
China's Auto Industry in the Age of Disruption

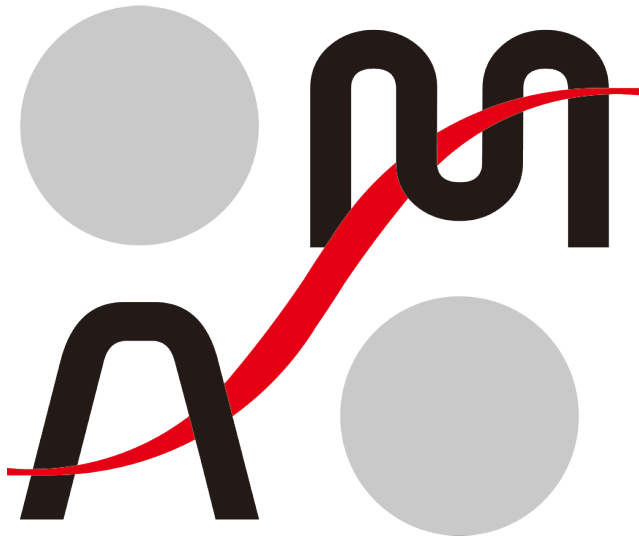
The Birth of the “Automobility” Business Model



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What is Automobility?



- Mobility needs are increasingly being served through “usership”
- On-demand mobility services are a paradigm-changing development
- It requires a complete rethinking of the way to deliver value to the market
- To succeed, companies must expand their focus from the product (the automobile) to the utility derived from the product (“automobility”)

Our recent auto industry publications



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The Evolution of Personal Mobility

Status of China's Auto Market

Emerging Disruptions of China Auto Market

Future Mobility Scenarios

The evolution of personal mobility...

Horse-drawn carriage



- First form of vehicular travel
- Uses “horse power”
- Abundant use of wood, and little metals along with leather; Furniture makers were a big part of the supplier chain

Internal combustion engine



- 1886 - The birth of the modern “automobile”
- Self-powered vehicles fitted with internal combustion engines
- Early automobiles had to be lightweight for the low powered engines and were still wood-built coaches

Industrial automobiles



- 1908 - The first mass produced automobiles
- More powerful and reliable engines with transmissions
- Assembly line, Interchangeable parts, beginning the use more metals especially brass throughout the
- Tire manufacturers were born

...what will the future look like?

Golden era



- 1920-1970 Vehicles grew in size and were more powerful
- Fully enclosed cabins, standardized controls, creature comforts
- Abundant use of metals and innovation in features and functions, initially focused on mechanical and powertrain systems

Modern Automobile



- Engineered to optimize highway driving speeds and occupant safety – therefore over-engineered for urban mobility
- Initial deployment of alternate power sources or “new energy vehicles”
- Occasional use of composite materials and lightweight alloys
- Early adoption of modern smart devices and mobile connectivity with IOV

Future Urban Mobility Device



- Designed specifically for city-use
- Lower driving speeds and V2V crash avoidance technology reduce crash protection requirements and enable smaller and lighter vehicles made primarily of lightweight composites

Future Autonomous Cars?



- What will power these vehicles?
- Space-age materials and features?
- How will vehicles be used?

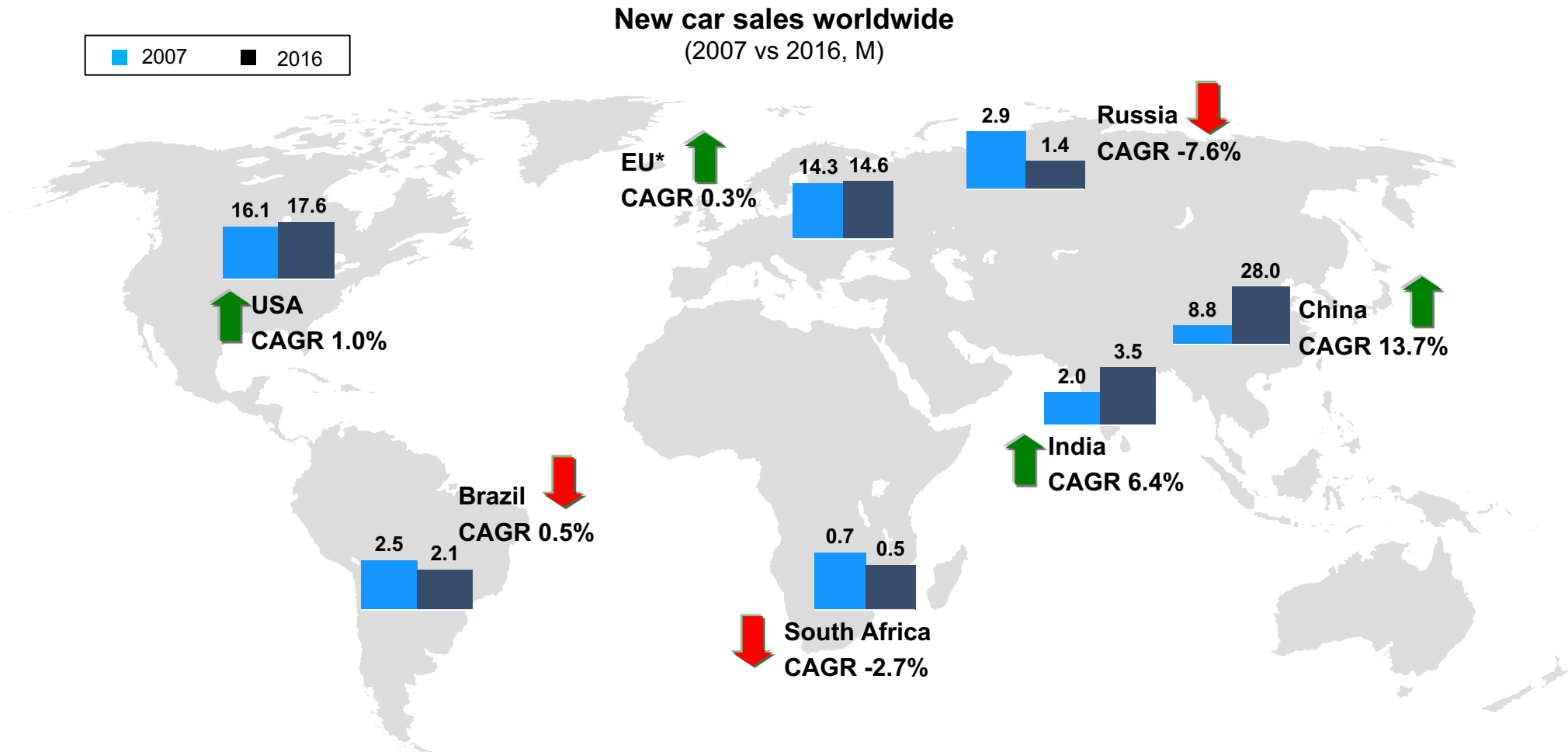
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For the global automotive market, Asia Pacific represents the greatest opportunity for growth



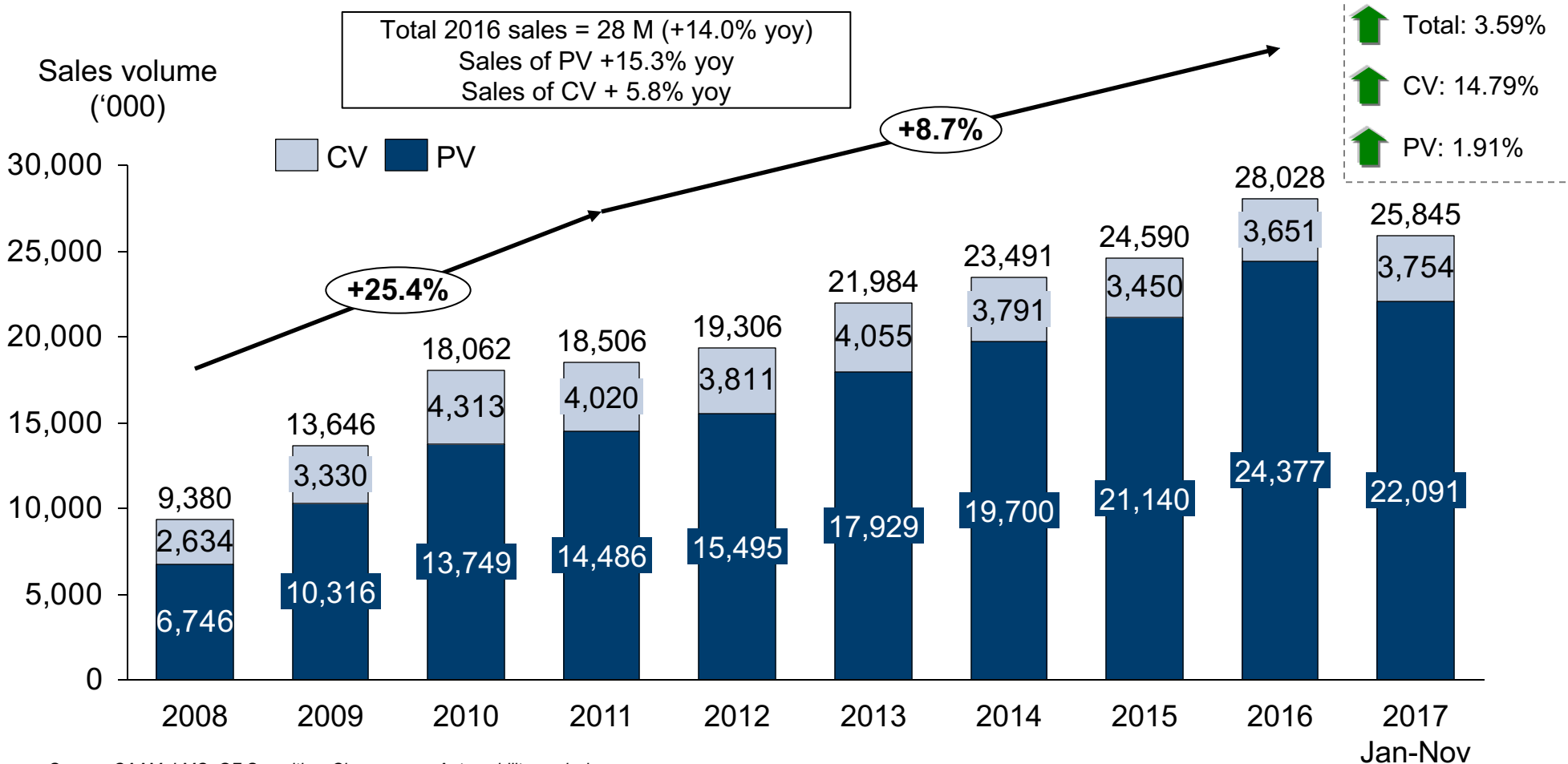
Note: EU new car sales volume was 2015 before the British Exit

Source: CAAM, Society of Indian Automobile Manufacturers, National Association of Automobile Manufacturers of South Africa, Association of European Businesses, LMC Automotive

After a period of explosive expansion, China's auto market has decelerated

Overall China Auto Industry by Sales Segments

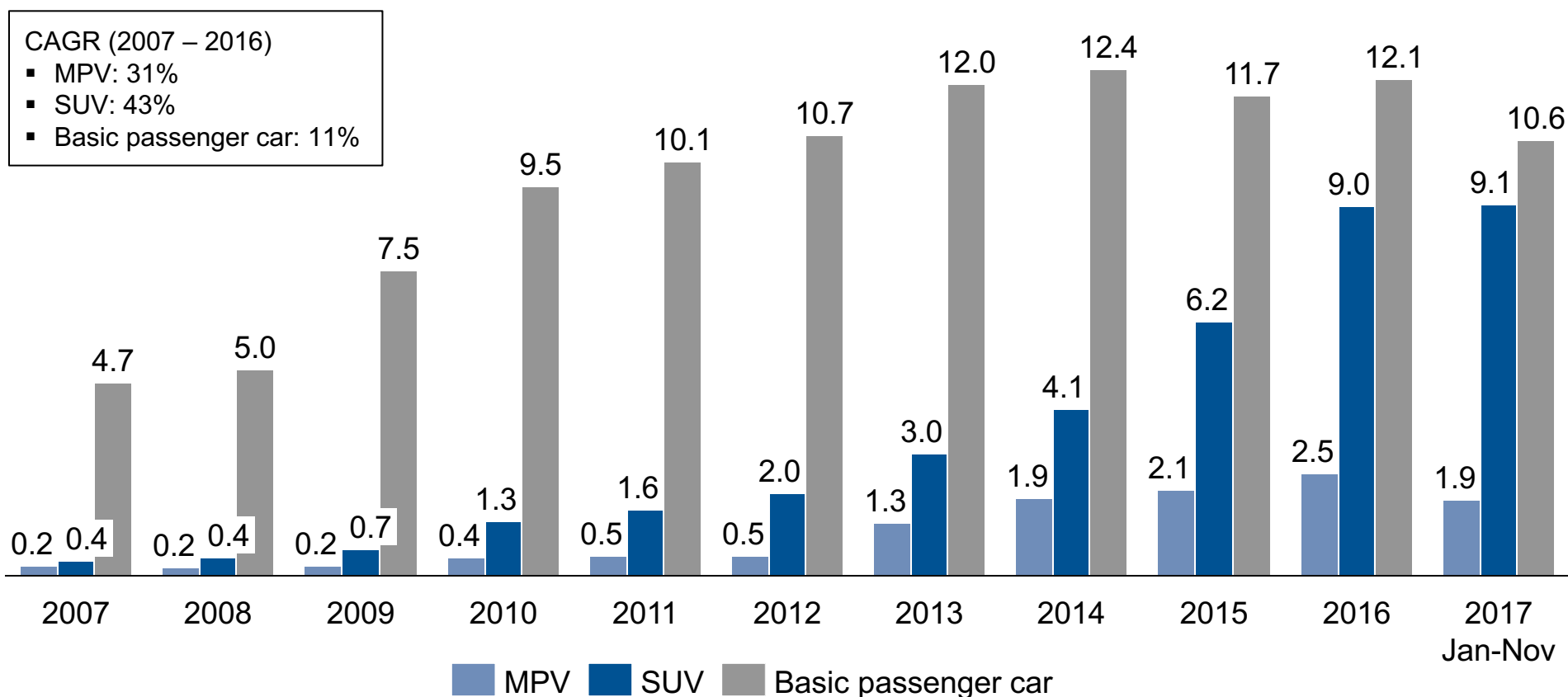
(2008-Nov. 2017, volume: '000)



