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Digital Disruption in China Auto Market

Presentation by Bill Russo
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Gao Feng's Recent Auto Industry Publications

For More Information:

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The Evolution of Personal Mobility

Status of China’s Auto Market

Emerging Disruptions of China Auto Market

The Future of Automobility Industry

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 car
- Tire manufacturers were born

Source: Gao Feng analysis

…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

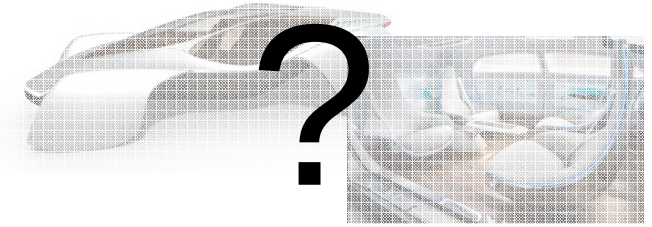
Modern Automobile

- 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
- Procurement

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?

Source: Gao Feng analysis

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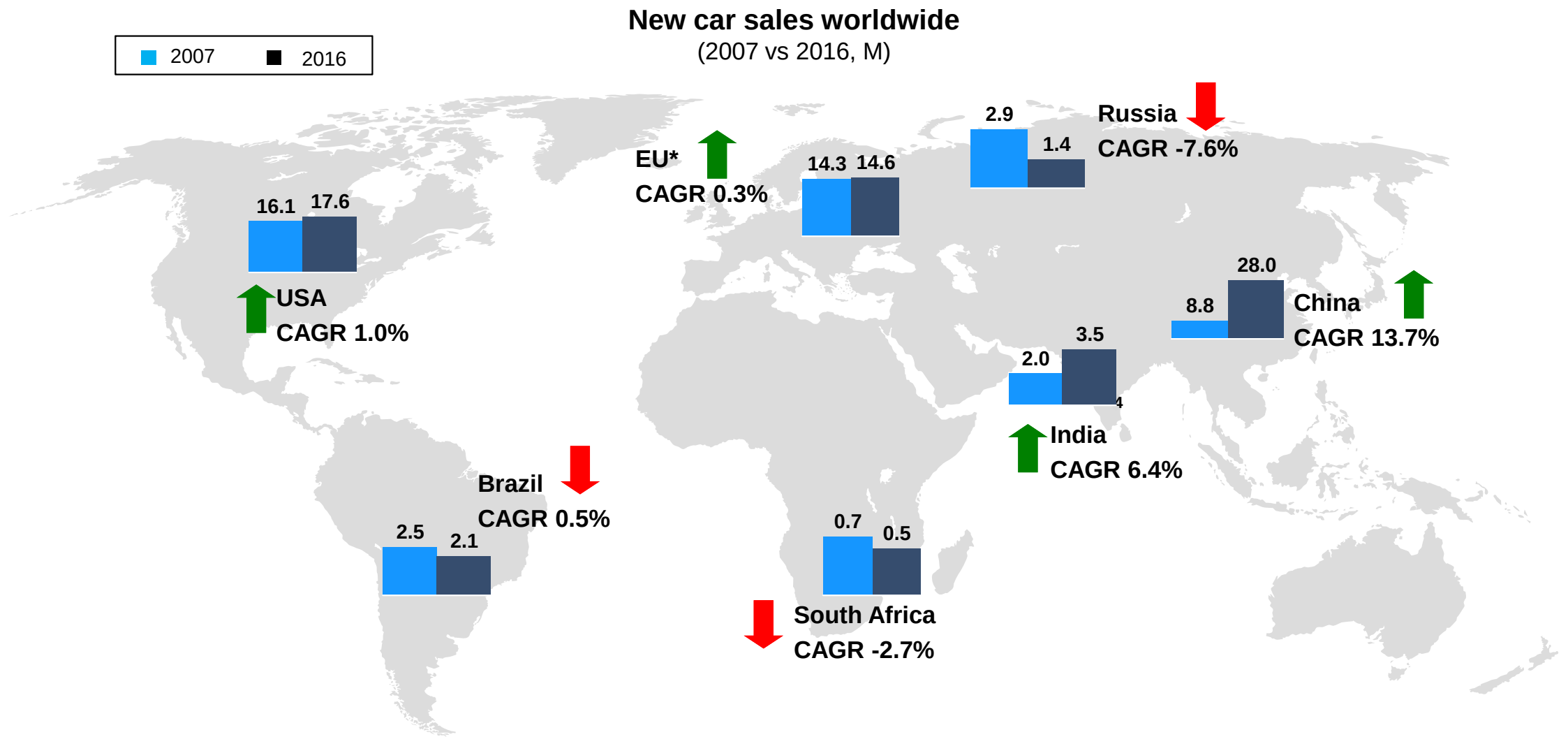
For the global automotive market, Asia Pacific represents the greatest opportunity for growth

