Three key trends in automotive industry
Three key trends in automotive will fundamentally transform automotive industry

- Digitalization
- Electrification
- Changing mobility

Source: Strategy& analysis
Digitalization will disrupt the whole value chain from R&D and production to sales

Value chain of traditional auto industry

- R&D
- Sourcing
- Mfg.
- Dealership
- Marketing & service

Value chain changes

- Linear value chain
- Focus on products/hardware
- Vehicle as a means of transportation
- Multi-level distribution structure
- Mainly finished products

Value chain of digital auto industry

- R&D
- Mkt & service
- Real time connectivity
- Mfg.
- Product
- Supply chain

- Multi-dimensional connectivity in value chain
- Focus on service/software
- Vehicle as a consumption scenario
- Client relationship without intermediary
- Customized products/services in small scale

Source: literature research; Strategy& analysis
**Daimler, as a pioneer, optimized its value chain via digital innovation**

**Smart R&D:**
- Various Apps, infotainment, automation and battery techs have been developed by 150 digital engineers as well as prototype designers in the R&D center in Silicon Valley.

**Smart marketing service:**
- Restructured the marketing department, with the steering committee at HQ consisting of sales, technicians for in-car info and entertainment systems and IT staff.
- Define customer habits and lifestyle & mobility drivers with big data mining.

**Smart manufacturing:**
- Global unified component standard and system framework, as well as auto control module.
- The standard module is applied into all new robots and production processes. And digital simulation can be applied into the whole process from stamping to final assembly.

**Digital auto products:**
- The current intelligent connectivity includes lifestyle service, infotainment and safety service.
- Self-driving concept car is to be launched by CES in 2016.

**Intelligent supply chain:**
- Daimler piloted auto transportation system in Hungary, which transferred pre-sorting components boxes to production line.

Source: literature research; Strategy& analysis
**Digitalization applied in R&D**

### Value of digitalization in R&D
- Reduced cost
- Shortened time line
- Portfolio management
- Virtual verification
- ... 
- Fast prototype design
- Digital analog (DIAN)
- ... 

### Influence of digitalization R&D in industry chain
- New products
- New value chain/system design
- The pressure from constant technical evolution
- Fast prototype design
- Platform
- Joint R&D
- Cross-functional R&D team
- IT security
- Interface, etc.

### What contributions R&D can made for digital transformation (in culture, partnership...)?

*Source: literature research; Strategy& analysis*
Open R&D system pushed by digitalization will change the R&D mode essentially, involving every stakeholders in the process.

- Marketing
- Service
- Supervision
- Engineering
- Purchasing
- Product management
- Design partnership
- Suppliers
- Distributed manufacturing

R&D
Analysis
Corporation
Products development
Model & platform

- Quality
  - Test specification
  - Tool design
  - Packaging / labeling specifications
  - Consumer goods specifications

- Manufacturing
  - Operational training requirement
  - Manufacturing path
  - Work instruction
  - Process configuration
  - Manufacturing feedback
  - Compliance specifications
  - Compliance reporting

- Service
  - Service parts catalogue
  - Service manual
  - Training manual
  - Serve BOM
  - Event reporting
  - Design feedback

- Customers
- Suppliers

- Design partnership
  - Products concept
  - Products requirement
  - Products cost

- Marketing
  - Proposal
  - Customers’ demands
  - Market demands
  - Revolution demands
  - Manual and data sheet

- Procurement
  - Qualified supplier
  - Selected components

- Engineering
  - BOM specifications
  - BOM specifications
  - Design specifications
  - Model
  - Draft
  - Simulation

- Service parts catalogue
- Service manual
- Training manual
- Serve BOM
- Event reporting
- Design feedback

Source: literature research; Strategy& analysis
Digitalization changed the interactive mode of information & material flow on both enterprises and the whole value chain.