Source: CAAM, LMC, GF Securities, Chexun.com, Automobility analysis

China auto demand has recently shifted to the SUV and MPV segments

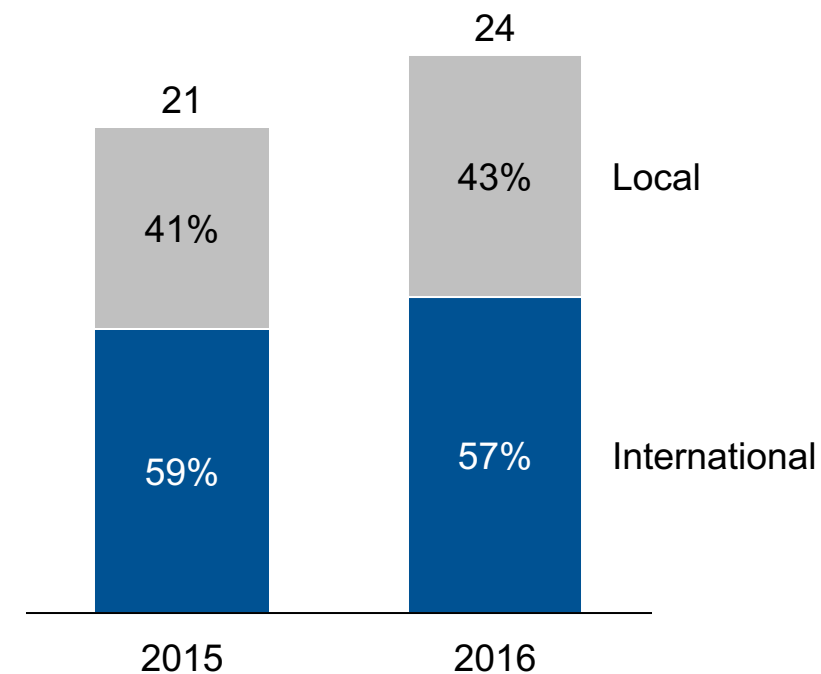
China new car sales volume: Basic passenger car vs. SUV vs. MPV
(2007-Nov 2017, Million Units)



Source: CAAM; *Automobility analysis*

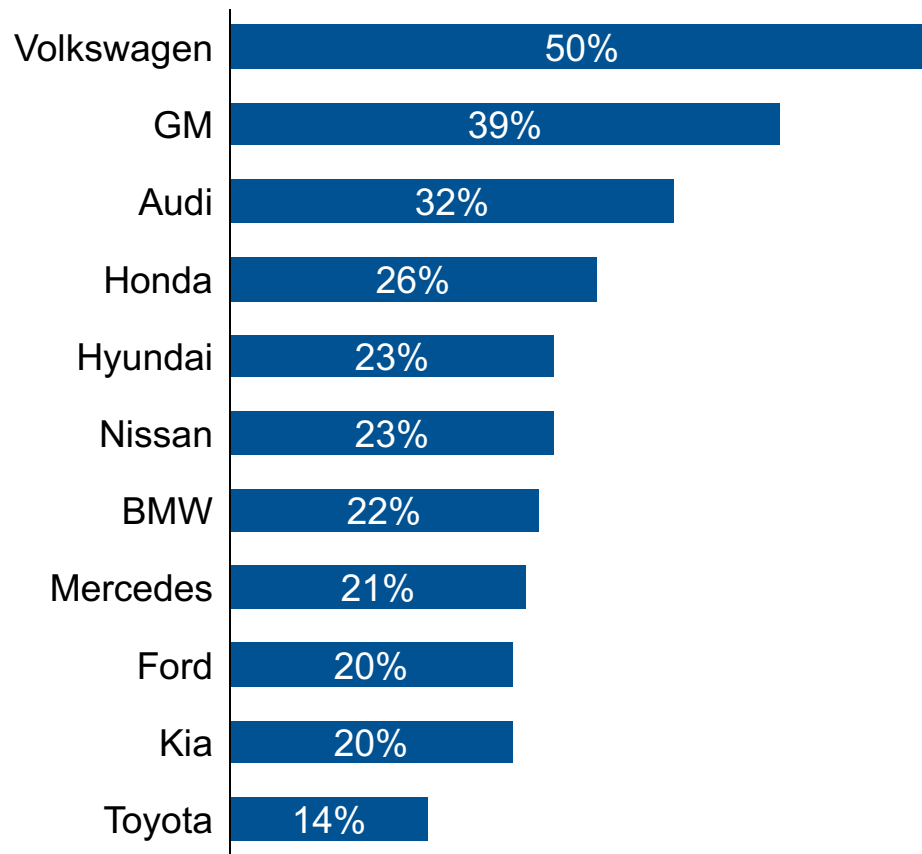
China is a significant market for global auto makers

China PV sales breakdown by brand region
 (% in terms of sales volume, Million units, 2015 vs. 2016)



- **Local OEM brand total PV sales surpassed 10M units** in 2016
- **International brand is still the majority** of total PV sales in China

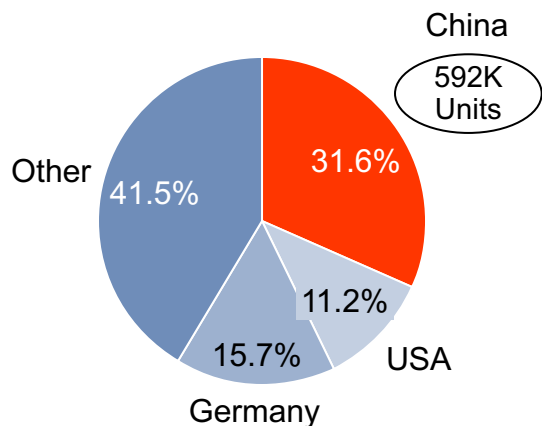
China sales as % of global sales by brand*
 (Partial list, 2016)



* Note: Volkswagen: Volkswagen brand only; GM includes Buick, Chevrolet, Cadillac, Baojun, and Wuling
 Source: CAAM, Company announcement, Sohu Auto, Sina Auto, Autohome, Focus2Move, Automobility analysis

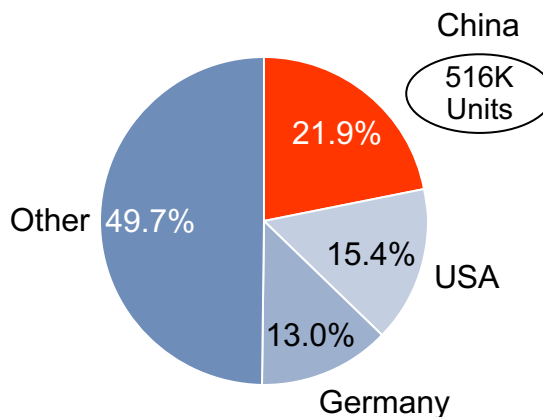
For all of these luxury car brands, China has become their most important market

Market sales share of major brands (2016)

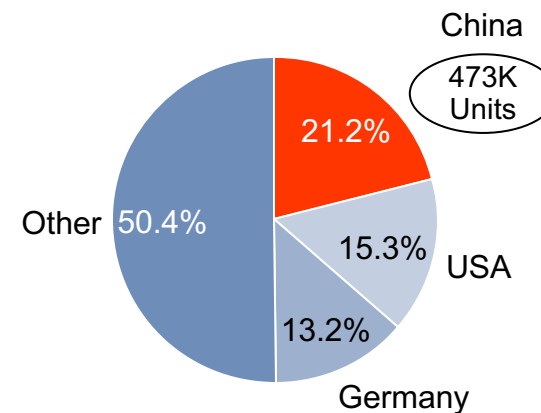


Global Sales

1.87M Units



2.36M Units



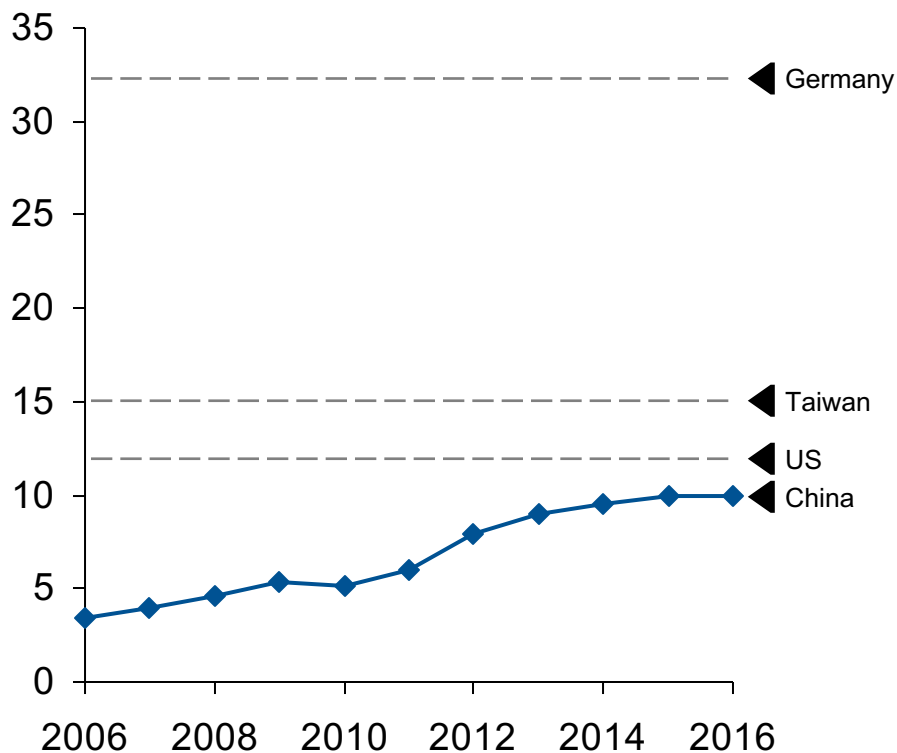
Mercedes-Benz

2.23M units

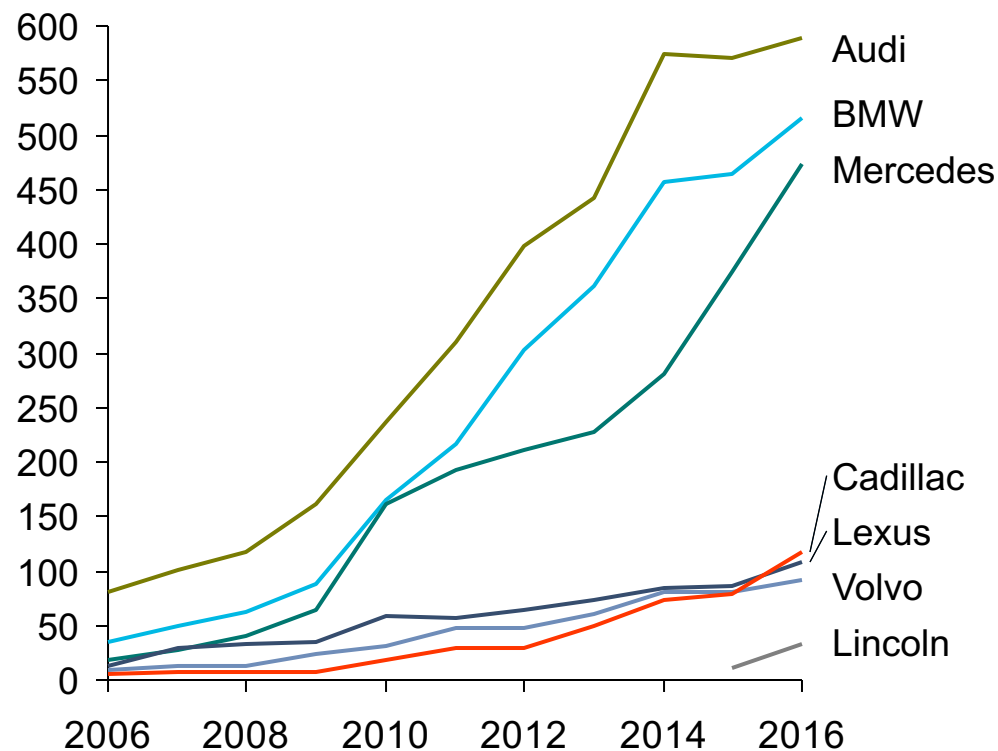
Note: Percentages may not add up to 100% as they are rounded to the nearest percent
 Source: Company announcements, Automobility analysis

The premium segment has outpaced overall market growth and still has headroom for growth

Premium Car Sales as % of Total PV
(%, 2006-2016)