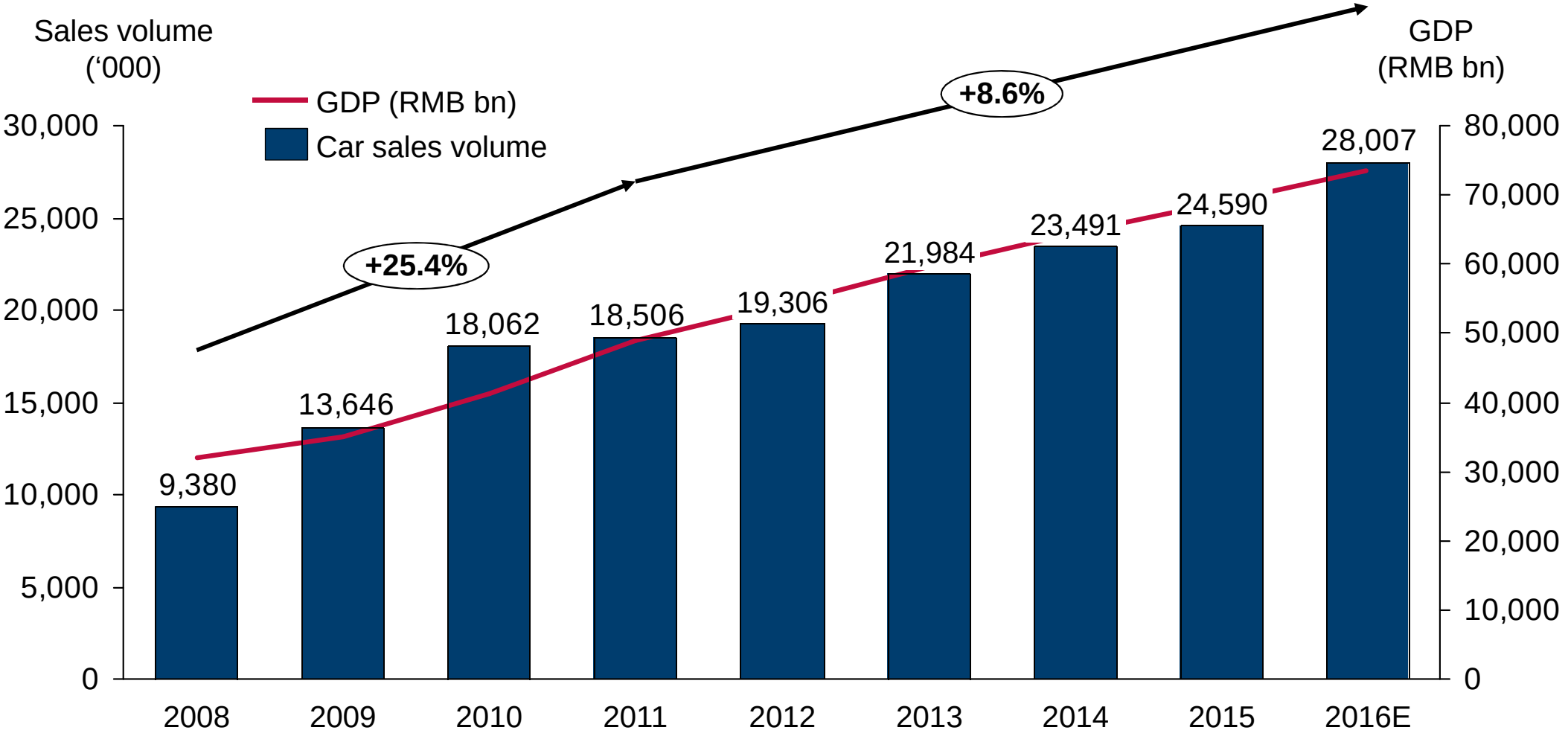


Note: EU new car sales volume was 2015 before the British Exit
Source: CAAM, Society of Indian Automobile Manufacturers, National Association of Automobile Manufacturers of South Africa, Association of European Businesses, LMC Automotive, Gao Feng analysis

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

Overall China Auto Industry by Sales Volume vs. China GDP Growth

(2008-2016E, volume: '000, GDP: RMB bn)



Source: CAAM, LMC, GF Securities, Chexun.com, Gao Feng analysis

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China's unique digital landscape by numbers (1/2)

Total Internet users in China

710M

(51.7% penetration rate)

Total mobile Internet users in China

656M

(10.4% YoY growth)

Monthly active users of WeChat*

806M

(34% YoY growth)

Number of Chinese companies in top 10 tech companies worldwide

4

(based on market capitalization)

Daily rides booked on Didi Chuxing (Sept. 2016)

20M

(covering more than 400 cities in China)

Alibaba's sales on Singles' Day 2016

USD 17.8Bn

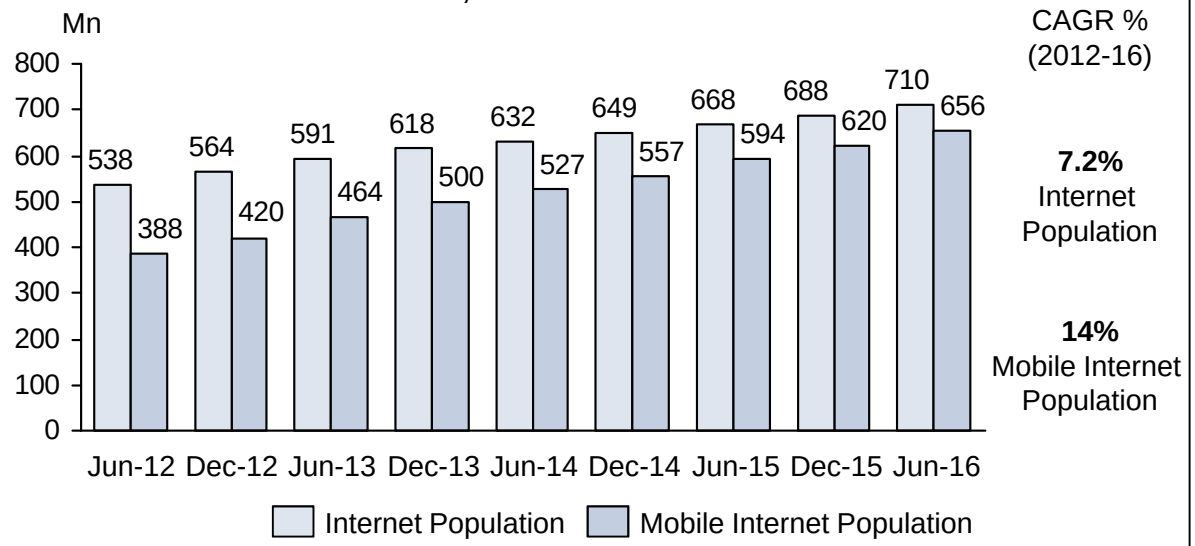
(82% purchased on mobile)

*Note: *Combined MAU of Weixin and WeChat; Numbers are latest published figures*
Source: CNNIC; Literature Research; Gao Feng analysis

China's unique digital landscape by numbers (2/2)

Total Internet and Mobile Internet Population in China

Million, Jun 2012 – Jun 2016



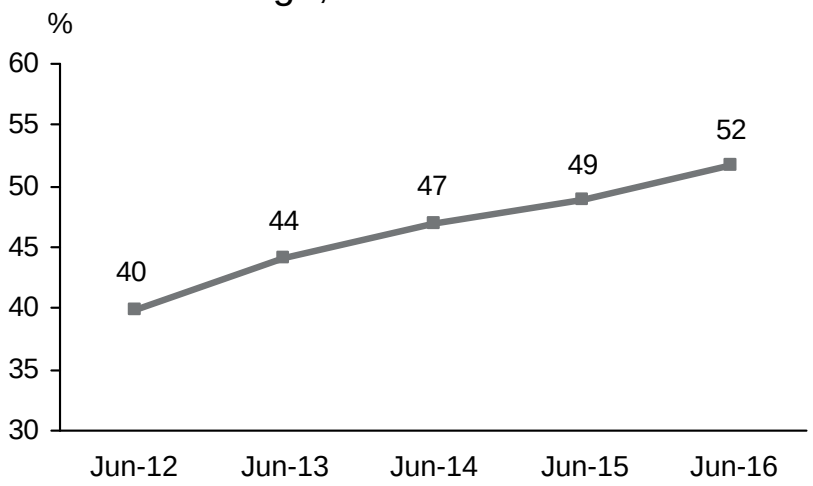
CAGR % (2012-16)