1. Supply and demand plan of E2E
   - Leverage cloud-based planning platform to realize system-based plan and vertical corporation of E2E
   - Real-time planning, execution, optimization, Scenario Planning

2. Management & communication of supply chain
   - Centralized supply chain and performance management
   - Analysis, predictions and business principles driven by data have been optimized
   - Socialized supply chain, communication and customer interaction

3. Effective order management
   - Real-time order confirmation by self-owned supply chain network
   - Remote order process
   - Fully real order exposure

4. Intelligent warehouse
   - Classification and selection, automatic packaging
   - Logistic system connecting to warehouse
   - Cross warehouse visualization and optimization

5. Logistics visualization of E2E
   - Logistic I&E records and tracking capability of the Internet of things
   - Supply chain visualization and event processing platform, “Single source of truth”
   - Detection and identification of initial risks and event processing tool

6. Supply network of digitalization
   - Systematic supplier inventory management/autonomous replenishment
   - Remote order process
   - Comprehensive R&D
   - Joint order management
   - Repertory visualization
   - 3D printing (spare parts)
   - Purchasing platform

Source: literature research; Strategy& analysis
Convert functional silo into E2E supply chain network through horizontal integration

<table>
<thead>
<tr>
<th>Traditional value chain</th>
<th>Integrated value chain</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transparency</strong></td>
<td><strong>Limited visualization of supply chain</strong></td>
</tr>
<tr>
<td><strong>Synchronism</strong></td>
<td><strong>Delayed effect of information in supply chain members</strong></td>
</tr>
<tr>
<td><strong>Extendibility/Cooperativity</strong></td>
<td><strong>Limited visualization impedes meaningful cooperation</strong></td>
</tr>
<tr>
<td><strong>Flexibility</strong></td>
<td><strong>Customer in the end should be contorted when the information is needed in logistics</strong></td>
</tr>
<tr>
<td><strong>Response</strong></td>
<td><strong>Delays by different planning cycle and response by different layers</strong></td>
</tr>
</tbody>
</table>
Integrate consumer electronics in vehicles, promoting their digital experience

The mix of digitalization and automation

- Customers want the personalized digital experience can be applied in vehicles via the easiest way (like the CarPlay by Android)
- Reduced/optimized travel time
- Comfortable feature
- Internal/external sensor/arrester
- Intelligence and connected vehicle
- Integration of smart grid
- OEMs want to be closer to end customers, especially via digital channel

Source: literature research; Strategy& analysis
Software, hardware and services will experience revolution with the development of vehicle digitalization.
Three key trends in automotive will fundamentally transform automotive industry

- Digitalization
- Electrification
- Changing mobility

Source: Strategy& analysis
With the prevailing of EV, great changes are taking place along the whole value chain of China’s NEV industry

### Status quo and future of China’s NEV industry

<table>
<thead>
<tr>
<th>Situation</th>
<th>Production &amp; Sale of finished automobile</th>
<th>Charging infrastructure operation &amp; battery recycling</th>
</tr>
</thead>
</table>
| **1** Battery & components manufacturing | - Local brands have had large presence in NEV already with diversified business models, e.g. e-commerce, leasing, etc.  
- Now international brands have limited market share in NEV  
- Non-traditional OEMs and social capital are entering NEV market | - Current existing public charging facilities is not reasonable with low use rate and simple sources of investment.  
- The government policies encourage segmentation of charging facilities investment to solve practical issues.  
- Along with the widespread use of NEV, demands of dealing and recycling waste battery are urgent. |
| **2** Production & Sale of finished automobile | - Foreign players’ increasing investment in China’s NEV market will accelerate the localization of EV product, resulting in fiercer competition  
- Under the overheated competition and investment, the new entrants might have to exit with their underestimation of the complexity and investment in auto manufacturing | |
| **3** Charging infrastructure operation & battery recycling | | - More private capital and OEM joined the investment of facilities, construction, and operation. The infrastructure networks of connectivity and win-win cooperation established with existing gas stations and other facilities introduced more business models and technology innovations.  
- With more strict rules and policies, attentions towards battery recycling are increased. OEM, battery companies and professional enterprises of battery recycling will have rapid growth. |

Source: literature research; Strategy& analysis

---

Strategy& | PwC
Inevitable price fall-The price of Cell and Pack will decrease ~50% by 2020, which will pose great threat for battery industry