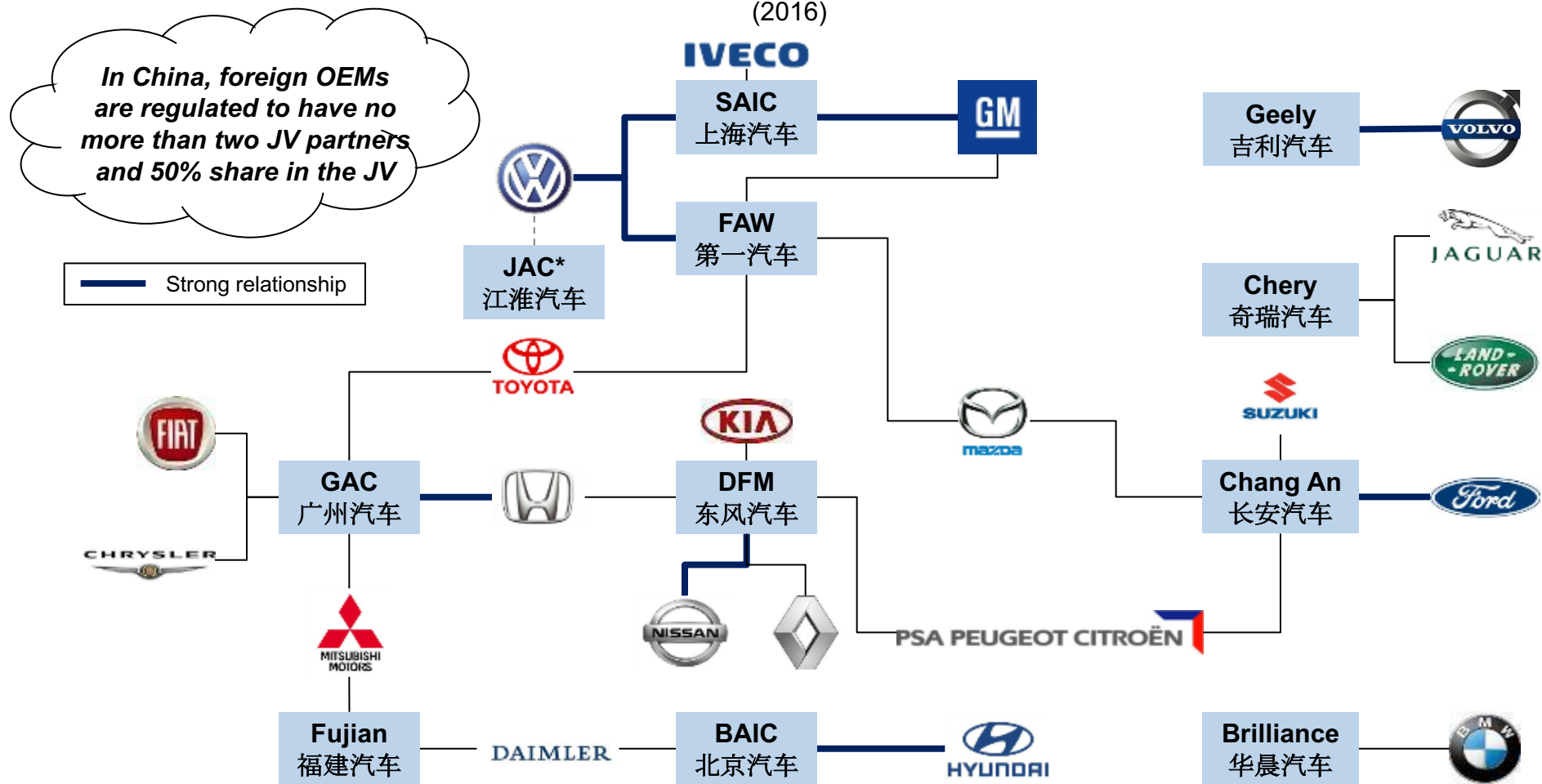
Major Premium Brand's Sales History in China
('000 Units, 2006-2016)



Source: Global Insight, Sina Auto, Automobility analysis

Currently, most foreign auto OEMs select partners from nine major state-owned auto groups

Global OEM JV partnership structure in China (2016)



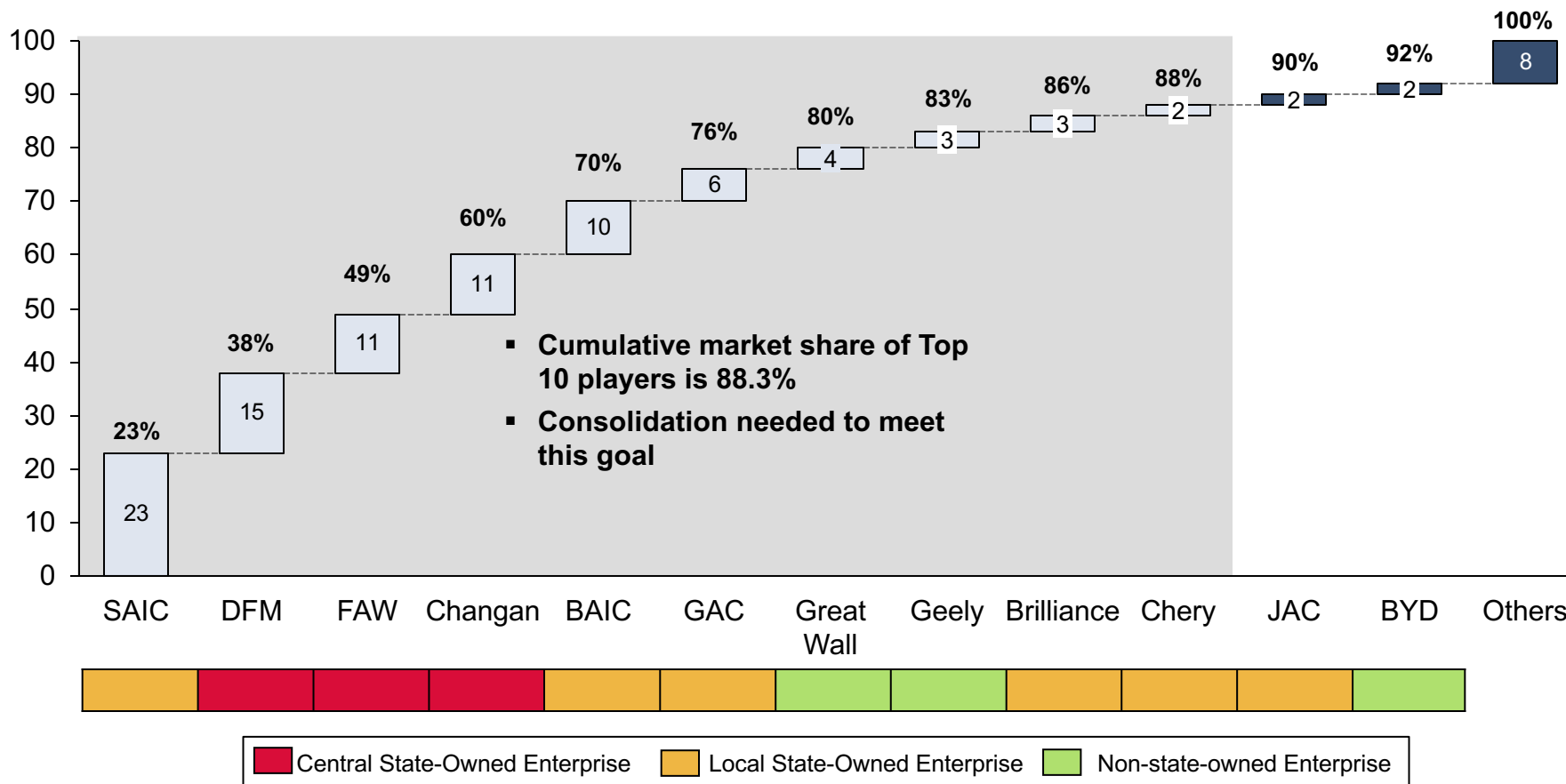
Note: Volkswagen Group is planning to establish a JV with JAC to build electric vehicles

Source: Literature research, Automobility analysis

The top 10 manufacturers represent a mix of Central, Local and Non-State-Owned Enterprises

Cumulative Market Share of Top Auto Players in China
(% in terms of sales volume, 2016)

Market Share



Source: CAAM, Company announcement, Automobility analysis

Local brands dominate in SUVs, while international brands leads the sedan category

Top 10 selling SUVs in 2016

Rank	Model	Manufacturer	2016 sales ('000)
1	Haval H6	Haval	580.7
2	GS4	GAC Trumpchi	327.0
3	Baojun 560	SGMW	321.6
4	Envision	Buick	275.4
5	Tiguan	VW	240.5
6	CS75	Chang An	209.4
7	Refine S3	JAC	197.9
8	Haval H2	Haval	196.9
9	CRV	Honda	180.3
10	X-TRAIL	Nissan	180.2

Top 10 selling sedans in 2016

Rank	Model	Manufacturer	2016 sales ('000)
1	Lavida	VW	478.9
2	Excelle-XT	Buick	370.4
3	Bluebird Sylphy	Nissan	368.0
4	Jetta	VW	348.4
5	Sagitar	VW	341.3
6	Santana	VW	318.3
7	Corolla	Toyota	306.5
8	Escort	Ford	296.9
9	Elantra	Hyundai	253.8
10	Emgrand	Geely	241.0

Source: CAAM, *Automobility analysis*

■ International brand
 ■ Local brand

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China's digital landscape by numbers



751M

Total Internet users in China (June 2017)



724M

Total mobile Internet users in China (June 2017)



980M

Monthly active users* on WeChat (Q3 2017)

mobike

200

Global cities with Mobike operations since April 2016

DiDi

450M

Didi users across 400 cities in China (2017)

Alibaba Group
阿里巴巴集团

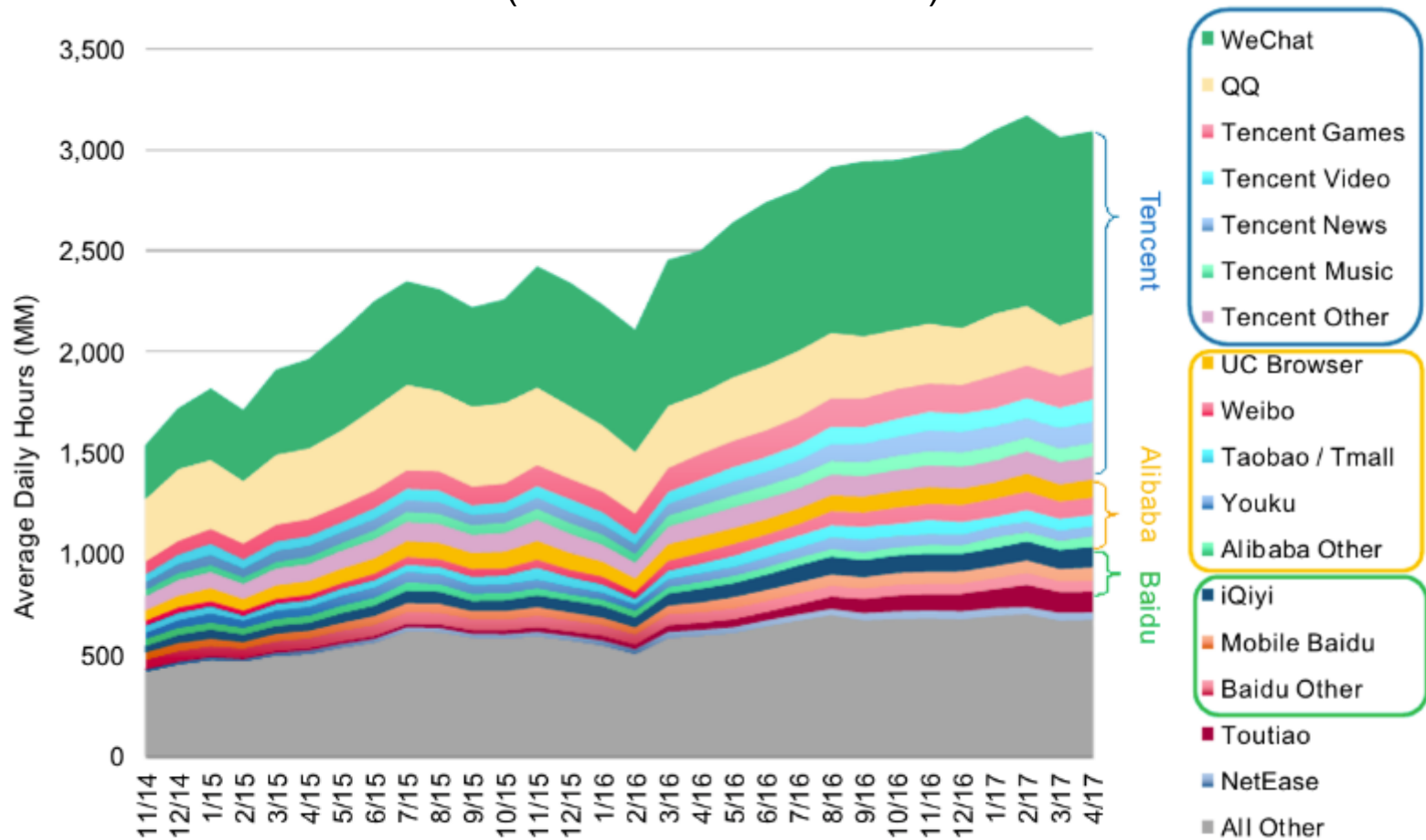
USD
25.3Bn

(GMV sales on Alibaba Singles' Day 2017)

Note: *Combined MAU of Weixin and WeChat; Numbers are latest published figures
Source: CNNIC, Literature research, Automobility analysis

Three major digital ecosystem players (Baidu, Alibaba, and Tencent) dominate users' time spent in mobile apps in China

China mobile internet daily hours by app
(2016/11/14 – 2017/4/17)



* Note: Only top 100 apps by time spent are categorized by company affiliation. Tencent, Alibaba and Baidu affiliates include strategically invested companies