7.2% Internet Population

14% Mobile Internet Population

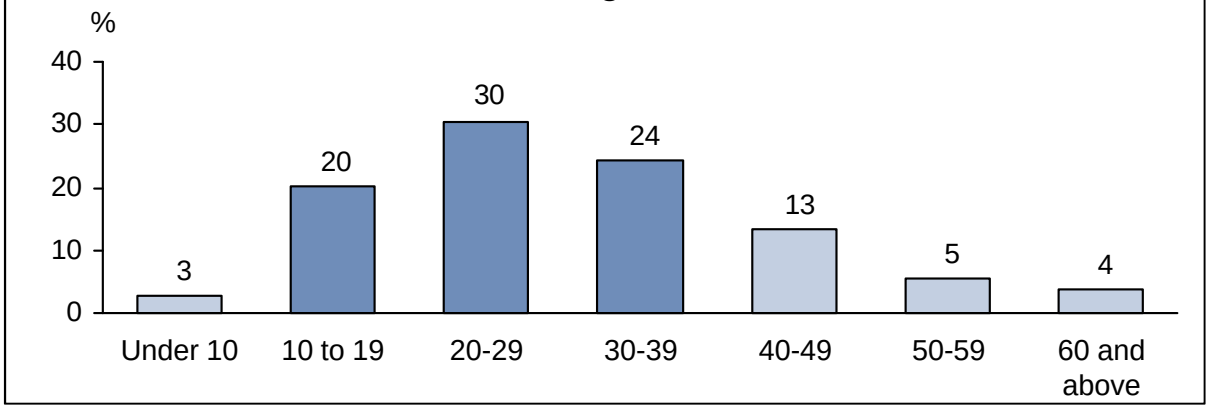
Internet Penetration Rate in China

Percentage, Jun 2012 – Jun 2016



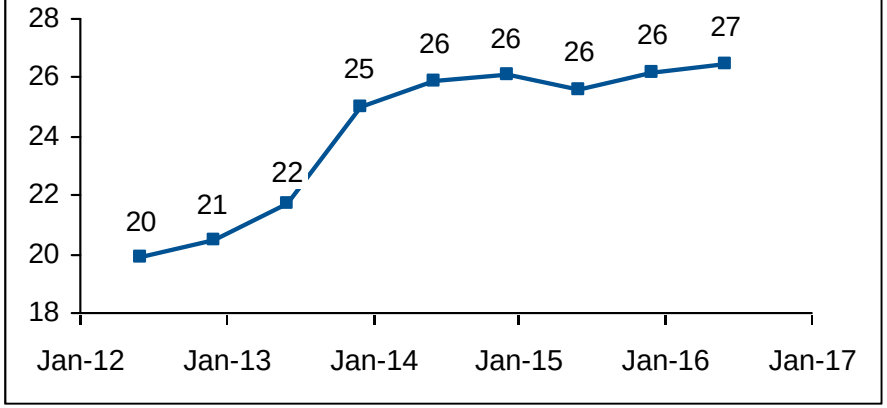
Age Distribution of the Total Internet Population

Percentage, Jun 2016



Average Time Spent Online Per Week

Hours, Jun 2012 – Jun 2016



Source: CNNIC; Gao Feng analysis

Disruptions refocus the industry from the product (the “auto-mobile”) to the utility derived from the product (“automobility”)

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
Data-driven insights enable opportunities in services business	▪ Analyzing **vehicle and driving data** can help companies to provide **personalized** and predictive vehicle and lifestyle related services to the users ▪ Emerging **service companies are disrupting the auto services value chain** with their strong C2B relationships and channel management capability

Source: Gao Feng analysis

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

Alternative Mobility Concepts

Ownership

- Focus on ownership
- Focus on purchase price & residual value
- Full car availability

Dealers, brokers

Leasing / Long Term Rental

- Focus on total cost of ownership and residual value
- Full car availability

Leasing, Fleet Management companies

Pay-per-use

- Traditional short term rental
- **Car sharing / alternative ownership forms** — Entry point for Disruption
- Taxi / chauffeur service
- Non-car individual transport; e.g., scooter, bike

Traditional OEM business

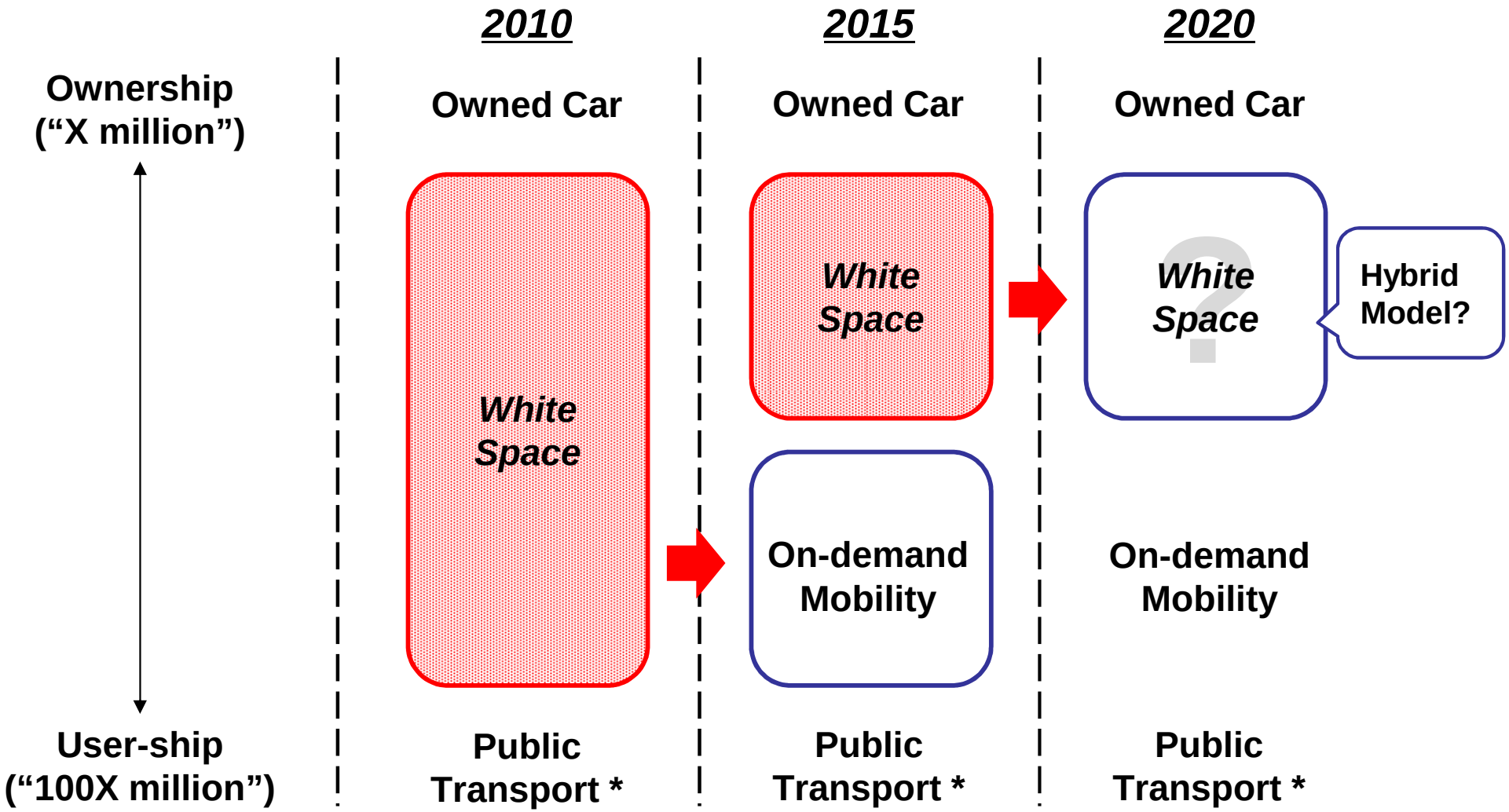
- Personally-owned
- Mobility "on the shelf"
- Low Utilization (<5%)
- **Hardware Centric Business Model**

