanned car companies' needs and architecture design is different, maybe through the car rules This chip can't be recognized by other unmanned car companies, so it can't help Waymo to spread the cost of chip development.

Waymo has been evaluated and made the following design changes ：

- Using Intel's common commercial Xeon server CPU, there are no more car rules ；

- However, considering that the function of the software will iterate quickly, resulting in tight hardware resources, the core computing unit is made into a pluggable card. When the computing power is insufficient after two years, the card can be replaced and a performance can be inserted. Stronger card. Waymo calls this idea a "Computing Card" in the car.

Comput08 Card

There are currently two mainframe manufacturers, Daimler and Volvo, following up on Waymo's design ideas and introducing them into the cockpit area：

Redesigning the cockpit architecture for domain integration；

In the entertainment domain, using a common processor-based computing card as a domain controller；

The processor does not require vehicle specifications, but requires high performance to meet the requirements of virtualization and multitasking expansion.；

To achieve separation of software and hardware, replace the computing card after two years, requiring the software to be modified on a small piece of hardware without any redevelopment.

08 Smart cockpit

Under the influence of intelligence and network connection, the vehicle interactive system, car interior, seat system and other aspects have become more intelligent and more human, and the interior space of the car has become as comfortable as home.

In general, the smart cockpit system includes a large display, intelligent sound system, seat system, various smart interiors and a powerful cockpit domain controller.

Nowadays, the popular cockpit electronic platform integrates various cockpit functions such as instrumentation and infotainment into a single computing platform for processing. It supports multiple systems through virtualization (Hypervisor) technology to drive multiple screens, supporting both real-time digital instruments. Sexual requirements can also meet the content richness requirements of infotainment systems.

Fusion between " in-vehicle multi-media" and internet company's ecosystem

The relationship between car networking ecology and internet ecology

Generalized car network

human

Internet ecology

With the rapid development of Internet technology, the car networking ecosystem is also making continuous progress. The broad-based car networking ecosystem includes the Internet of Things, V2X, etc., and the two parties jointly aim to serve users, connect with each other, and cross each other.

The benefits of both communication and integration

1) **Content enrichment:** from local music, FM, to enjoying massive cloud-connected content

2) **Scene enrichment: smart home:** Great Wall Motor + Baidu + JD + (Tencent, MI, etc.)

3) **Online and offline integration:**express delivery to the car: Geely Lynk&co 02

4) **Improve the quality of life in the car**: K song car: Xpeng Motors

5) **Face payment:** CHERY EXCEED

6) **Parking lot no payment platform:** ETCP

Bottlenecks and problems
08

1) The security risks caused by online video such as Tik Tok, iQiyi, etc.

2) WeChat social software and navigation, car GPS, car voice access

3) Synchronization of accounts

4) Vertical screen OR horizontal screen: ecological problem

BYD solution: rotating screen WHY?

Because the Internet of Vehicles is still a small ecosystem

belonging to the Internet.

More than 90% of TOP100 mobile apps are vertical screens.

Especially the vibrato and short video ecosystem are vertical screen

culture.

What is the next generation of car multimedia?

In the era of automatic driving, the car is the third space for independent movement, and the meaning, function and use of multimedia have a richer extension:

1.The car multimedia system should be based on more professional hardware conditions such as audio, large screen, AR HUD, etc;

2. With better software conditions, such as rich genuine audio and video content sources, etc;

3. It can enable users to enjoy information and information more conveniently in the car, and jointly create a professional audio-visual entertainment experience similar to that of a car theater

4. In addition to audio and video entertainment functions, the in-vehicle multimedia system should also include a dedicated in-vehicle office multimedia system and in-car multimedia social tools (including in-car text social/voice social/video social/3D holographic projection social, etc.), multiplayer interactive game system (including somatosensory games), etc.

What is the next generation of car multimedia?

Entertainment use

Networked, LED screen, support shaped screen / OLED flexible screen / integrated screen

1. Music playback: local music / CD + AUX + SD + USB;

2. Radio: FM+AM/Online Internet Radio;

3. Video playback: local video;

4. Support mobile phone interconnection solutions such as CarLife/CarPlay;

5. Voice interaction:

Open up the intelligent voice interaction of the Internet service ecosystem;

6. Simple multi-screen interaction:

The entertainment function information is displayed in the instrument panel/HUD/air conditioning control screen, which can be easily exchanged through the protocol;

7. Multimedia entertainment information system platform and rich content resources with dual network convergence of satellite broadcasting network and terrestrial cellular network;

8. AR enhanced display can be applied to any screen, including HUD and central control screen;

9. Customized holographic projection, users can display the contents of the screen in multiple areas of the car, not only support display, but also support interaction, similar to virtual assistant.

10

What is the next generation of car multimedia?

Social use

1. Customized social software is pre-installed for the car; the social support in the car is as follows: text + picture + voice + small video social (for example: vibrating Tiktok) + live social + interactive game social;

2. Communication social:

Support Bluetooth phone + seat bone conduction call (free headset, support multiple calls at the same time, different passengers can not hear each other) + earphone bone conduction call (support single);

3. Support complex team travel: positioning + navigation screen sharing + support mobile phone route planning sharing + route 3D visualization.

What is the next generation of car multimedia?

Office use

1. Support car video conference call (support live-action screen; does not support file screen sharing), support voice memo + voice memo to text + memo share to mail / social software (such as WeChat); back row support tablet record MEMO;

2. Calendar event mobile phone, car two-way synchronization (not only can be seen in the car, but also editable);

3. The rear screen of the car machine system supports check + edit mail; mail account login / offline; draft box synchronization;

4. Support handwritten tablet handwritten mail / check / forward mail when parking;

5. The front row supports car-specific customized office software operation based on holographic projection/gesture recognition/eye movement control (in combination with hardware).

What is the next generation of car multimedia?

Game use

1. A co-pilot or master driving can support small games based on gesture recognition, such as cutting fruit;

2. When racing, the racing game based on the steering wheel;

3. Small games (voice-based interactive quiz games);

4. Parking support: car version of online competitive games; action adventure game car version;

5. Support holographic projection and holographic interaction games.

What is the next generation of car multimedia?

Snapchat
Colorful life, lightning record
★★★★☆ 179
Obtain

亲密好友
小视频社交App

多闪
+ 8↓
我的随拍
伤心boy   kin   你的可爱   今天哥
小仙女
Tony   明天去打球咯，哥们
小鸡的猫咪叫条条   回复了你的随拍
抖音搞笑视频分享群   [有人@你] neko: 小小熊 这个人像你
消息   ○   世界
👍

视频短信
有话，小视频说
< ⑤   奶油小菜   •••
23:01
😃 ❤️
2037
发消息...

随拍
多彩生活，闪电记录
< 小仙女   ×
回复 小仙女...

Small video social era

Thanks for listening