Source: Kleiner Perkins and Hillhouse Capital "KP Internet Trends 2017", QuestMobile, Automobility analysis

Three key areas of disruption are emerging in China's automotive industry

The rapid rise of connected, on-demand mobility (ODM) and the digital mobility ecosystem

- **Expanding demand for mobility** in an increasingly urbanized world
- Connected, on-demand mobility services **challenge the traditional ownership model**
- Sticky digital ecosystems **disintermediate traditional B2C relationships**

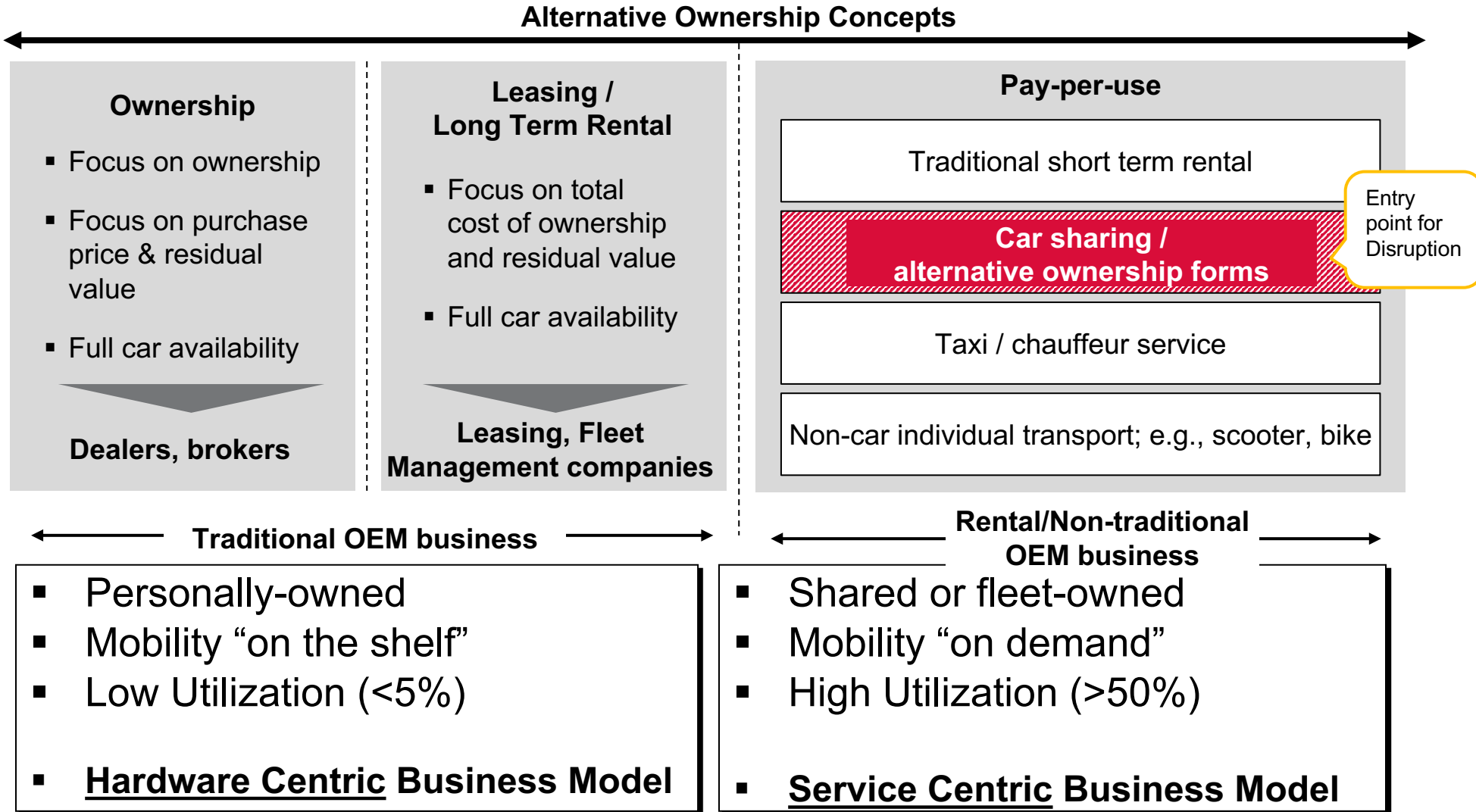
The link between hardware innovation and the economics of the digital ecosystem

- China is more **ready for electrification** than mature markets, driven by government policy, market forces, and a favorable production environment
- **Accelerated commercialization of new technology** including NEV and autonomous vehicles is driven by the economics of ODM

The explosive growth of Aftermarket services with rapid emergence of IAM and O2O platforms

- China's **auto aftermarket will develop fast towards independent aftermarket (IAM)**, driven by an aging car population, government push, and consumer preferences
- Emerging **service companies are disrupting the aftermarket value chain** with their strong C2B relationships and channel management capability

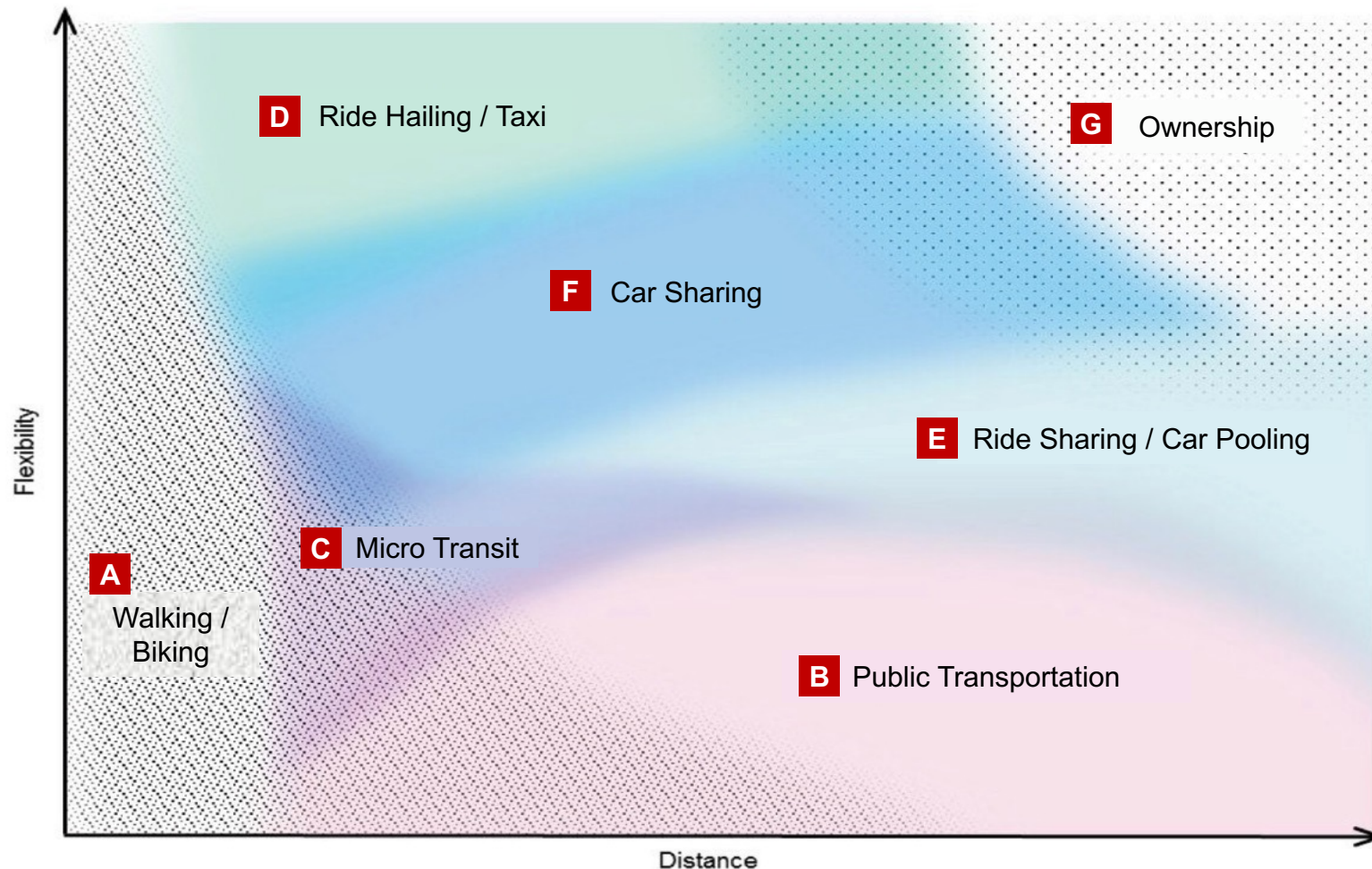
Today's consumers have several alternatives to address their mobility needs



Source: *Automobility analysis*

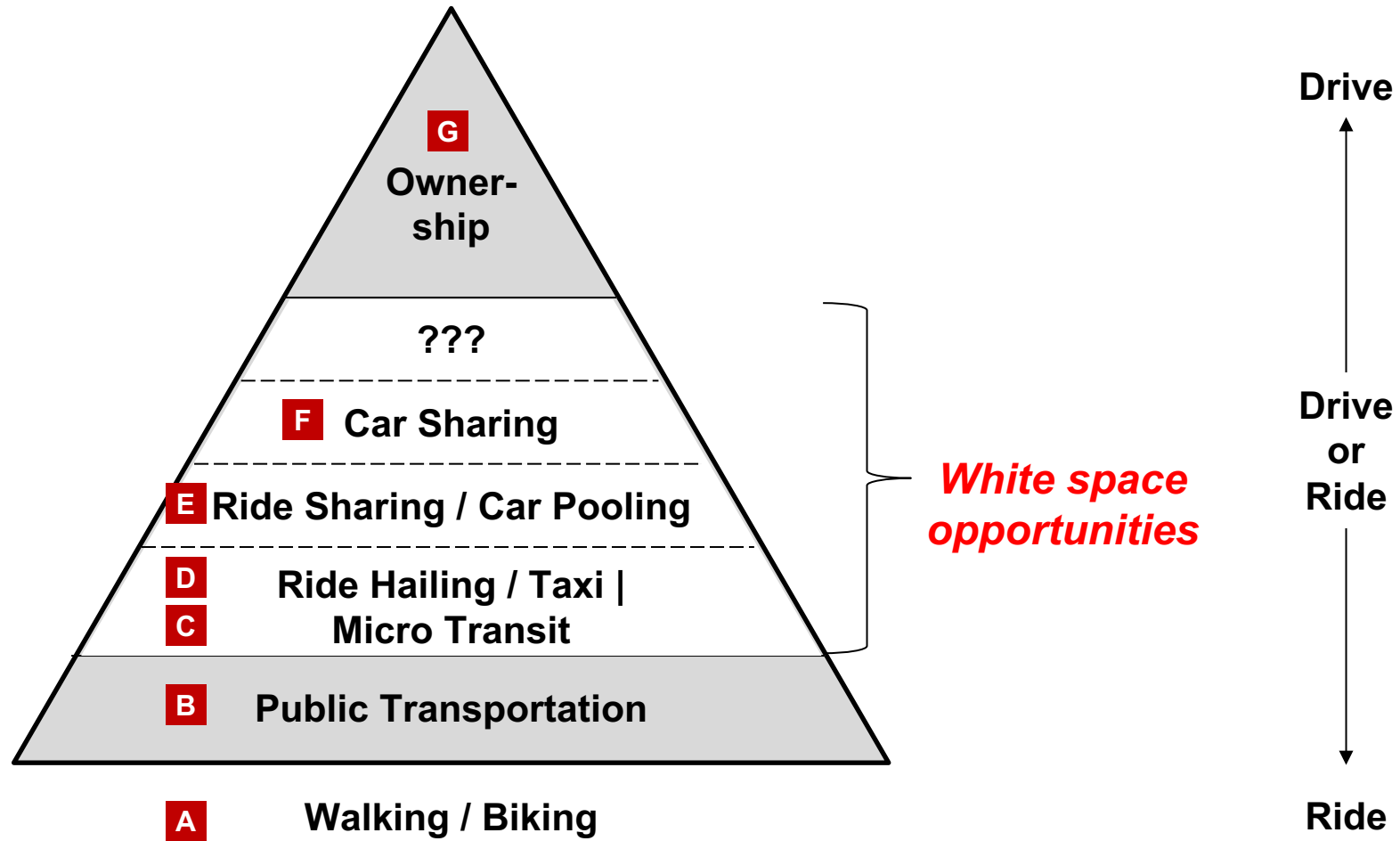
Mobility options by level of flexibility and travel distance

Use cases for different modes of transportation



Source: Center for Automotive Research; Automobility analysis

Driven by urbanization and affordability, new modes of transportation are emerging in the white space

