The Evolution Of The Car
Connected Cars Will Be A Top Internet Of Things Device

John Greenough
Research Analyst, Internet of Things

Connected Car

- Strategy for Connecting

- Benefits of Connecting

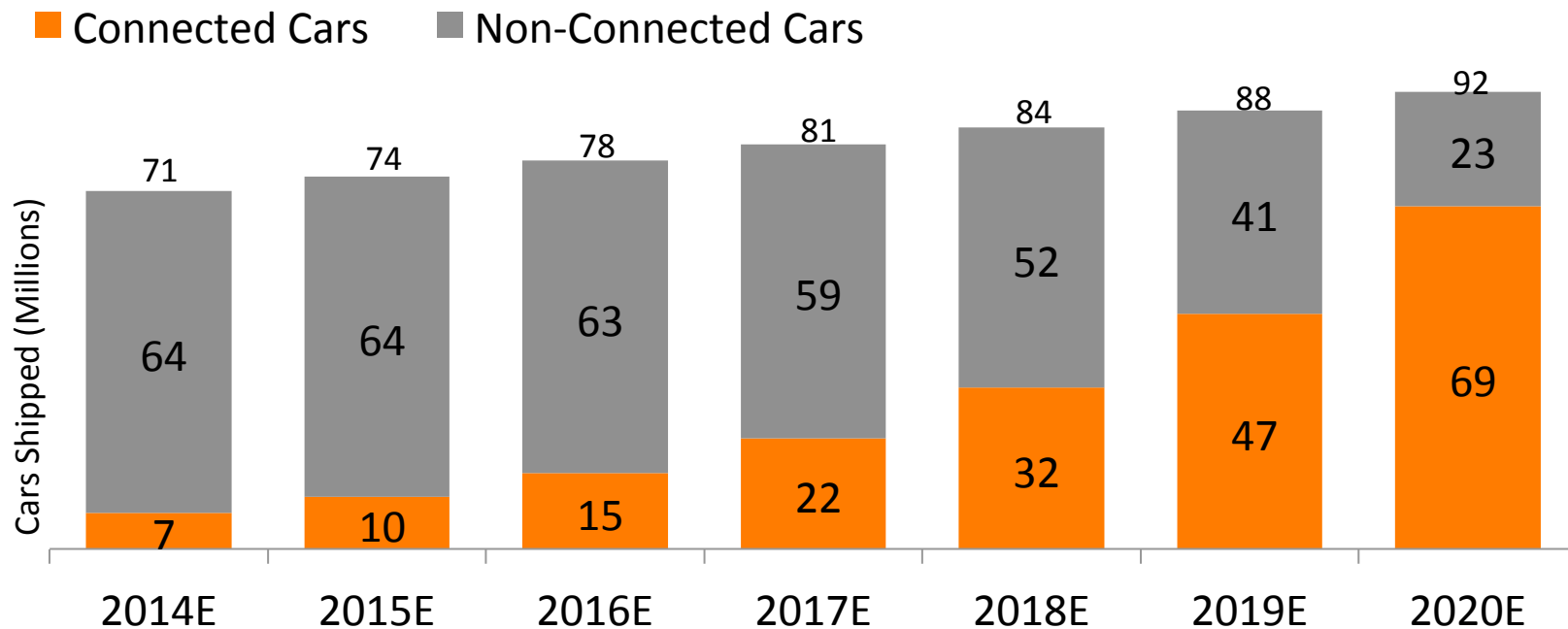## Self-Driving Car

- Semi vs. Fully Autonomous

- Barriers

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Connected Car

# Automakers Are Connecting Cars To The Internet

Global Connected Car Shipments

■ Connected Cars **■ Non-Connected Cars**

Source: Scotiabank, BI Intelligence Estimates, 2015

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The Majority Of Cars Shipped In 2020 Will Be Connected