### Current Price Situation

<table>
<thead>
<tr>
<th>Co.</th>
<th>Customer</th>
<th>Price of Pack (Yuan/Wh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pride (CATL)</td>
<td>BAIC C10</td>
<td>2.2-2.4 (2.6-2.7)</td>
</tr>
<tr>
<td>GuoXuan High-Tech</td>
<td>BAIC M307</td>
<td>1.6</td>
</tr>
<tr>
<td>Tenpower</td>
<td>BAIC M307</td>
<td>1.1</td>
</tr>
<tr>
<td>Zhuoneng</td>
<td>BAIC M307</td>
<td>1.1-1.2</td>
</tr>
<tr>
<td>Wina</td>
<td>Foton PX/2T</td>
<td>2.0</td>
</tr>
<tr>
<td>EVE</td>
<td>Huatai</td>
<td>1.8</td>
</tr>
<tr>
<td>Coslight</td>
<td>Yogomo</td>
<td>2</td>
</tr>
<tr>
<td>Wanxiang</td>
<td>Haima</td>
<td>2.1</td>
</tr>
<tr>
<td>Guoneng/Tianjin</td>
<td>Tongjia</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Source: literature research; Strategy& analysis

### Target Price

<table>
<thead>
<tr>
<th>Year</th>
<th>Cell Yuan/Wh</th>
<th>Pack Yuan/Wh</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>1250</td>
<td>1850</td>
</tr>
<tr>
<td>2017</td>
<td>1200</td>
<td>1800</td>
</tr>
<tr>
<td>2018</td>
<td>1100</td>
<td>1600</td>
</tr>
<tr>
<td>2019</td>
<td>950</td>
<td>1300</td>
</tr>
<tr>
<td><strong>2020</strong></td>
<td><strong>850</strong></td>
<td><strong>1100</strong></td>
</tr>
<tr>
<td>2021</td>
<td>750</td>
<td>950</td>
</tr>
</tbody>
</table>
More frequent integration of industry chain-battery company also cooperates with OEMs in Pack field to target customers

<table>
<thead>
<tr>
<th>Types</th>
<th>Company</th>
<th>Integration of industry chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregation</td>
<td>BYD</td>
<td>From raw materials such as lithium, battery, motor, electronic control, power assembly to the vehicle</td>
</tr>
<tr>
<td>Vehicle-battery</td>
<td>Lifan</td>
<td>10 lithium battery production lines have been built with an investment of 1.548b RMB. Power battery production volume is 6GWh annually</td>
</tr>
<tr>
<td>Battery-pack</td>
<td>CATL</td>
<td>• Self-owned BMS and PACK team</td>
</tr>
<tr>
<td></td>
<td>Wanxiang A123</td>
<td>• JV with BAIC called Pride in PACK field</td>
</tr>
<tr>
<td></td>
<td>Sunwoda</td>
<td>• Qida(JV) PACK in Wuhu with Chery</td>
</tr>
<tr>
<td></td>
<td>Lishen/Optimumnano</td>
<td>• Self-owned PACK site</td>
</tr>
<tr>
<td>Battery-up &amp; downstream</td>
<td>Guoxuan High-Tech</td>
<td>• 300m RMB share of BAIC accounting for 3.76%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Joint effort on R&amp;D center in Silicon Valley</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Joint establishment of a 10b AH power battery plant in Laixi, Qingdao</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Partnership leasing and charging business with 3rd party</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Self-built positive electrode and separator plant with an investment of 5b RMB</td>
</tr>
<tr>
<td>Battery-vehicle</td>
<td>Wanxiang A123</td>
<td>• M&amp;A Fisker (An American EV company) and plan to reproduce Karma</td>
</tr>
<tr>
<td></td>
<td>De-Fluoride</td>
<td>Invested 150m RMB in Hongxing Auto, acquiring a share of 72.5%</td>
</tr>
<tr>
<td>Raw material-Battery</td>
<td>Shanshan</td>
<td>In addition to negative electrode material business, raise funds into power battery, electronic control and other fields</td>
</tr>
<tr>
<td></td>
<td>Zhonghe</td>
<td>• Deep footprints in Lithium resources, lithium salt, precursor materials, cathode materials and other fields</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Provide NCA / NCM materials through their own Shenzhen Tianjiao</td>
</tr>
<tr>
<td></td>
<td>Citic Guohan</td>
<td>Launch battery plants</td>
</tr>
</tbody>
</table>