Rental/Non-traditional OEM business

- Shared or fleet-owned
- Mobility "on demand"
- High Utilization (>50%)
- **Service Centric Business Model**

Source: Gao Feng analysis

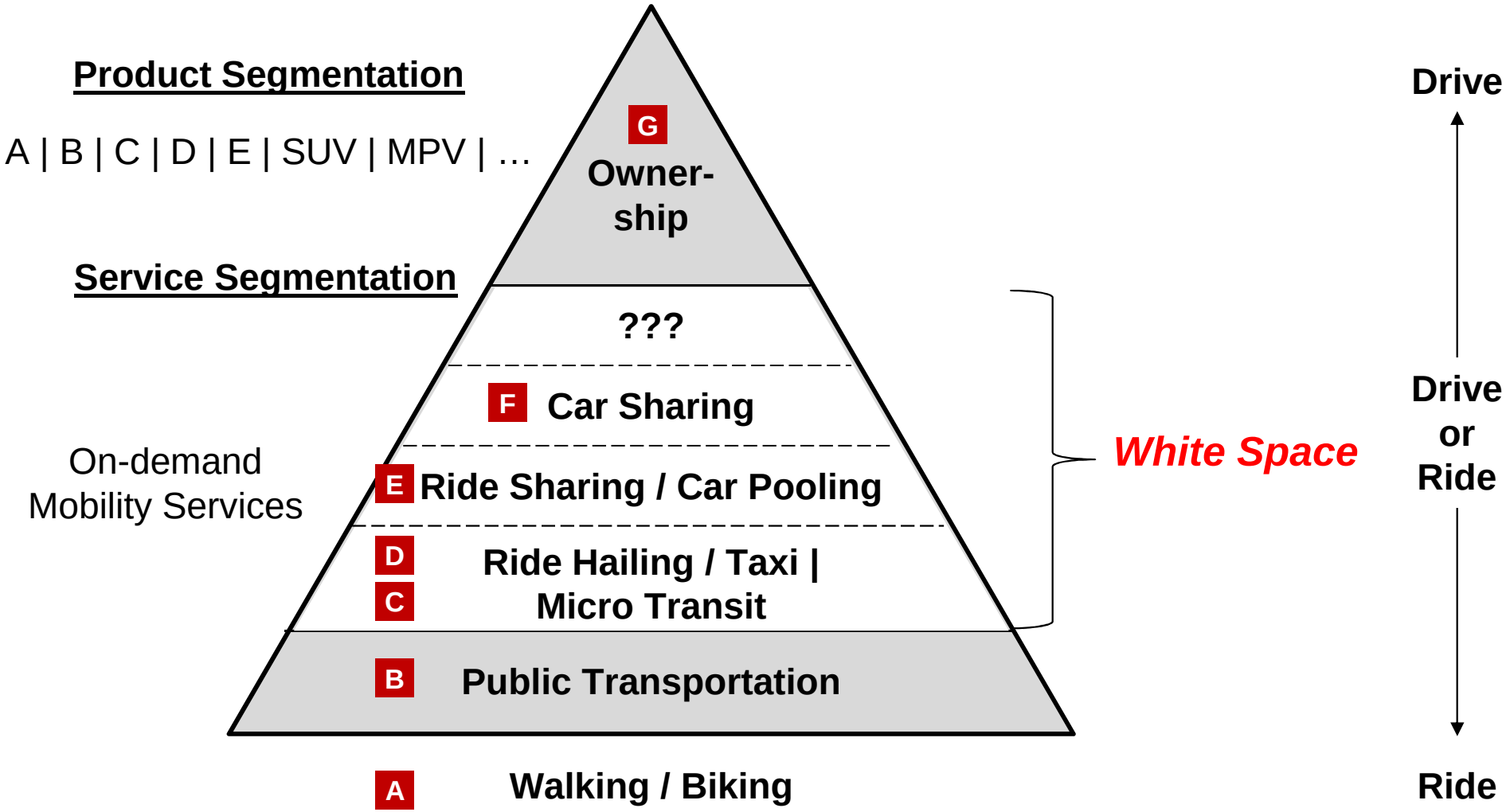
Technology-enabled solutions are emerging to address new mobility segments