Global Connected Car Shipments As A Percentage

75%

54%

38%

27%

20%

14%

10%

2014E 2015E 2016E 2017E 2018E 2019E 2020E

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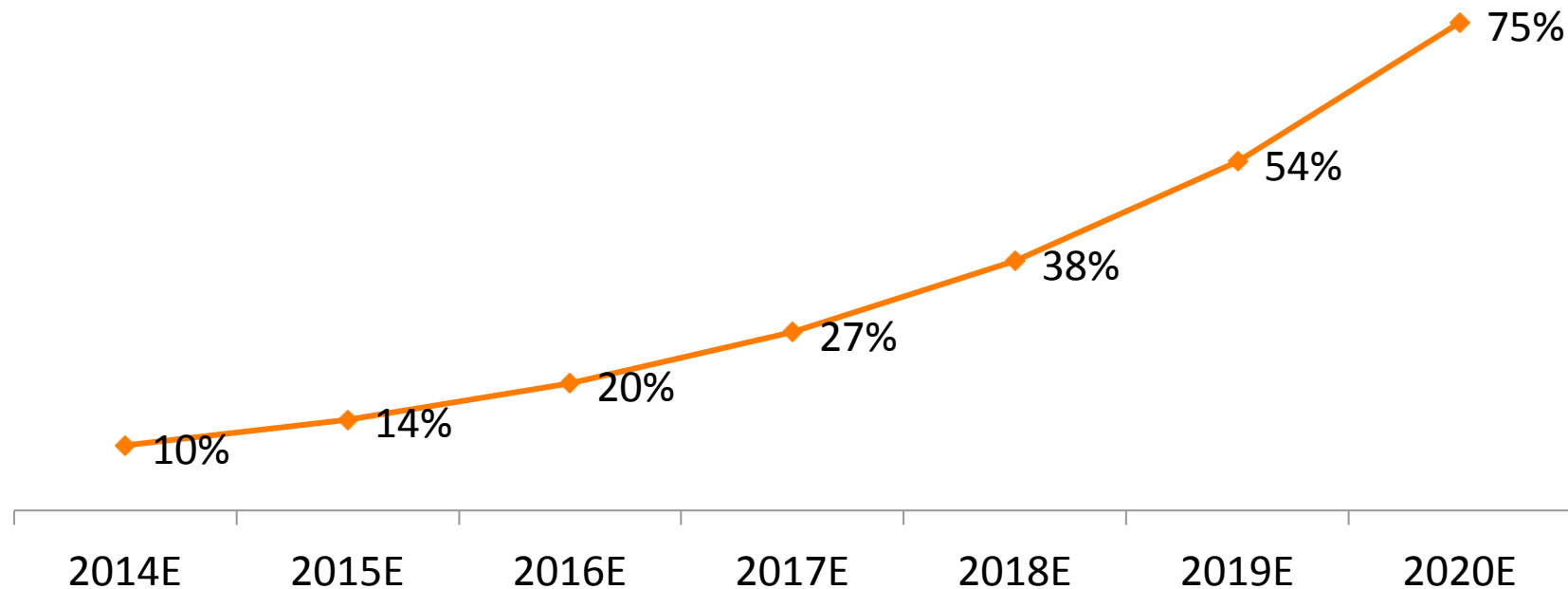
The Connected Car Is A Small Portion Of The IoE Device Market

Internet Connected Device Installed Base

Devices Installed (Billions)

Legend:
- Connected Car
- Home
- Enterprise
- Government
- Connected TVs
- Other Wearables
- Fitness Bands
- Smart Watches
- Personal Computers
- Tablet
- Smartphones