Source: literature research; Strategy& analysis

Data source: EVTANK/companies' public data
OEMs continue to deepen control of the PACK and batteries

<table>
<thead>
<tr>
<th>OEM</th>
<th>NEV strategy</th>
<th>Battery supplier</th>
<th>With PACK business or not</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYD</td>
<td>Planned annual production and sales of 300,000 cars in 2020</td>
<td>• Wuxi Fullsave/Tianjin Jieve/Shanghai Aerospace Power/CATL</td>
<td>• Self-production</td>
</tr>
<tr>
<td>DF</td>
<td>Planned annual production and sales of 500,000 cars in 2020</td>
<td>• Samsung SDI/ SK • CATL/Coslight/Boston</td>
<td>• Confirmed cooperation between CATL and Lishen</td>
</tr>
<tr>
<td>BAIC</td>
<td>Planned annual production and sales of 200,000 cars in 2020</td>
<td>• Samsung SDI • Lishen/Guoxuan High-tech</td>
<td>• Establish Pride with CATL • Establish BESK with SK</td>
</tr>
<tr>
<td>JAC</td>
<td>Planned annual production and sales of 200,000 cars in 2020</td>
<td>• LGC • Wanxiang A123/Shanghai Jiexin / CATL</td>
<td>• Deep cooperation with Huating</td>
</tr>
<tr>
<td>SAIC</td>
<td>Planned annual production and sales: 200k by own, 400k by JV</td>
<td>• BAK • Tianeng / Wanxiang A123/ Weineng / First / Sounddon / Lishen / Boston / Do-Fluoride</td>
<td>• Establish Shanghai Jiexin with Wanxiang A123</td>
</tr>
<tr>
<td>Zotye</td>
<td>Planned annual production and sales of 500,000 cars in 2018</td>
<td>• Wanxiang A123/Tianjin Jieneng</td>
<td>• N/A</td>
</tr>
<tr>
<td>Chery</td>
<td>Planned annual production and sales of 200,000 cars in 2020</td>
<td>• Optimum / Sinopoly</td>
<td>• Establish Wuhu Qida with Sunwoda</td>
</tr>
<tr>
<td>Jiangling</td>
<td>Planned annual production and sales of 60k-70k cars in 2020</td>
<td>• Coslight/Boston/Do-Fluoride</td>
<td>• N/A</td>
</tr>
<tr>
<td>Geely</td>
<td>Planned annual production and sales of 1,000,000 cars in 2020</td>
<td>• CATL/Coslight/Boston/Do-Fluoride</td>
<td>• N/A</td>
</tr>
<tr>
<td>Chang'an</td>
<td>Planned annual production and sales of 400,000 cars in 2020</td>
<td>• Wanxiang A123/LGC</td>
<td>• N/A, but control planning on its own</td>
</tr>
<tr>
<td>Lifan</td>
<td>Planned annual production and sales of 500,000 cars in 2020</td>
<td>• BAK • Shandong Hengyu/Cham / National Power</td>
<td>• N/A, but control planning on its own</td>
</tr>
</tbody>
</table>
According to the medium-term (till 2020) and medium-and-long-term (till 2025) analysis, China’s NEV market will maintain a high-speed development in next decade

Prediction of China’s NEV market sales, thousand vehicles, 2015–2025E

- By 2020, driven by the policy will the CAGR will be maintained at nearly 50%
- Central and local governments’ subsidies policies for consumption will continue to support the development of NEV industry
  - Since 2015 H2, the government has launched intensive charging-facilities-related policies to support the development of charge-related ancillary industries and consumer charging experience
- During 2020-2025, affected by the decline in subsidies, NEV market will maintain nearly 22% of the CAGR
  - With the gradual introduction of government subsidy policies, the market driver will transformed from policies to product identities