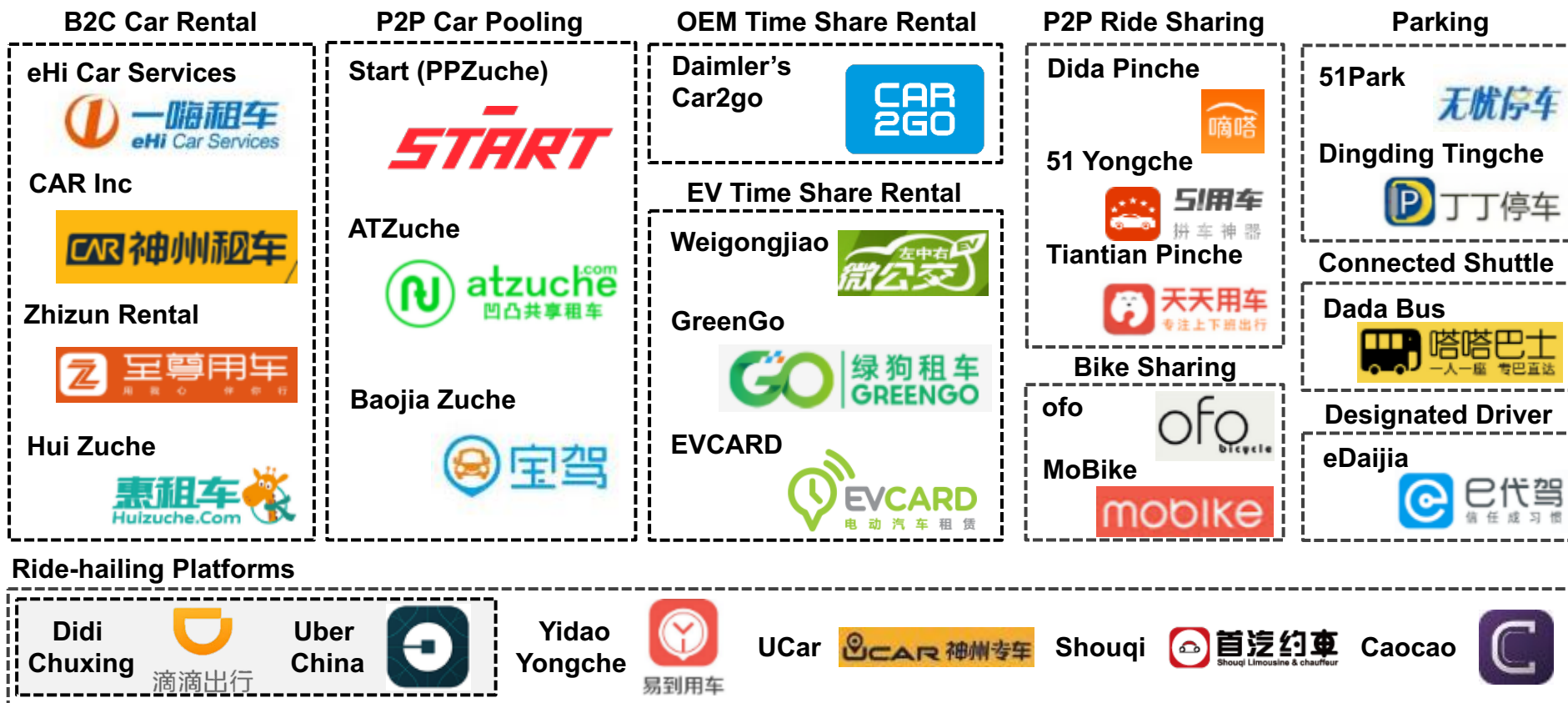


Source: Center for Automotive Research; Automobility analysis

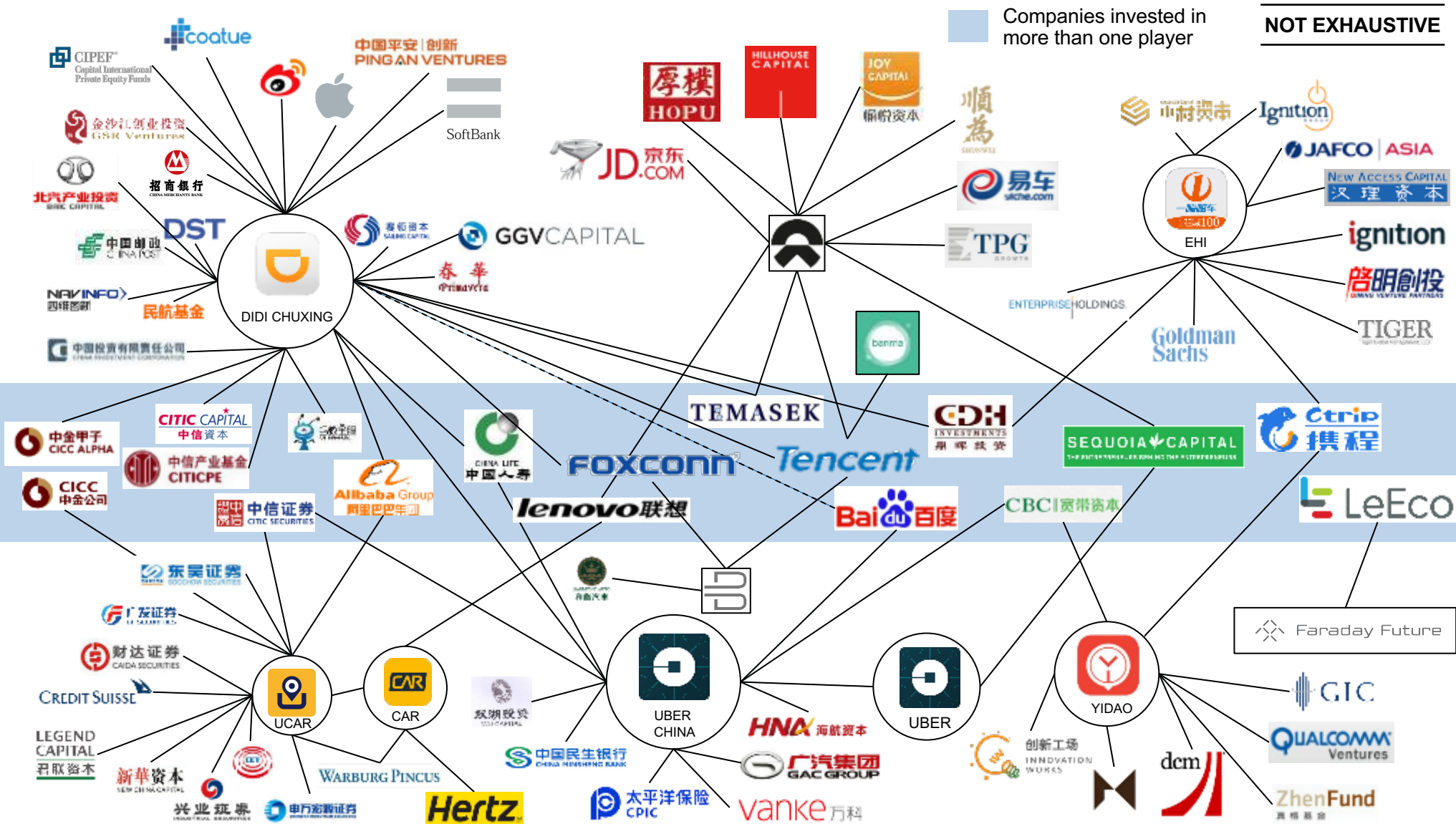
Besides ride hailing, companies are experimenting with other new mobility services

NOT EXHAUSTIVE

Landscape of On-demand Mobility Services in China



China mobility and EV companies investment landscape



Source: ITJUZI, Crunchbase

Didi Chuxing has built a one-stop mobility ecosystem

- **Oct 2015:** Launched “Didi Test Drive”
- **Aug - Sept 2015:** Invested in Ola (India), GrabTaxi (Southeast Asia) and formed strategic partnership with Lyft (U.S.)
- **May 2016:** Apple’s USD 1Bn investment in Didi
- **Aug 2016:** Uber China merges with Didi
- **Sept 2016:** Entered car rental market with eHi
- **Nov 2016:** Announced to form a JV with VW

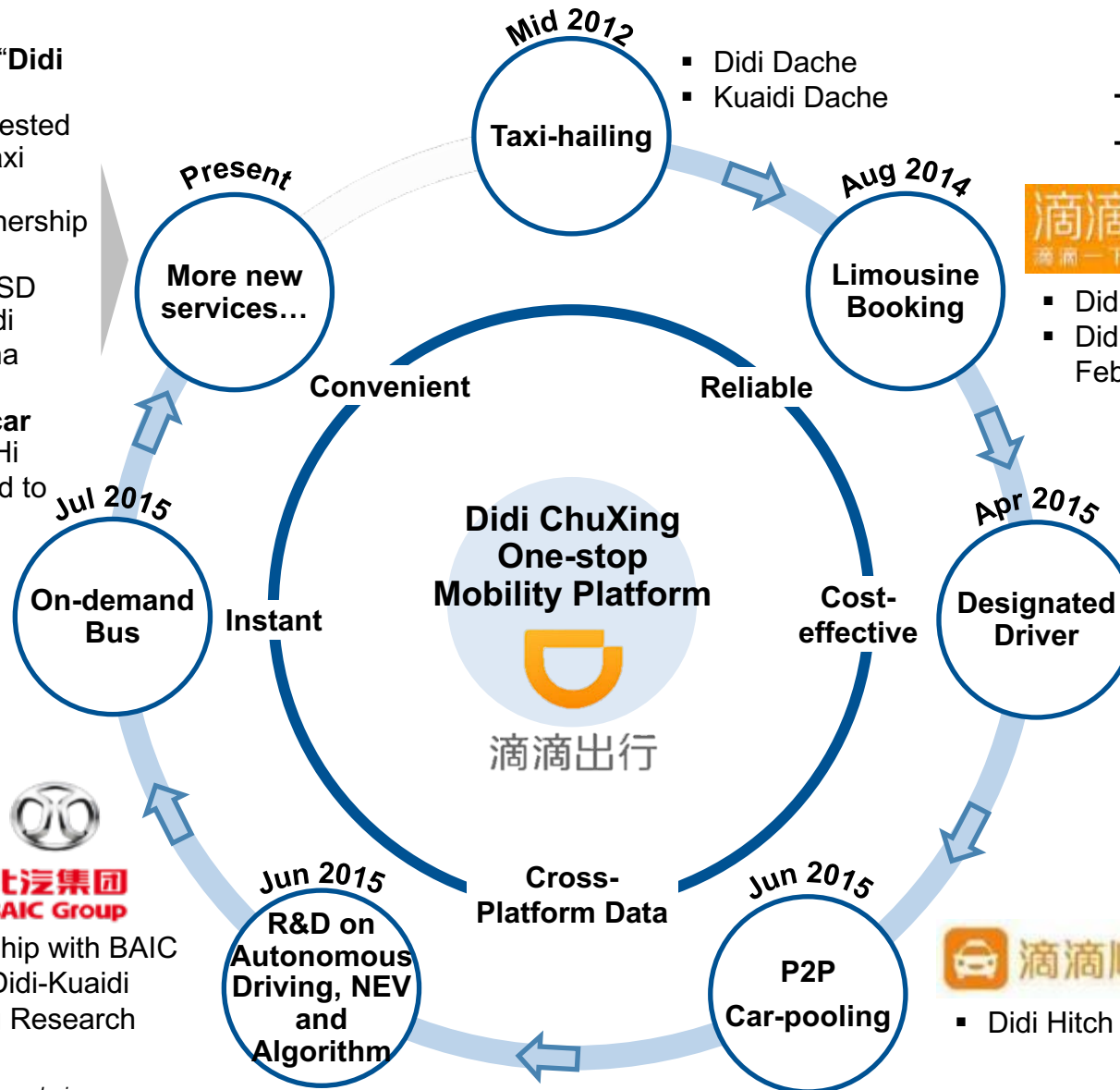


- Didi Bus



北汽集团
BAIC Group

- Strategic partnership with BAIC
- Established the “Didi-Kuaidi Machine Learning Research Centre”



- Didi Dache
- Kuaidi Dache

CASE EXAMPLE



- Didi ZhuanChe
- Didi and Kuaidi merged in Feb 2015



DIDI DRIVER

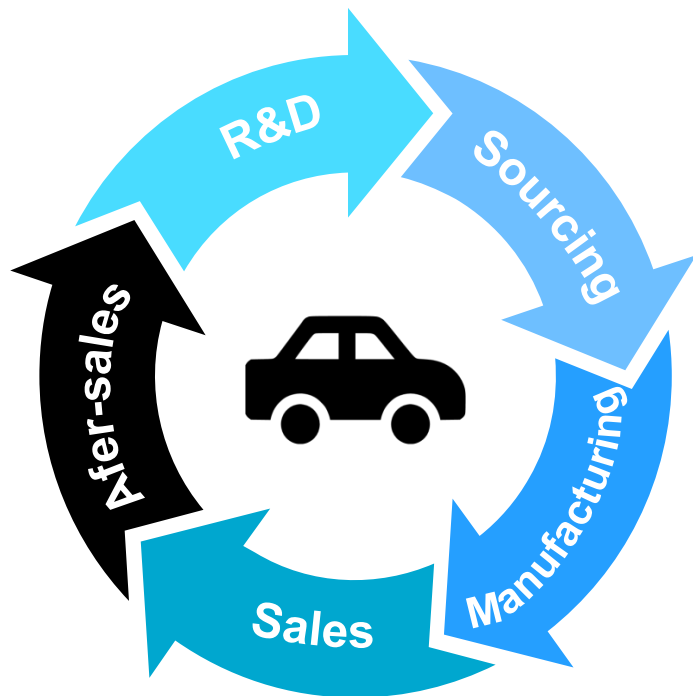
- Didi KuaiChe
- Didi Daijia (launched in selected cities)