X-axis: 2014E, 2015E, 2016E, 2017E, 2018E, 2019E, 2020E

Y-axis: -, 5, 10, 15, 20, 25, 30, 35, 40

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Source: BI Intelligence Estimates, 2015
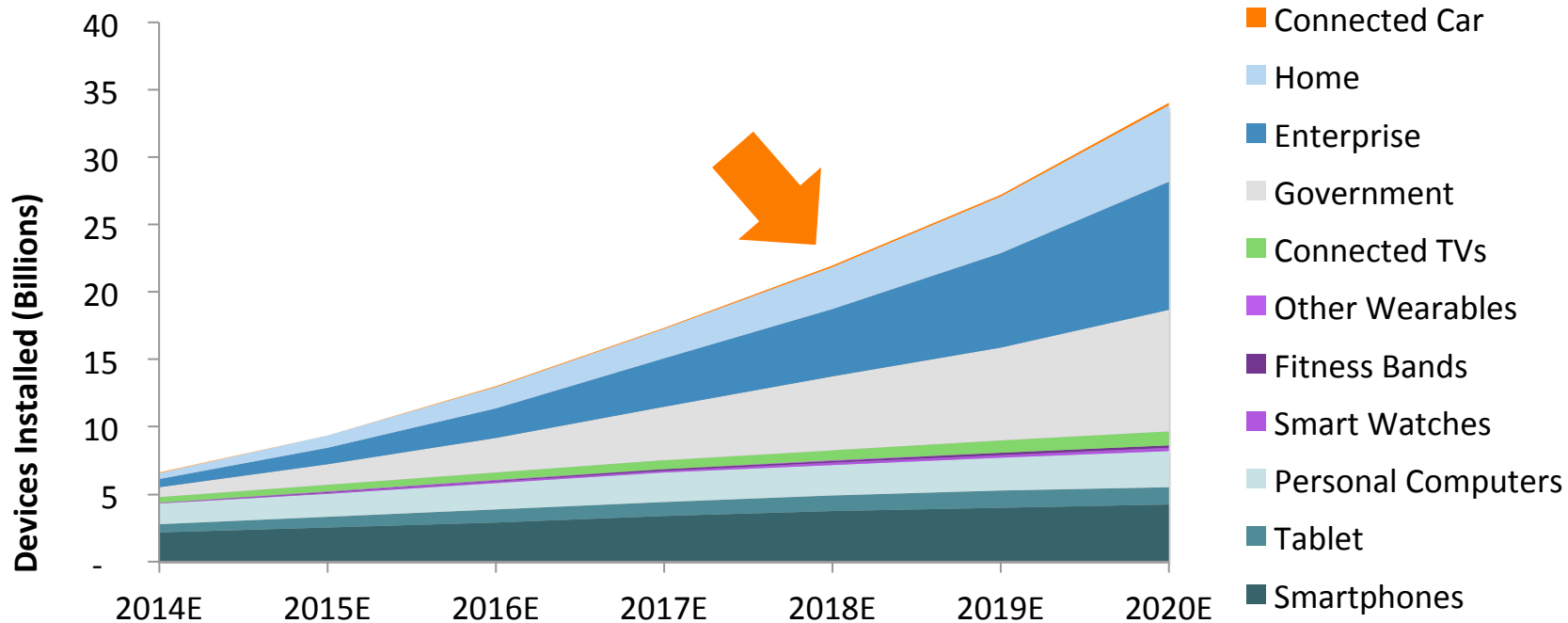
But The Car Market Generates A Lot Of Money