<table>
<thead>
<tr>
<th>Year</th>
<th>Proportion of NEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>1.3%</td>
</tr>
<tr>
<td>2016E</td>
<td>1.9%</td>
</tr>
<tr>
<td>2017E</td>
<td>2.8%</td>
</tr>
<tr>
<td>2018E</td>
<td>4.3%</td>
</tr>
<tr>
<td>2019E</td>
<td>6.4%</td>
</tr>
<tr>
<td>2020E</td>
<td></td>
</tr>
<tr>
<td>2025E</td>
<td>15.0%</td>
</tr>
</tbody>
</table>

Source: literature research; Strategy& analysis

Strategy& | PwC
Therefore, we see a great number of new entrants

<table>
<thead>
<tr>
<th>EV manufacturer background</th>
<th>Company name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founders from auto industry</td>
<td>Kaiyun, WM, Yudo, Xpeng, Dearcc, NEVS</td>
</tr>
</tbody>
</table>
| Auto parts and design company | Parts company: Changjiang, Wanxiang, Minth, Loncin, Do-Fluoride, Jiangte  
Design company: CH Auto(Qiantu Motor), Eastone |
| Other traditional company | Youxia, Gree, Hanergy, Western Resources, Fangda Special Steel |
| Internet Co. in auto verticals | NextEV, Chehejia |
| Corp. between internet and auto | Hexie & Tencent & Foxconn, Chery & Pateo & Yidao |
| Crossover Internet Co. | Letv, Singulato, Baidu driverless car |

Source: literature research; Strategy& analysis
China government aims to have 4.8Mn charging posts and 120K charging stations in place by 2020

Number of charging posts in China, 2015 vs. 2020

In unit

Guidance for Development of EV Charging Infrastructure (2015-2020)

Source: literature research; Strategy& analysis
3 Private charging post (PRCP): with regulations relating to the PRCP construction, a 1:1 ratio of BEVs and slow PRCPs is expected in future

Vision of PRCPs in 2020
Charging post installation rate of BEV owners

PRCP installation rate
- As of August 2016, installation rate of PRCP (including residential and office space) is 77%
- By 2020, the rate of installation of PRCP is expected by 90%~100%
  - After sales, OEM will install charging posts for owners for free
  - Gradual implementation of Guidelines in Accelerating Constructions of Charging Infrastructure for EV

PRCP power
- In 2016, the power is mainly at 3.3 kW, and by 2020, it will be updated to 7kW
Public charging post (PUCP): by 2020, the number of DC charging post will account for 50% of the public charging posts, and power can reach 60 ~ 120kW

Vision of PUCP in 2020

In unit

<table>
<thead>
<tr>
<th>Year</th>
<th>DC (in unit)</th>
<th>AC (in unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>19,600</td>
<td>29,400</td>
</tr>
<tr>
<td>2016E</td>
<td>49,000</td>
<td>90,000</td>
</tr>
<tr>
<td>2020pl</td>
<td>250,000</td>
<td>250,000</td>
</tr>
</tbody>
</table>

CAGR +35%

Ratio of DC and AC charging post
- In 2016, the ratio of DC (including both-in-one) / AC charging post is 4:6
- By 2020, the ratio of DC (including both-in-one) / AC charging post will be 5:5
  - Since consumers are more willing to charge with DC posts, DC charging post is better than AC post in profitability
  - As the public DC charging post is more conducive to promoting the development of EV industry, the government tend to focus on its development

DC and AC power
- In 2016, semi-public DC post power is mainly at 30-45kW and in highway at 60-120kW; AC post power is mainly at 7kW
- By 2020, semi-public DC post power will be at 60kW and in highway at 120kW; AC post power will remain at 7kW
For BEV with short mileage, 60kW charging posts can get 18% IRR per post and pay back in 8 years. Equipment and grid capacity expansion are mainly investment cost