* = Taxi, Metro, Bus

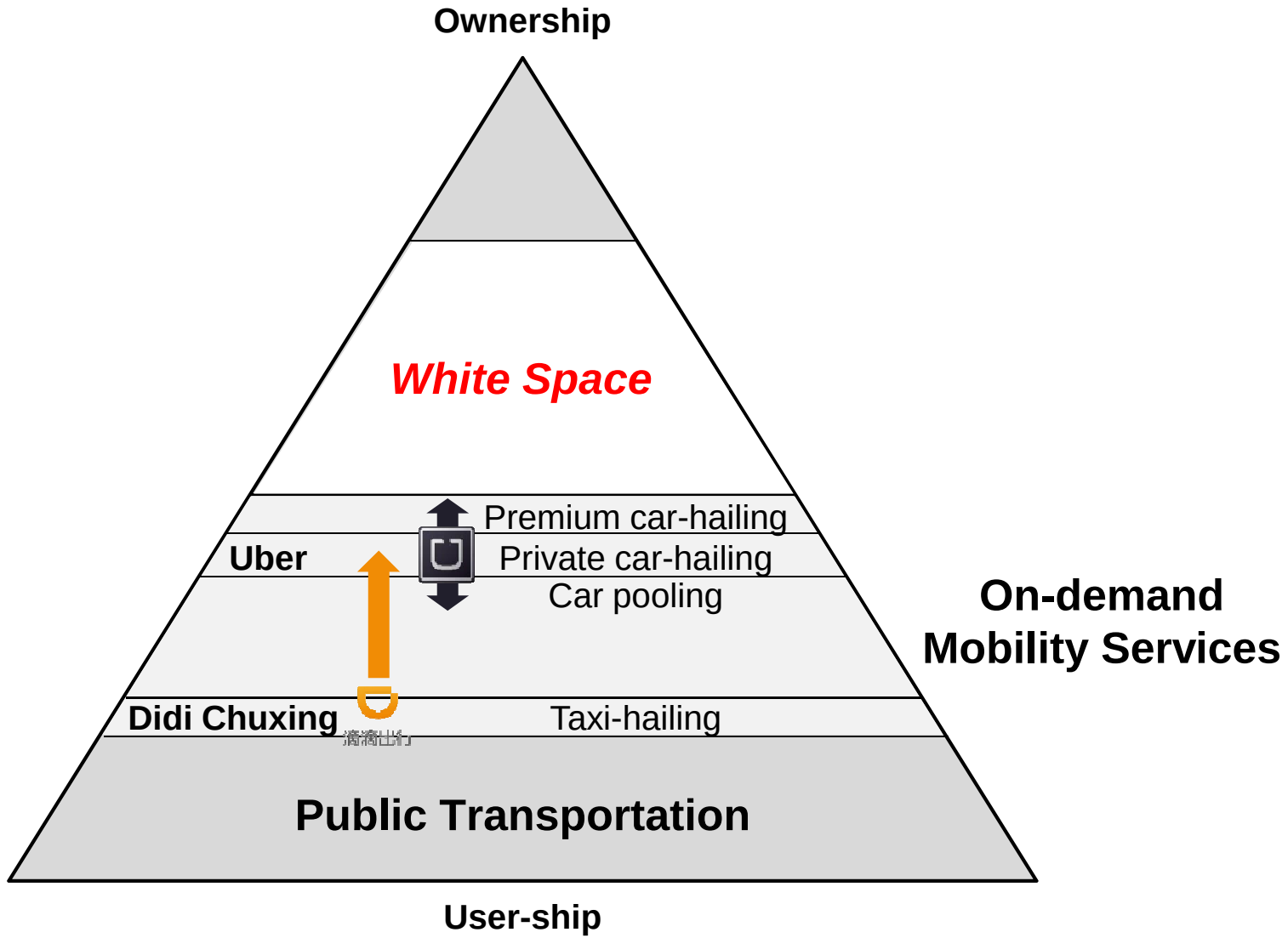
Source: Gao Feng analysis

An entirely new mobility service-centric segmentation is emerging



Source: Gao Feng analysis

Disruptive ride hailing companies expand from the base of the mobility pyramid



Source: Gao Feng analysis

Besides ride hailing, companies are experimenting with other new mobility services and the landscape is quite fragmented

Landscape of On-demand Mobility Services in China

NOT EXHAUSTIVE

B2C Car Rental
- eHi Car Services
- CAR Inc
- Zhizun Rental
- Hui Zuche

P2P Car Pooling
- PPZuche
- ATZuche
- Youyou Zuche
- Baojia Zuche

OEM Time Share Rental
- Daimler's Car2go

EV Time Share Rental
- Weigongjiao
- GreenGo
- EVCARD

P2P Ride Sharing
- Dida Pinche
- 51 Yongche
- Tiantian Pinche

Bike Sharing
- ofo
- MoBike

Parking
- 51Park
- Dingding Tingche

Connected Shuttle
- Dada Bus

Designated Driver
- eDaijia

Ride-hailing Platforms
- Didi Chuxing
- Uber China
- Yidao Yongche
- UCar
- Shouqi
- Caocao

Note: Didi Chuxing and Uber China merged in Sept. 2016
Source: Gao Feng analysis

A new multi-dimensional and disaggregated value chain is emerging – the emergence of an automobility ecosystem