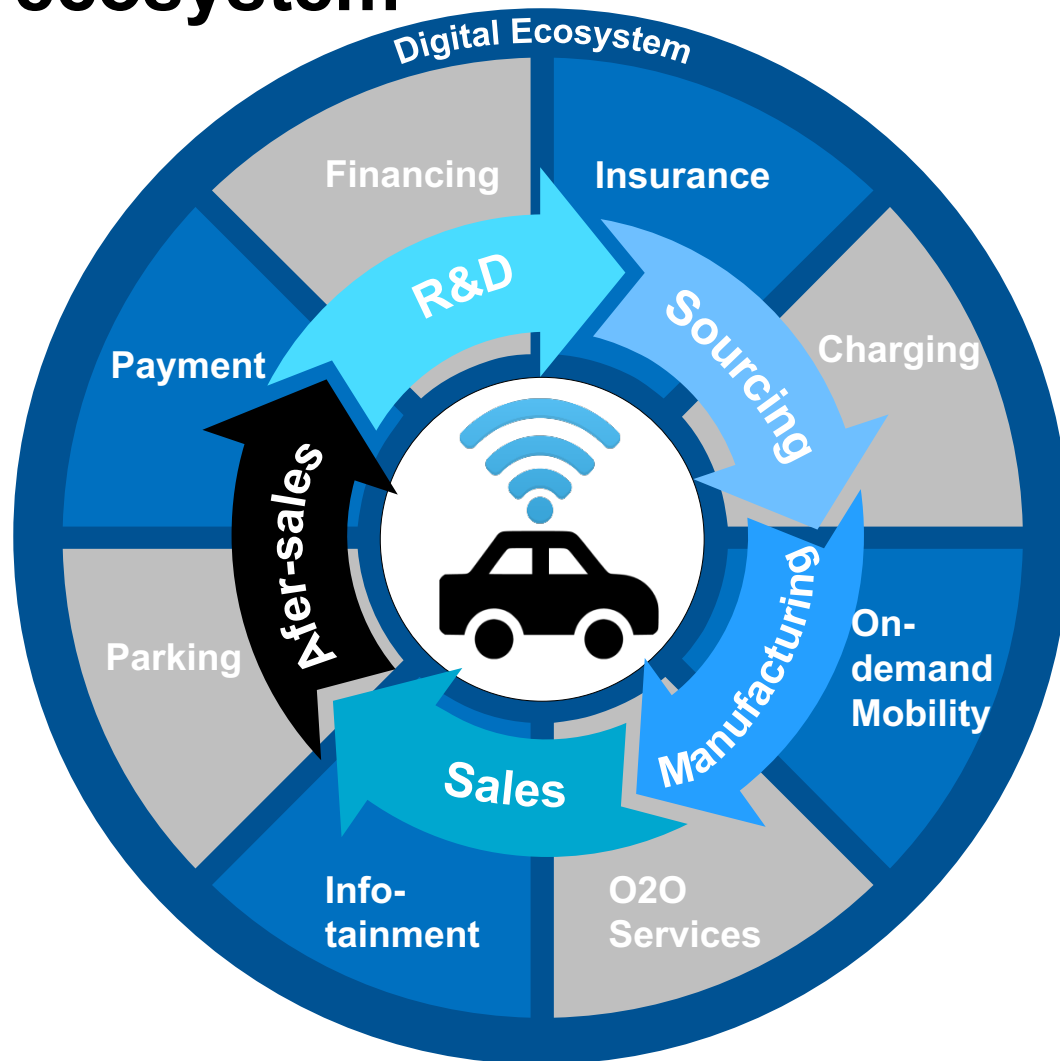
- Didi Hitch

Source: Didi Chuxing, Automobility analysis

The automobility world will be highly embedded in the exponential digital ecosystem



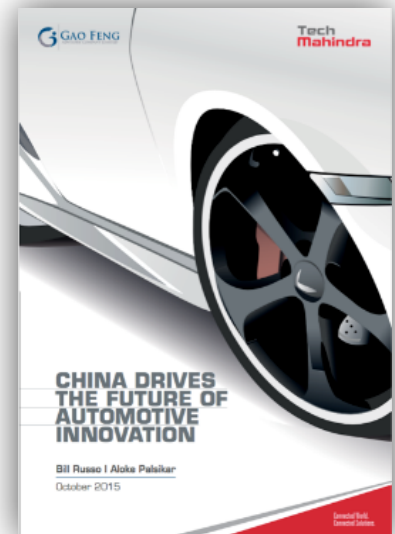
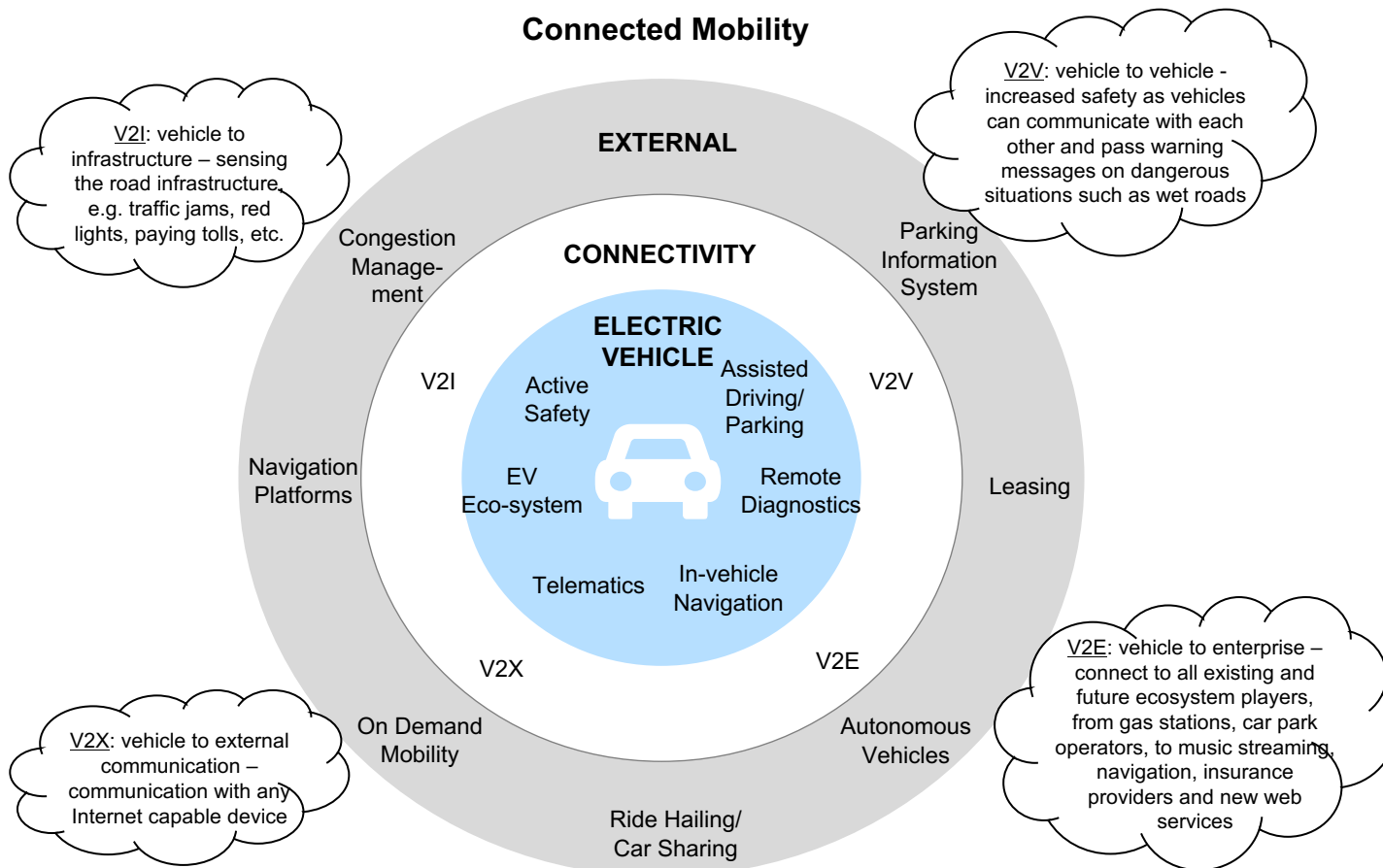
Vehicle Lifecycle-focused



Use Case and Scenario-focused

Source: Automobility analysis

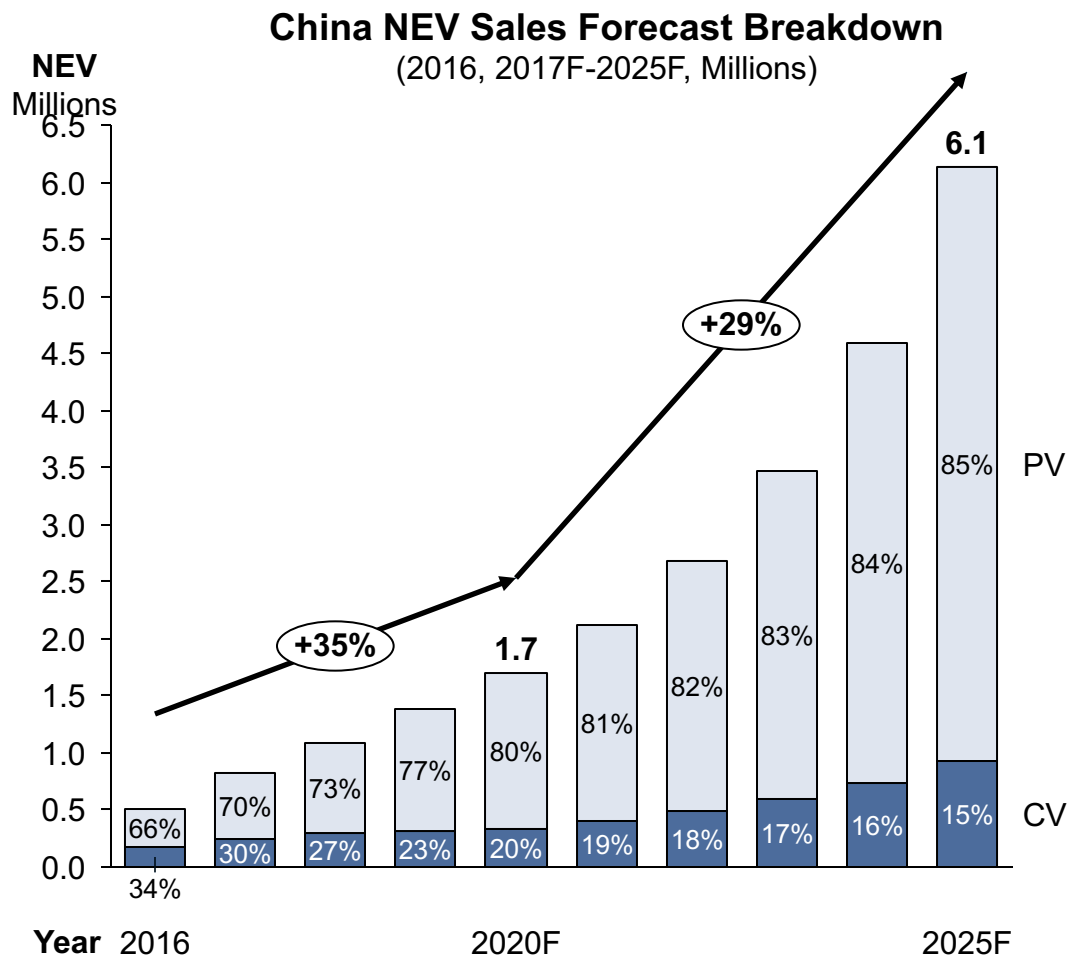
Connectivity is transforming the automobile into an intelligent platform for a wide variety of in-vehicle and external services



Further details can be found in our IC article co-authored between Gao Feng and Tech Mahindra, “China Drives the Future of Automotive Innovation” – Oct, 2015, Bill Russo, Aloke Paisikar

Source: *Automobility analysis*

China's NEV segment is becoming a fast growing part of China auto market, driven by policies