Basic hypothesis

- **60kW DC charging post**
- **30kWh (200KM)**
- **serve 5.6 cars in average per day**

**After beginning investment (subsidy at 30%): 121,500 yuan**

- **Equipment cost**: 42,000 (35%)
- **Grid expansion**: 58,500 (48%)
- **Construction and installation cost**: 7,000 (6%)
- **Labor cost and other**: 14,000 (12%)

**10-year benefit**

<table>
<thead>
<tr>
<th>Use ratio</th>
<th>Average annual revenue</th>
<th>EBIT</th>
<th>IRR</th>
<th>Payback period</th>
</tr>
</thead>
<tbody>
<tr>
<td>13%</td>
<td>RMB 39,245</td>
<td>42%</td>
<td>18%</td>
<td>8 years</td>
</tr>
</tbody>
</table>

Charge 24kWh one car per person in average (30*80%)
Earn 19.2 yuan per vehicle
Earn 107.5 yuan one post per day
At same power level, with the rise of BEV mileage, the financial performance of existing charging posts will improve for higher use efficiency.

Effect of 400KM long mileage EV penetration on benefits with 60kWh Charging posts

- IRR (%)
- Payback period (year)
- Charging use rate
- Average single-charge duration (minutes)

Continue operating existing charging posts and increase penetration through long-mileage EV to improve use rate, which is more in line with operators’ interests.
Three key trends in automotive will fundamentally transform automotive industry

- Digitalization
- Electrification
- Changing mobility

Source: Strategy& analysis
Fast growing economy and urbanization lead to growing mobility demand, yet also pose challenges to infrastructure & environment

- Fast growing economy
- Continuous urbanization
- Insufficient infrastructure
- Traffic jam
- Pollution
- Traffic and license plate restriction

Source: Strategy& analysis
More types of vehicles will be active in the future to meet mobility needs in different cities and of different travel scenarios.

<table>
<thead>
<tr>
<th>General public transport</th>
<th>Compact public transport</th>
<th>Personalized transport</th>
<th>Private vehicles</th>
<th>Sub-prime vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Metro, bus, etc.</td>
<td>• Minibus, car pooling</td>
<td>• Cab, e-hailing, car sharing</td>
<td>• Private vehicle</td>
<td>• Bicycle, electric scooter/bicycle, etc.</td>
</tr>
</tbody>
</table>

Source: Strategy& analysis
Firstly, different types of cities and their layout will influence mobility options

Illustrative: Future mobility options by city tier

- **General public transport**: Metro, Bus, etc.
- **Compact public transport**: Minibus, car pooling
- **Personalized transport**: Cab, e-hailing, car rental, car sharing
- **Private vehicles**: Private vehicles
- **Sub-prime transport**: Bike, e-bike, Scooter

- **Mega-City (Central Urban)** (High population density; high income)
- **Mega-City (Suburb)** (Medium population density; high income)
- **Small cities** (Medium population density; medium income)
- **Countryside** (Low population density; low income)

Source: Strategy& analysis
Secondly, mobility options are also influenced by different travel scenarios.

**Illustrative: mobility options (mega cities example)**

<table>
<thead>
<tr>
<th></th>
<th>Commute</th>
<th>Daily life (Shopping, recreation, etc.)</th>
<th>Business trips</th>
<th>Short Outing</th>
<th>Vacation Road Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>General public transport</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Cab</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>e-hailing</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Car Rental</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Car sharing</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Private vehicle</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>Sub-prime transport</td>
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</tbody>
</table>

● Most popular among mobility options  ○ Least popular among mobility options

*Source: Strategy& analysis*
People have various mobility decision criteria – different mobility options have different advantage along the criteria.

<table>
<thead>
<tr>
<th>Mobility selection criteria</th>
<th>Public Transport</th>
<th>Car rental</th>
<th>Car sharing</th>
<th>Cab</th>
<th>E-Hailing</th>
<th>Private Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time saving</td>
<td></td>
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<tr>
<td>Planning Flexibility</td>
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<tr>
<td>Cost saving</td>
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<tr>
<td>Comfort</td>
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<tr>
<td>Transfer convenience</td>
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<tr>
<td># of steps needed from A to B</td>
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<tr>
<td>Car use convenience</td>
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<tr>
<td>Parking, return</td>
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</tbody>
</table>

Source: Strategy& analysis
Diversified mobility needs will foster diversified business models which are improved and innovated by new technologies.