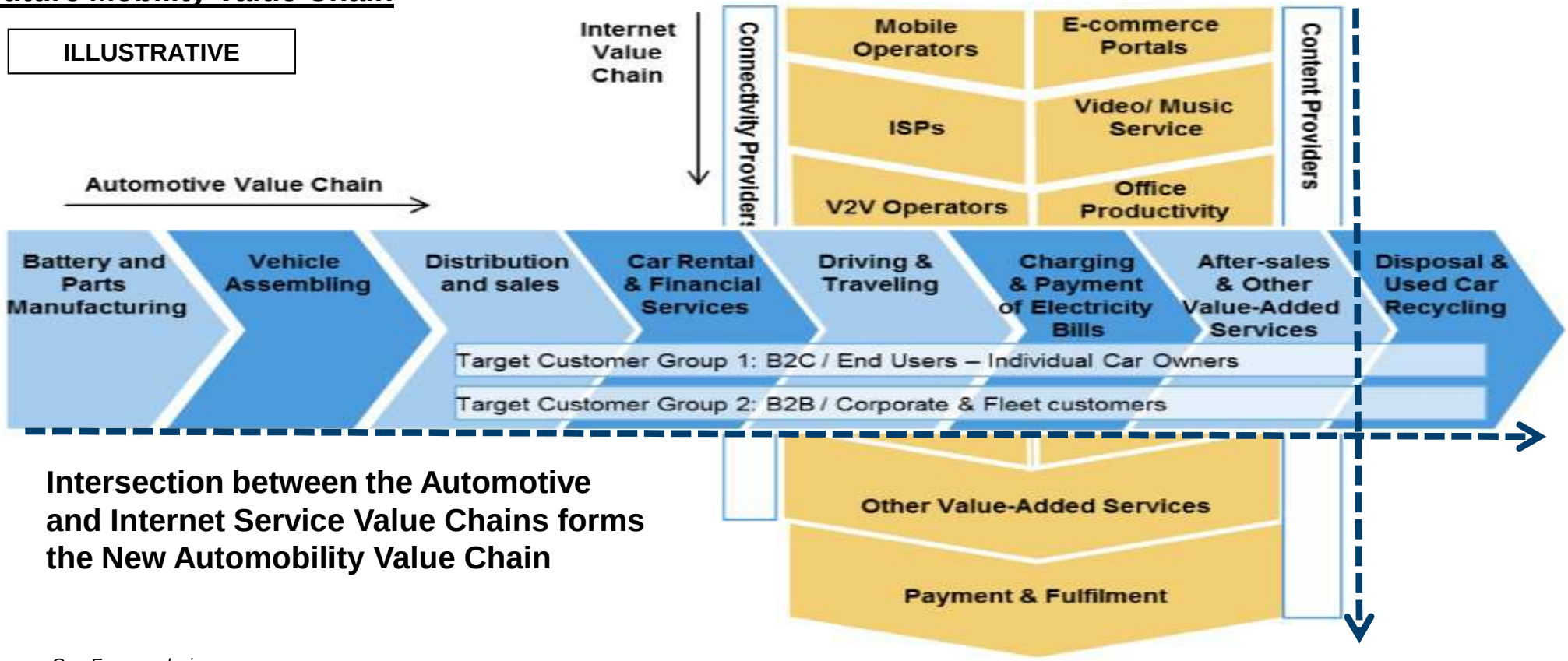
Traditional Automotive Value Chain

CASE EXAMPLE: CONNECTED MOBILITY

R&D | Product Development | Sourcing | Manufacturing | Marketing | Sales & Distribution | Service

Future Mobility Value Chain

ILLUSTRATIVE

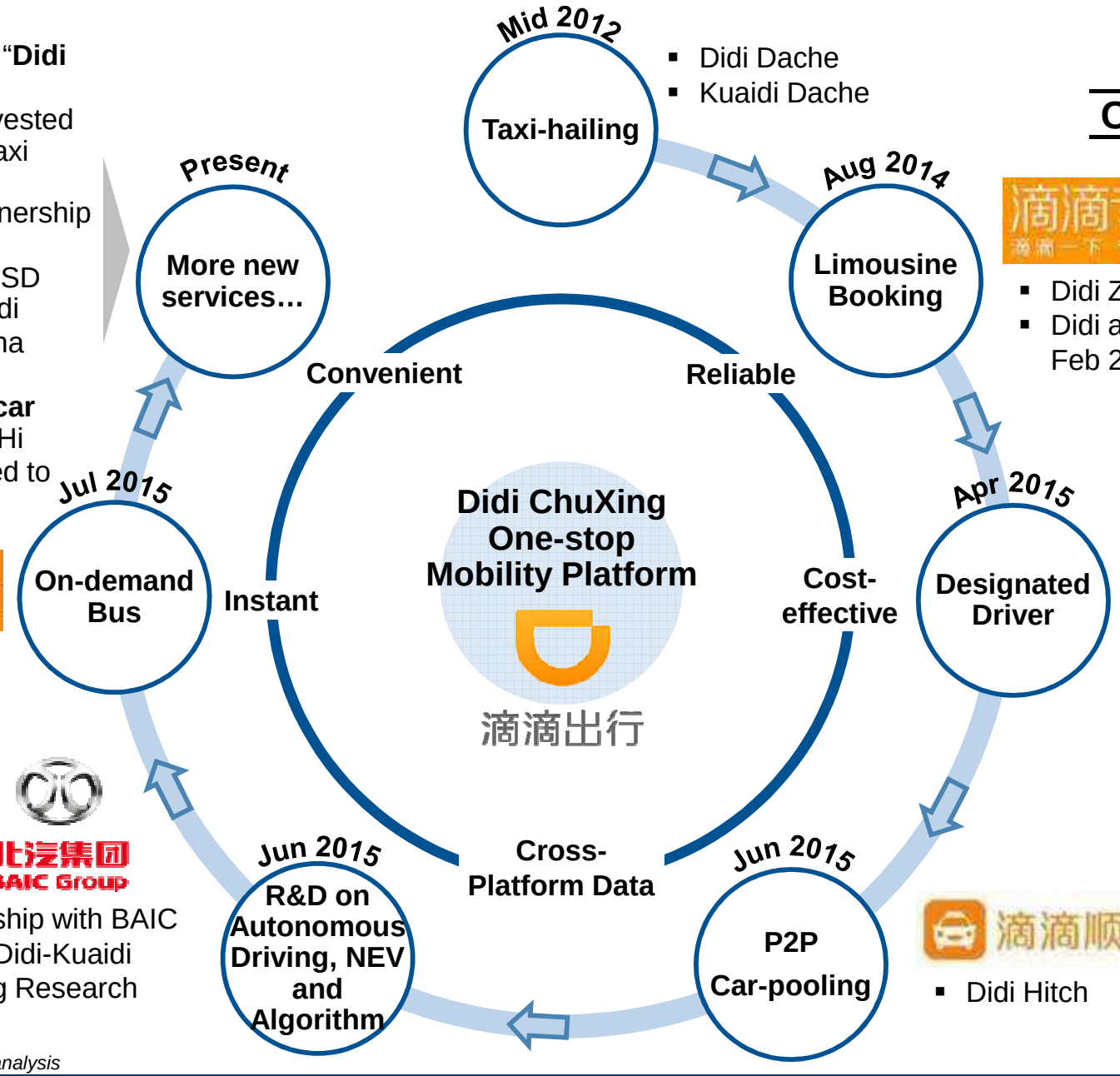


Intersection between the Automotive and Internet Service Value Chains forms the New Automobility Value Chain