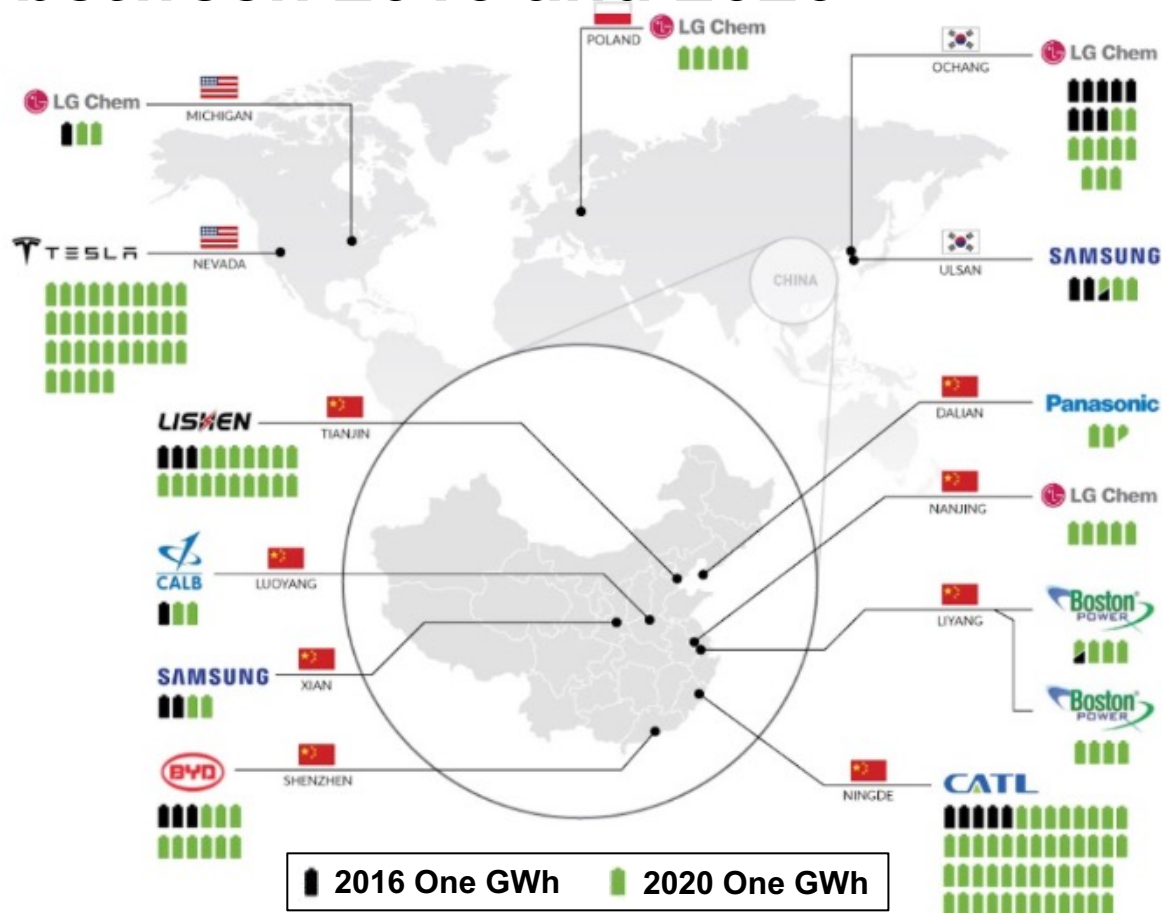
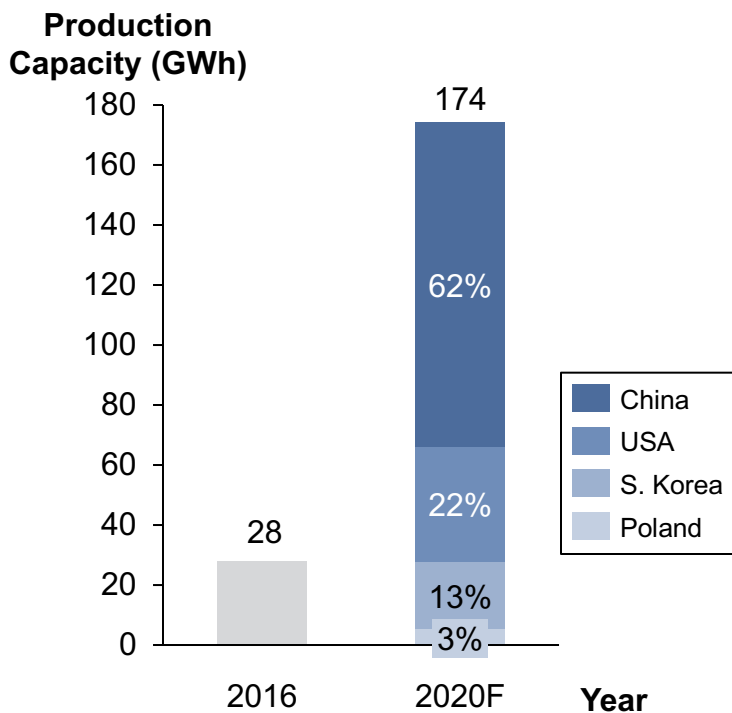
Highlights

- **NEV sales** will constitute **19%** of all new car sales in 2025 under our projected moderate disruption scenario
- The PV:CV split was 66:34 in 2016, and expected to reach a conservative national average of 85:15 by 2020
- The **growth** seen in the **moderate disruption scenario** are largely **driven** by **fleet adoption**
- A **higher rate of adoption** of NEVs is likely for **government-owned** and **ODM fleets**
- Although **conventional ICE vehicles** will **continue to dominate** new car sales and overall car PARC, **NEVs will become a fast growing and significant part of the market**

*NEV actual data from 2010-2016 used to project 2017F-2025F, based on reaching 5M NEV PARC by 2020
Source: National Bureau of Statistics of PRC, Automobility analysis

Global lithium-ion battery production is expected to expand over 500% between 2016 and 2020

Global Li-ion Production Capacity
(2016, 2020F, GWh)



By 2020, mass production of Li-ion batteries will be concentrated in four countries, with China being the largest

Source: Benchmark Mineral Intelligence, Literature Research, Automobility Analysis

NIO aims to build a “user enterprise” with connectivity at the core, with its ES8 all-electric SUV recently launched

Company background



CASE EXAMPLE

- Founded in 2014
- Backed by Tencent, Hillhouse Capital, Sequoia Capital, founder of Autohome, JD.com and BitAuto
- Senior Executives are experts from global technology and automotive companies
- Launched NIO brand and EP9, the world’s fastest electric car in Nov 2016
- Launched its first mass-produced model **ES8**, an all-electric SUV in Dec 2017



WILLIAM LI
Founder of BITAUTO



PADMASREE WARRIOR
Former CTO of Cisco



The ES8 sports utility vehicle, with a range of 500 kilometers (311 miles) on a single charge, retails at 448,000 yuan (\$67,783), half the starting price of Tesla's 836,000 yuan (\$126,470) Model X in China



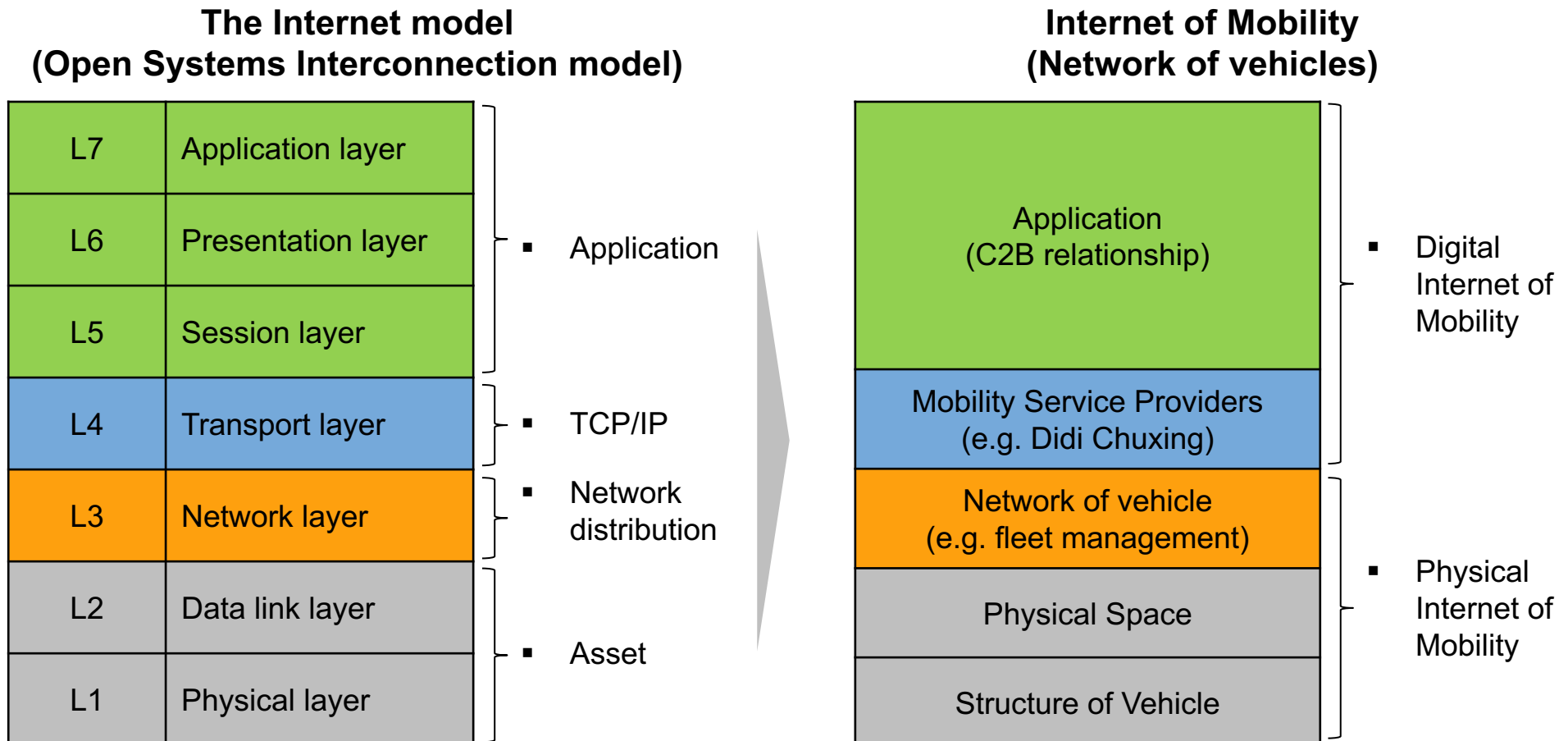
The seven-seat ES8 is made to order, customizable and equipped with an artificial intelligence system. The car will be able to accelerate to 100 km per hour (62 miles per hour) in 4.4 seconds.



At the launch, Nio introduced a battery charging plan with a rental subscription set at 1,200 yuan (\$181) a month. Nio plans to build 1,100+ "Power Swap" charging stations and deploy over 1,200 "Power Mobile" vehicles by 2020

Source: Literature research; Automobility analysis

Traditional automakers must expand from supplying hardware to creating a physical Internet of Mobility that enables the digital Internet of Mobility



Source: *Automobility analysis*

New mobility services are disrupting the traditional ownership value chain

Traditional Ownership Value Chain (B2C)



New Mobility Service Value Chain (C2B)



Further details can be found in our IC article “Collision Course: The Impact of the Mobility Revolution on Automotive Retail Networks in China” – Mar 2017, Bill Russo

Traditional players must expand their focus beyond just the product to the utility that is derived from the product

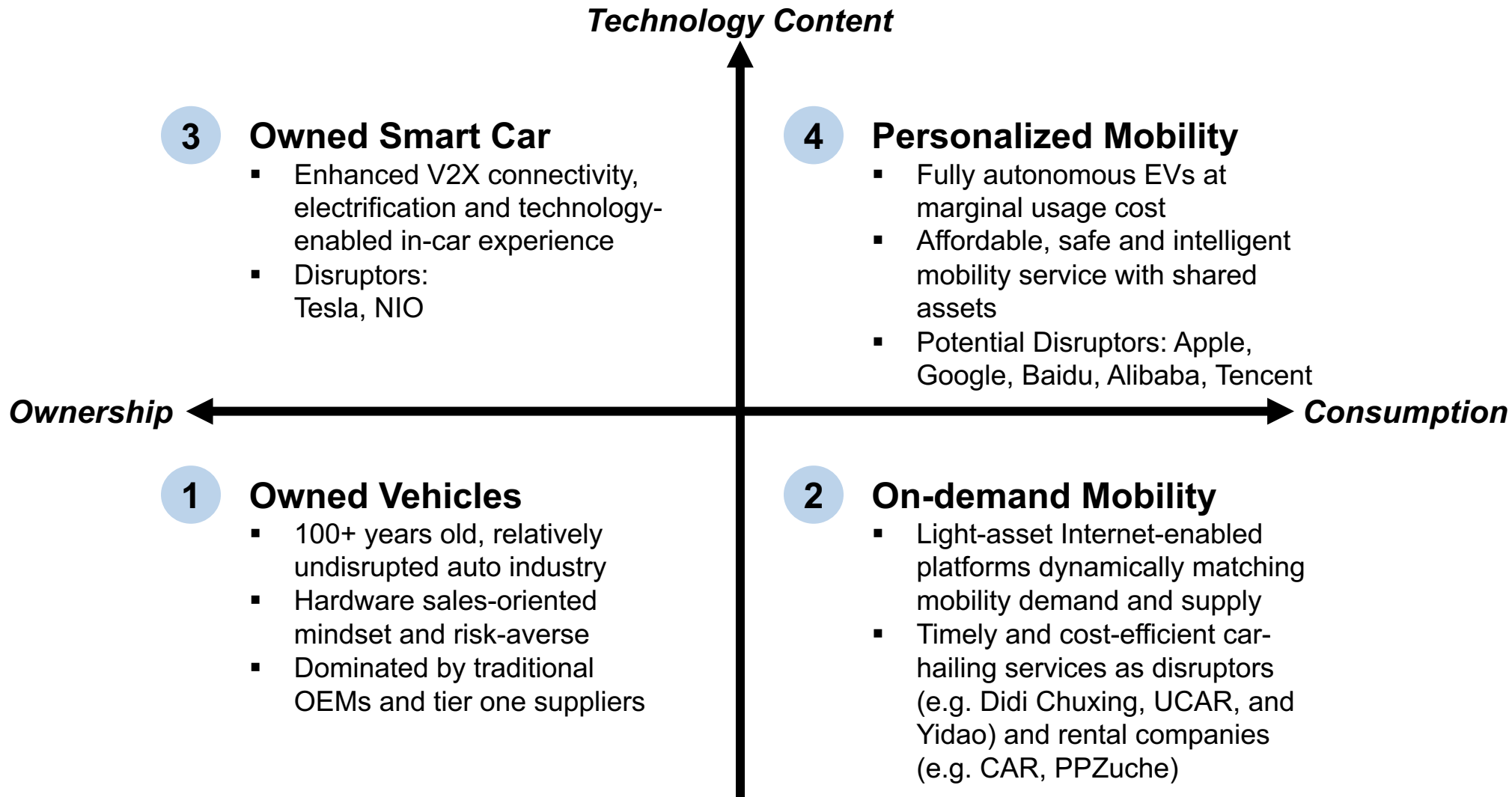
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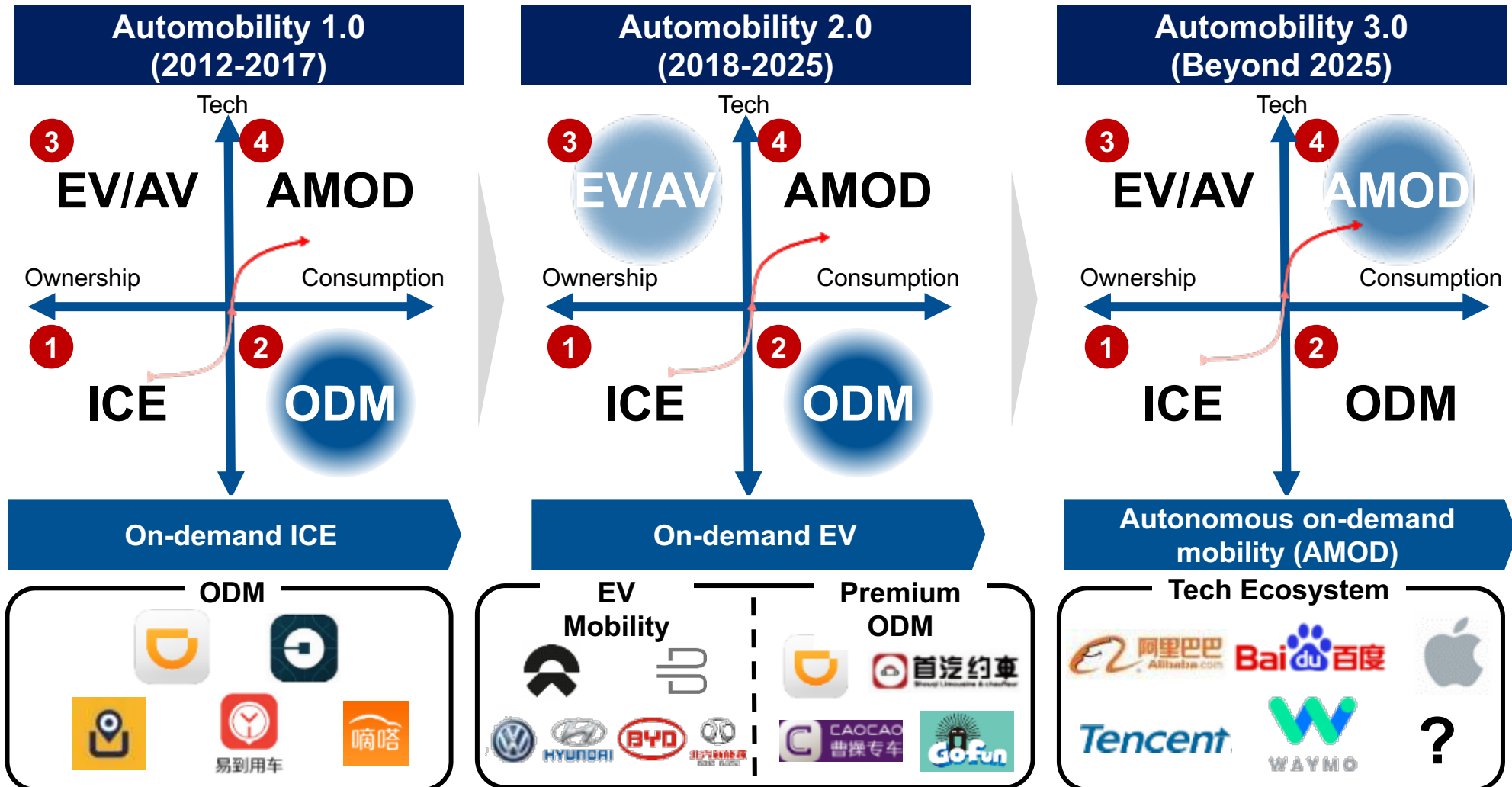
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Forces are shaping the future of mobility along several dimensions