Examples: technologies to improve & innovate mobility business model

- **VR/AR**: Precise and Smart Navigation support by VR/AR map and wearables
- **Autonomous Driving**: Autonomous driving as last mile solution, e.g., pick-up and return rental cars, valet parking
- **Big data**: On-demand optimize routes of public transportation fleet; Dynamically improve operation and utilization of shared cars
- **AI**: Automatically set mobility schedules and set vehicle environment according to estimated individual conditions

*Source: Strategy& analysis*
Business Model Example (1) – Car sharing’s feasibility is likely to improve

Scale economy under China context

<table>
<thead>
<tr>
<th>High Population Density</th>
<th>Large City Area</th>
<th>Low Vehicle Ownership</th>
<th>High Ownership of Driver License but License Plate Restriction</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Population Density (‘000 people / 10 000 sqm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tianjin</td>
</tr>
<tr>
<td>Shanghai</td>
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<tr>
<td>Beijing</td>
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<tr>
<td>Munich</td>
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<tr>
<td>Berlin</td>
</tr>
</tbody>
</table>

Profitability outlook of car sharing

- China market and consumer characteristics may help scale up revenue
- Car sharing has advantage in multi-lag, short lay over, mid to long distance trips (EV drive range to be solved), e.g., business tour, sales visits, weekend outing
- At the same time, car sharing may take mobility shares from traditional car rental
- Big data technology may help improve car sharing utilizations, operations efficiency and control costs
- Non-OEM backed car sharing may profit earlier

Source: Strategy& analysis
Business Model Example (2) – Sub-prime mobility vehicle is likely to spread fast in China to improve mobility efficiency

Sharing of sub-prime mobility vehicles

<table>
<thead>
<tr>
<th>Travel distance</th>
<th>Mobility Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td>1~3 km</td>
<td>• In Mega-cities: Supplementary Commuting; Exercise &amp; Entertainment</td>
</tr>
<tr>
<td>3~5 km</td>
<td>• In Small cities: Full purpose and mainstream vehicles</td>
</tr>
</tbody>
</table>

Case: Ford foldable smart e-Bike

MoDe:Me: Personal Mobility Use
• Can be folded to fit in the trunk, brought to subway. Max speed: 25km/h

MoDe:Pro: Commercial Mobility Use
• Suitable for courier and cargo, max drive range: 35km

Source: Strategy& analysis
Business Model Example (3) – Compact Public Transportation may be promoted to improve mobility efficiency and accessibility

Compact Public Transportation model

• Integrate big data from public transportation, taxi, e-hailing and infrastructure services, analyze and predict population mobility demand
• Optimize fixed routes of public transportation vehicles
• Open dynamic, real-time on-demand compact public transportation services, relieve traffic jams of mega cities and improve accessibility in inter-city or other low demand areas

Case: Panda Public Mobility Solutions

Overview
• Leverage big data to dynamically design the routes of Ford Transit fleet as convenient and flexible public transportation means

Applied Scenarios
• Peak traffic time in mega cities
• Low demand day time
• Night time with insufficient city public transport

Source: Strategy& analysis
Business Model Example (4) – Inter-modal transportation may be developed to improve mobility efficiency and lower cost

Example: bike sharing + car sharing

- Jintai Xizhao to South Community of Hu Jia Lou (1.3km/7min/RMB 2yuan)

Example: car sharing + subway

- Chaobai River to Tuqiao metro station (16km/30min/RMB 23yuan)

- Tuqiao metro station to Sihui metro station (18km/30min/RMB 5yuan)

Inter-modal transportation

- Multi-Modal mobility companies cooperate to design connection points and offer seamless transition across different mobility modes, thus improve mobility efficiency and lower cost

Source: Strategy& analysis
Thank You!

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