Source: Gao Feng analysis

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 Dache
- Kuaidi Dache

CASE EXAMPLE

滴滴专车

- Didi ZhuanChe
- Didi and Kuaidi merged in Feb 2015

滴滴快车

滴滴代驾 DIDI DRIVER

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

滴滴顺风车

- Didi Hitch

滴滴巴士

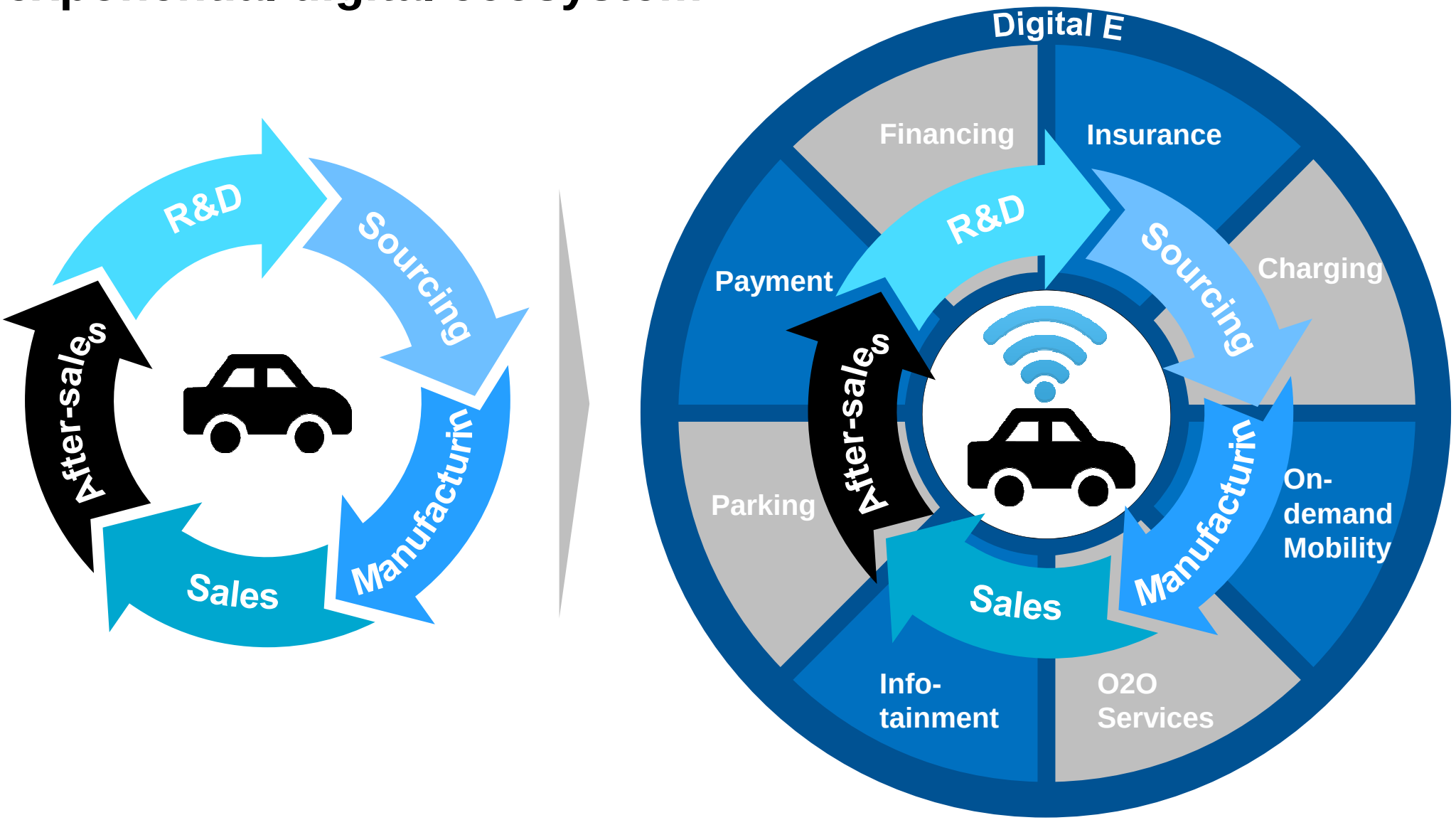
- Didi Bus

北汽集团 BAIC Group

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

Source: Didi Chuxing, Gao Feng analysis

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



Vehicle Lifecycle-focused

Use Case and Scenario-focused

Source: Gao Feng analysis

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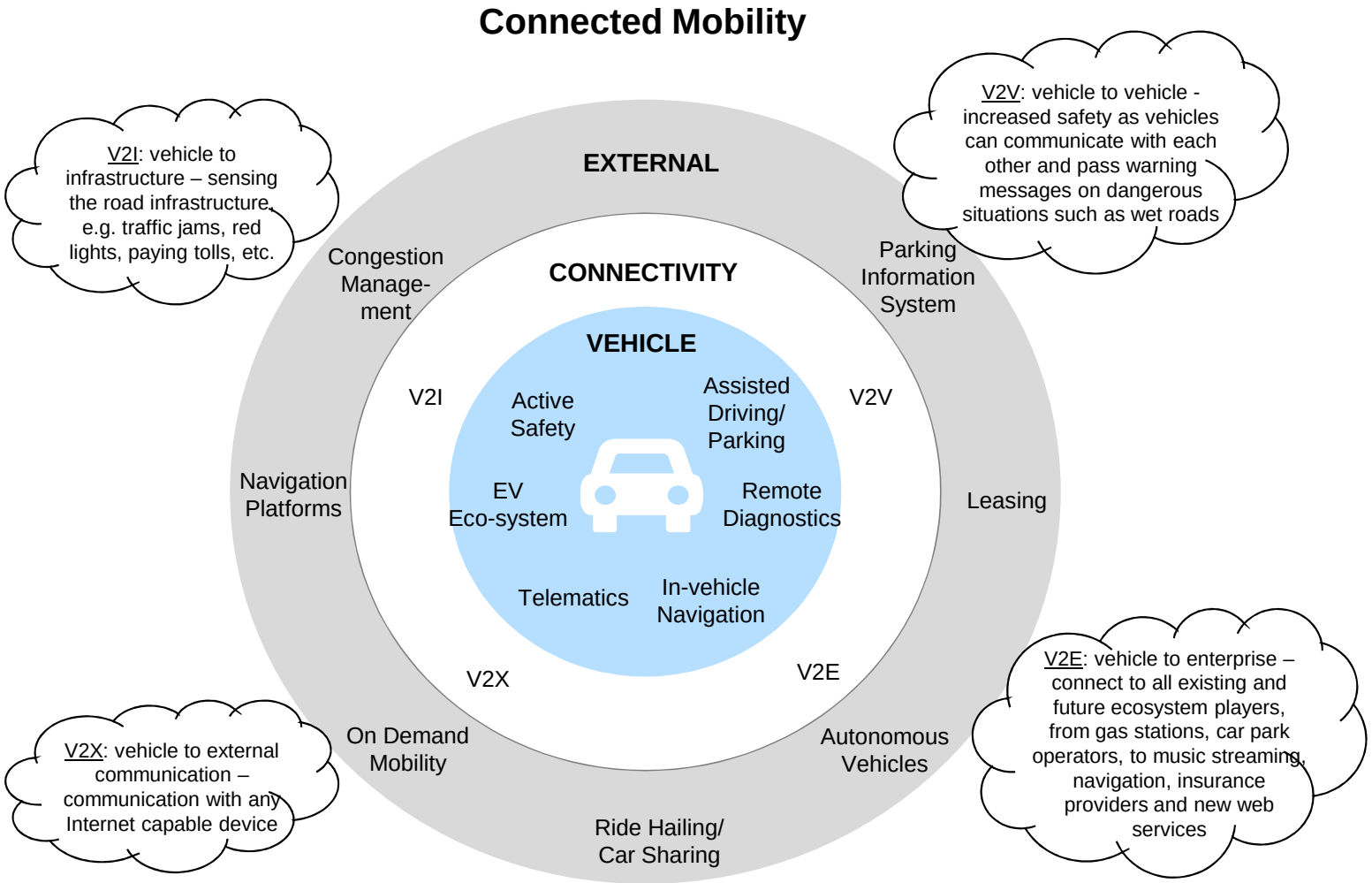
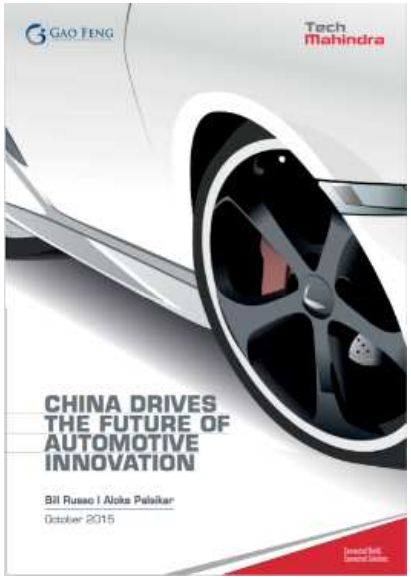
Connectivity is transforming the automobile into an intelligent platform for wide variety of online and offline services