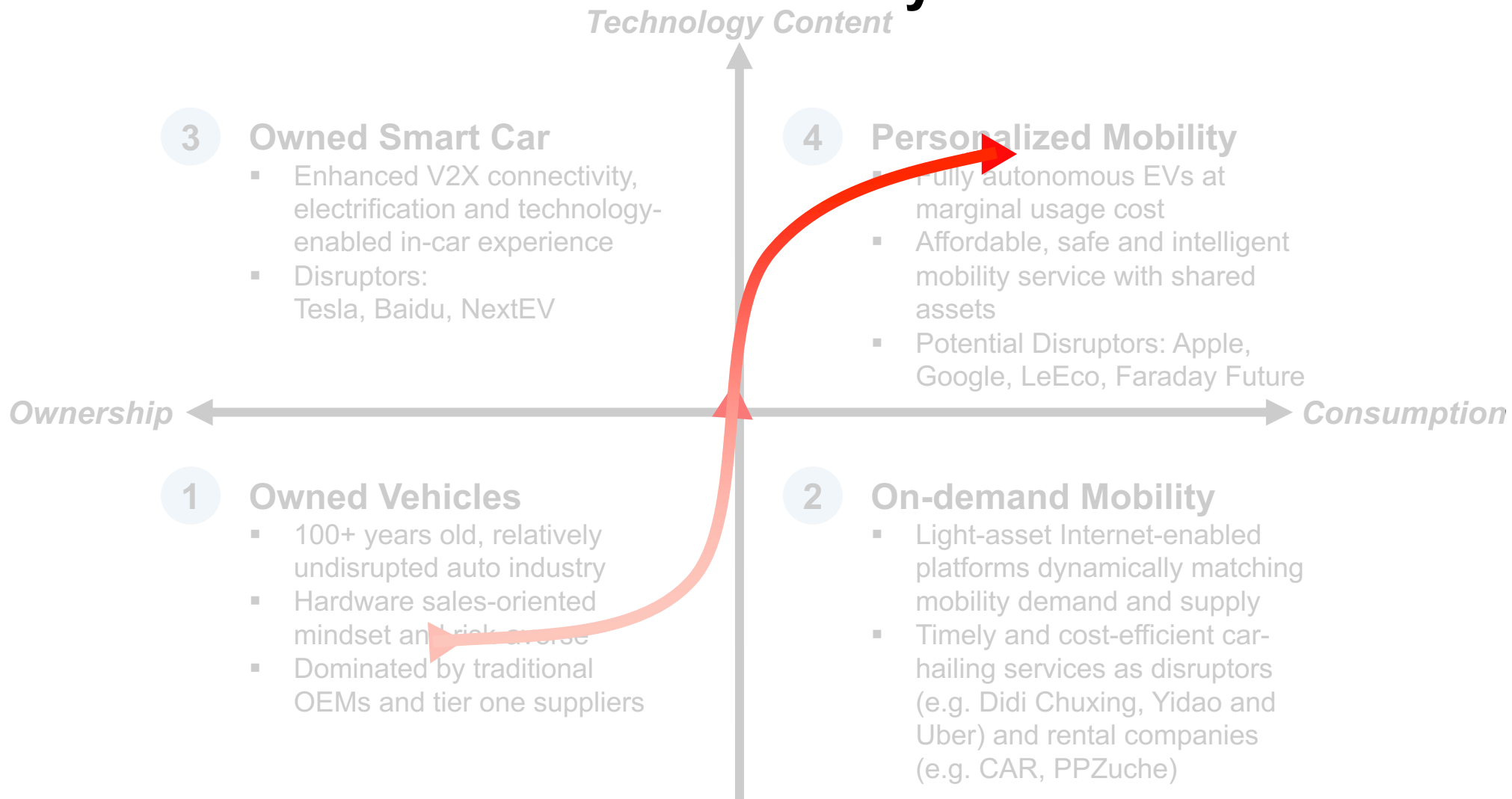
*Note: Technology content includes connectivity/telematics, electric vehicles, autonomous vehicles, etc.
Source: Automobility analysis*

A three-phased Automobility revolution is transforming the competitive landscape



Note: ICE: Internal combustion engine; ODM: On-demand Mobility; EV/AV: Electric / Autonomous vehicle; AMOD: Autonomous mobility on-demand
Source: Automobility analysis

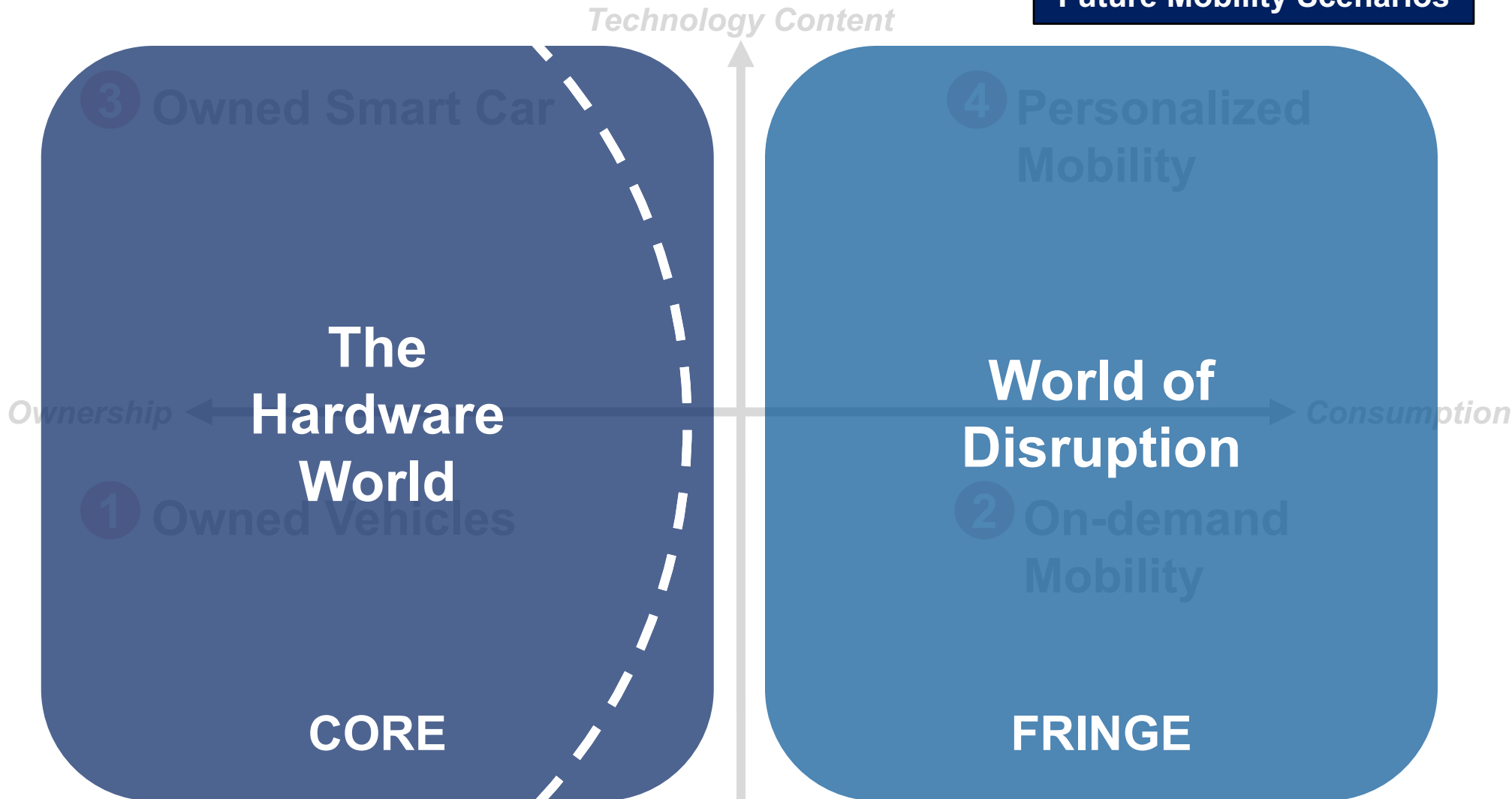
Connectivity drives a path towards personal, electric and autonomous mobility on-demand



Source: Automobility analysis

Traditional players must learn to compete in the world of connected mobility

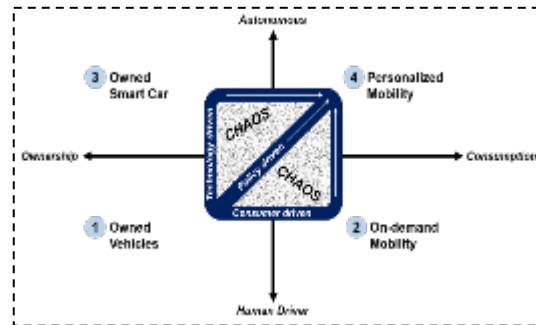
Future Mobility Scenarios



Source: Automobility analysis

Autonomous Mobility On-demand (A-MOD) will open up new opportunities for disruption

Maturity of Autonomous Driving Technology



Wide adoption of On-demand Mobility Services



Enabler/Catalyst:

- Chinese government strong strategic and regulatory support on “Internet + Auto” and smart city infrastructure development

New mobility service:
Fleets of connect, electric, smart and autonomous vehicles with new tailored designs



New business models:
A-MOD services and other complementary services (eg, NIO’s autonomous EV with a focus on user experiences)

Source: *Automobility analysis*

Key Insights

- The top 10 automotive groups account for 89% of total sales – however the market remains highly fragmented. Currently, GM, VW are mass-market leaders, and the German 3 are jointly leading the premium market.
- For the near term, companies with strong localized capabilities and ability to access lower tier consumers will extend their lead. Above average growth will remain in certain segments including crossover/SUV, MPV and premium cars.
- The world has entered a new era since 2008, with over half of the world population now living in cities, and this increasingly urbanized world challenges the established set of paradigms for personal and commercial transportation, especially in the densely populated urban centers in China.
 - ✓ Net expansion of the middle class population will continue to fuel increased demand for mobility in China.
 - ✓ We have observed **three waves of disruption** in China's auto market which will influence the competitive positioning and strategies for new and emerging industry players
 - ✓ As the leading automotive market, China is poised to revolutionize the global automotive industry, especially in the areas of the **Connected, Electric and Autonomous Mobility**

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