OUTLINE

1. What is a Connected Car?
2. What are the Problems?
3. How can Big Data and Machine Learning Help?
4. What is BMW doing?
5. What are the Remaining Challenges?
6. What is the Future?
01
WHAT IS A CONNECTED CAR?
THREE REASONS AUTOMAKERS ARE CONNECTING CARS

1. Internet connectivity enables over-the-air updates. $35B in savings in 2022.

2. Data generated from the vehicle indicates how efficiently the vehicle is operating and driver usage.

3. Automakers can leverage internet connections to cross sell products and services.

Source: Business Intelligence
THE MAJORITY OF CARS WILL BE CONNECTED IN THE FUTURE

Estimated Connected Car Shipments

381 Million
Connected Cars On The Road By 2021

Source: Business Intelligence
THE CONNECTED CAR REVOLUTION ENTAILS HIGHLY AUTONOMOUS DRIVING, DIGITAL SERVICES AND THE INTERIOR OF THE FUTURE.
02

WHAT ARE THE PROBLEMS?
FOUR DISRUPTIVE TECHNOLOGY-DRIVEN TRENDS…
RADICALLY CHANGING THE MOBILITY INDUSTRY

Electrification
Connectivity
Autonomous driving
Diverse mobility

| Shifts markets and revenue pools |
| Changes in mobility behavior |
| Diffusion of advanced technology |
| New competition and cooperation |

In India, Morgan Stanley estimates that shared-mobility players such as Uber and Olacabs will buy 16% of new cars sold in 2030 — up from 3% in 2015.
DATA SERVICES ARE BECOMING A ‘MUST HAVE’

I would switch to another manufacturer if it was the only one offering a car with full access to the applications data, and media

<table>
<thead>
<tr>
<th>Country</th>
<th>2014</th>
<th>2015</th>
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<tr>
<td>Germany</td>
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<td>US</td>
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<td>China</td>
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HOW CAN BIG DATA AND MACHINE LEARNING HELP
FOUR MAIN PILLARS DRIVE THE DIGITAL TRANSFORMATION PROCESS

1. CLOUD
   - INFORMATION

2. BIG DATA & PREDICTIVE ANALYTICS
   - INTELLIGENCE

3. PERSONAL SMART DEVICES
   - ACCESS

4. THE INTERNET OF THINGS
   - INTEGRATION
COLLECTING DATA

Phone  OBD-II adapter  Car headunit
What is big data worth?
To find out, we analysed the following use cases...

### Big Personal

<table>
<thead>
<tr>
<th>PAYD</th>
<th>PHYD</th>
<th>CRM - sales</th>
<th>CRM - service</th>
<th>Prognosis</th>
<th>Advertising - PULL</th>
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### Big Vehicle

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<tr>
<th>Weather</th>
<th>Traffic</th>
<th>Road Maintenance</th>
<th>Warranty</th>
<th>Insurance</th>
<th>Trip Analysis</th>
<th>Advertising</th>
<th>Product design</th>
<th>Advertising - PUSH</th>
</tr>
</thead>
</table>

http://telematicsnews.info/2014/02/05/feature-what-is-the-realistic-value-of-automotive-big-data_f552/
MACHINE LEARNING DRIVES THE AUTONOMOUS CAR
MACHINE LEARNING HELPS TO AVOID HUMAN ERROR AND ACCIDENTS
MACHINE LEARNING HELPS TO CREATE EFFICIENT CAR POOLING
04
WHAT IS BMW DOING?
BMW CONNECTED – AVAILABLE IN THE USA SINCE MARCH 31ST.
FOUR MAIN PILLARS DRIVE THE DIGITAL TRANSFORMATION PROCESS. MACHINE LEARNING IN BMW CONNECTED

Learn where your home and work locations are automatically
Learn when and where you parked your car
Learn destinations that you recently went
Learn frequent routes that you take regularly
Predict your trips and notify you when you should leave
FOUR MAIN PILLARS DRIVE THE DIGITAL TRANSFORMATION PROCESS.

- Learn your parking, home and predicted destinations.
  - Never be late again; stay informed in and outside of your car.
  - With simple clicks, send an address from any app to your car.
  - Find parking near your final destination; get 'last mile' walking directions.
  - Use your smart device of choice at home or work to manage your mobility.
  - Send your estimated arrival time with a few clicks while driving.
  - Control your vehicle remotely.
  - Get intelligent, personalized info and suggestions based on your behavior.

Predicted trip
- Map of user’s location and parking location
- Learned home
LEARN YOUR FREQUENT, RECENT, WORK AND PARKING LOCATIONS

Never be late again; stay informed in and outside of your car.

With simple clicks, send an address from any app to your car.

Find parking near your final destination; get ‘last mile’ walking directions.

Use your smart device of choice at home or work to manage your mobility.

Send your estimated arrival time with a few clicks while driving.

Control your vehicle remotely.

Get intelligent, personalized info and suggestions based on your behavior.
LEARN YOUR TYPICAL ARRIVAL TIMES FOR A LEARNED DESTINATION

Estimated predicted arrival times to Home

Estimated predicted arrival time to Grand Palace Chinese restaurant
WHAT ARE THE REMAINING CHALLENGES?
ENSURING USER AND CAR SECURITY
INTEGRATE THE CONNECTED CAR TO YOUR DAILY LIFE

https://youtu.be/JuaiCf6MHa0
MACHINE LEARNING – COMING TO A BMW NEAR YOU