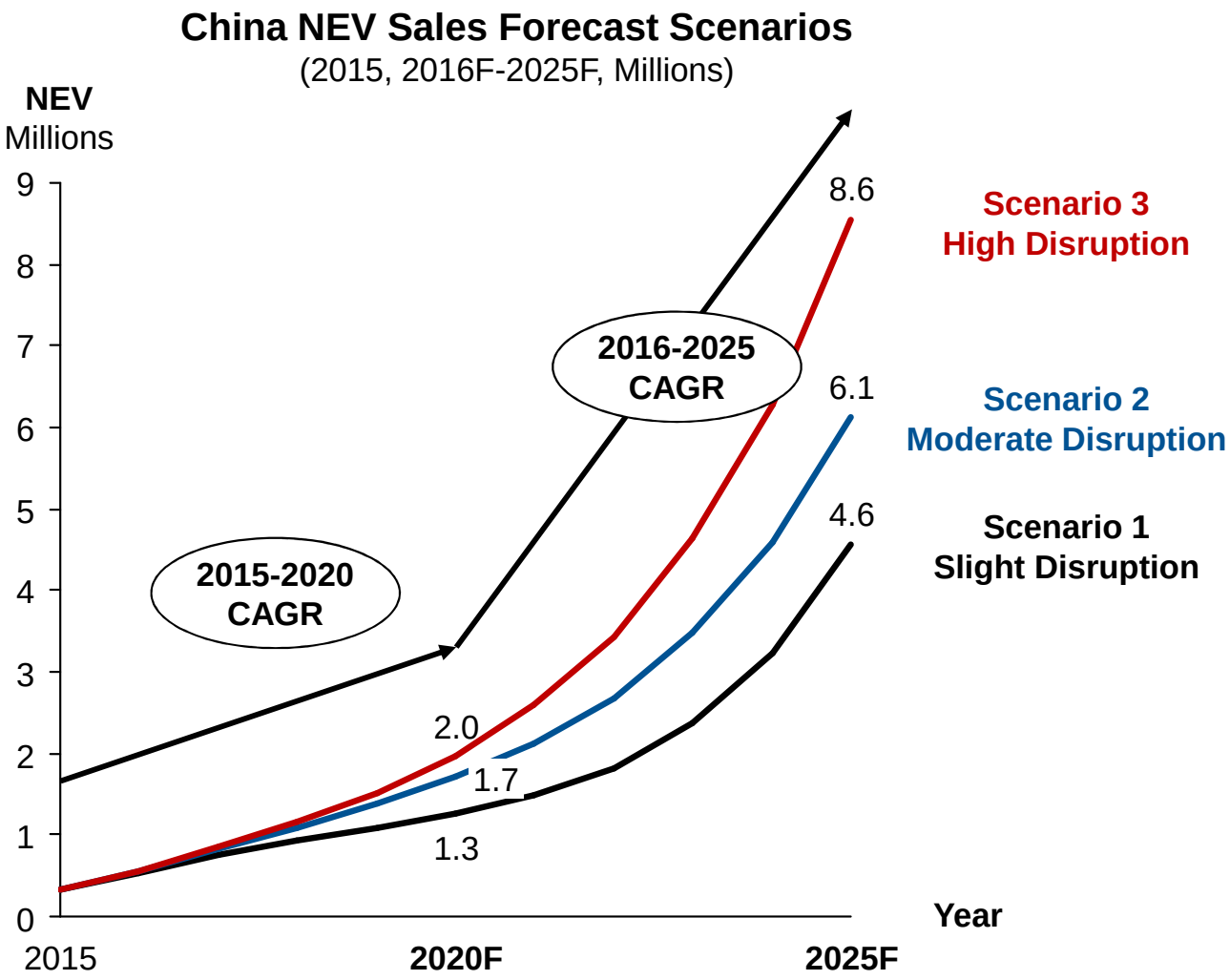




Further details can be found in our IC article co-authored between Gao Feng and Tech Mahindra, "*China Drives the Future of Automotive Innovation*" – Oct, 2015, Bill Russo, Aloke Palsikar

Source: Morgan Stanley Report, Literature Research, Gao Feng analysis

NEV sales are expected to grow significantly under three different scenarios



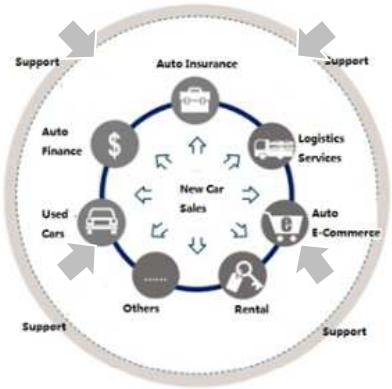
Comments

We have modeled the growth of NEVs in China under 3 different scenarios

- The **growth** seen in **scenarios 2** and **3** are largely **driven** by **fleet adoption**
- A **higher rate of adoption** of NEVs is likely for **government-owned** and **ODM fleets**
- Accessing **NEV opportunities** will **require** a **repositioning** of **Continental** into the NEV supply chain as a **value added solution provider**

**NEV actual data from 2010-2015, 2016F-2025F calculated based on reaching 5M NEV PARC by 2020*
Source: National Bureau of Statistics of PRC, Expert Interviews, Literature Research, Gao Feng Analysis

Automobility companies build a deep relationship with the customer leveraging connectivity and data insights

	Automotive	Automobility
		
Characteristics	Hardware-centric Asset heavy	Cloud-based, service-centric Can be asset light
Product Lifecycle	3-5 years (for product replacement)	Rapid prototyping (for technology-enabled services)
Business Model	Focused portfolio, proven Selling products with “cost plus margin” planning method	Diverse portfolio, new & innovative Matching demand with supply of mobility; big data insights etc.
Customer Relationship	Transactional	Intimate, Direct and Continual

Source: Gao Feng analysis