2014 Connected Car Market Was More Than Smartphone, PC, & Wearable Market Combined

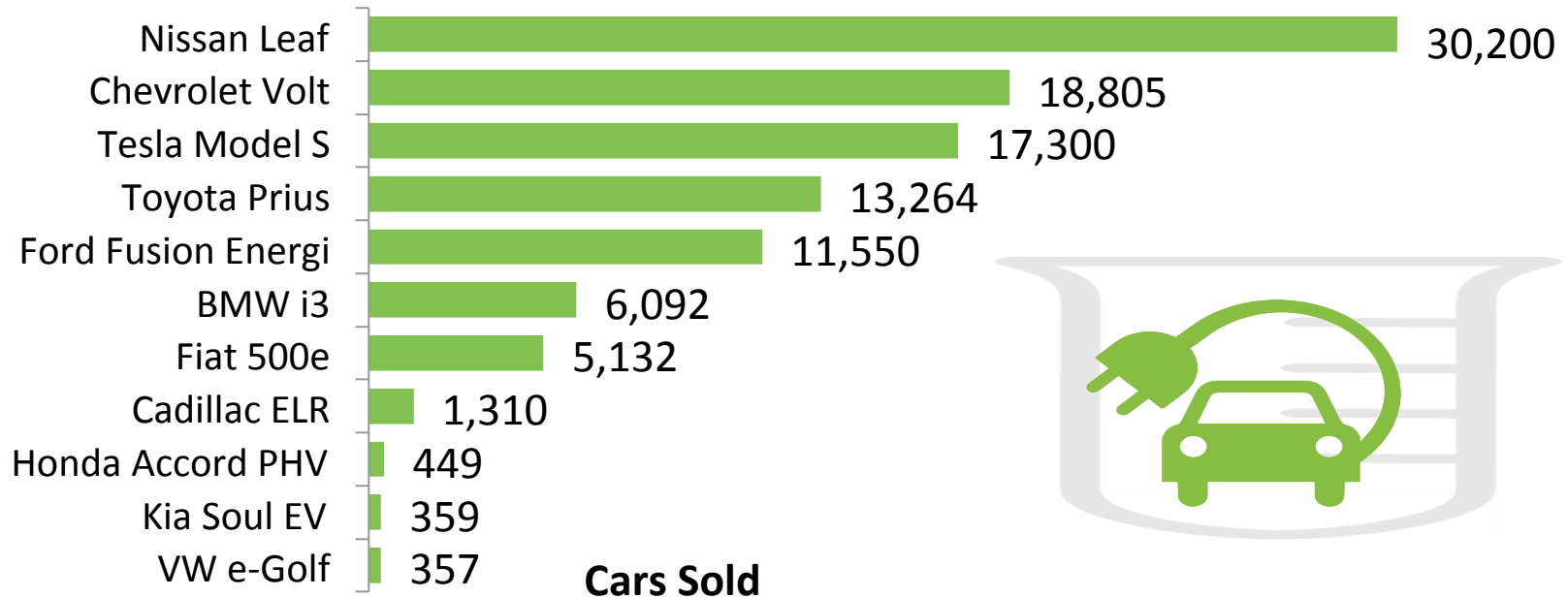Source: Markets and Markets, IDC, Visiongain, BI Intelligence Estimates, 2015
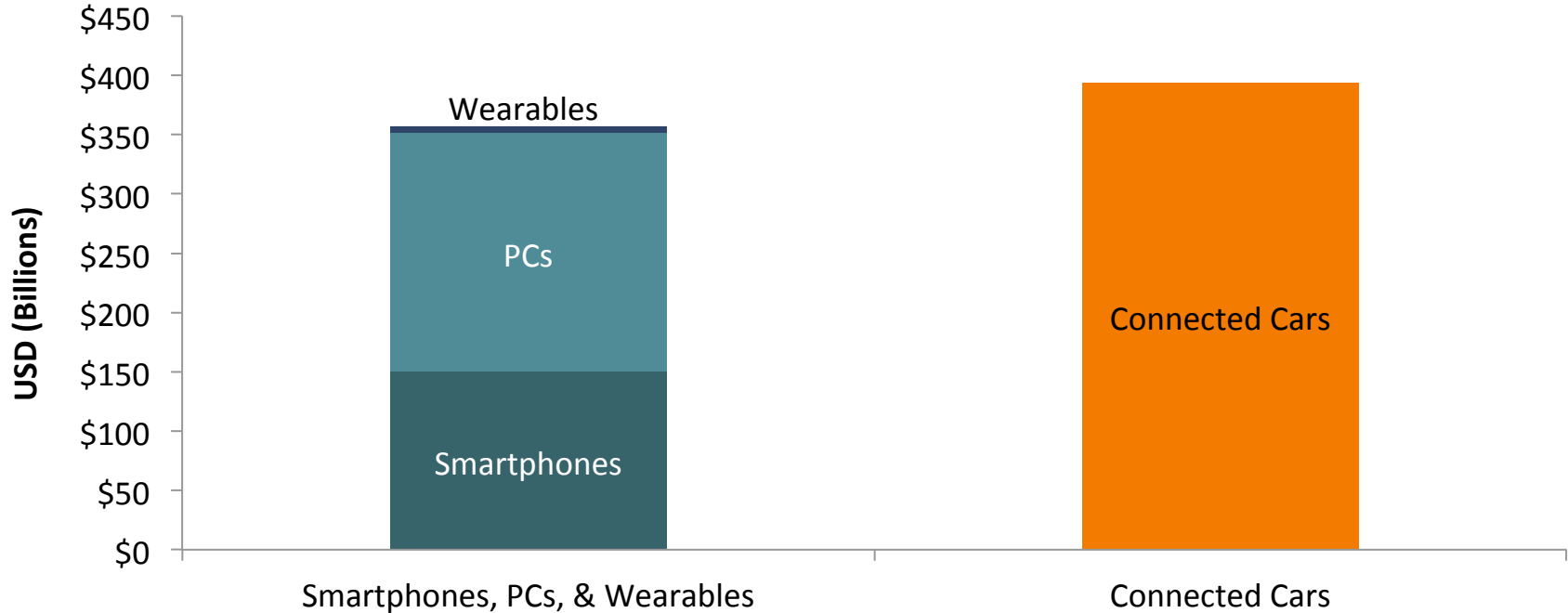
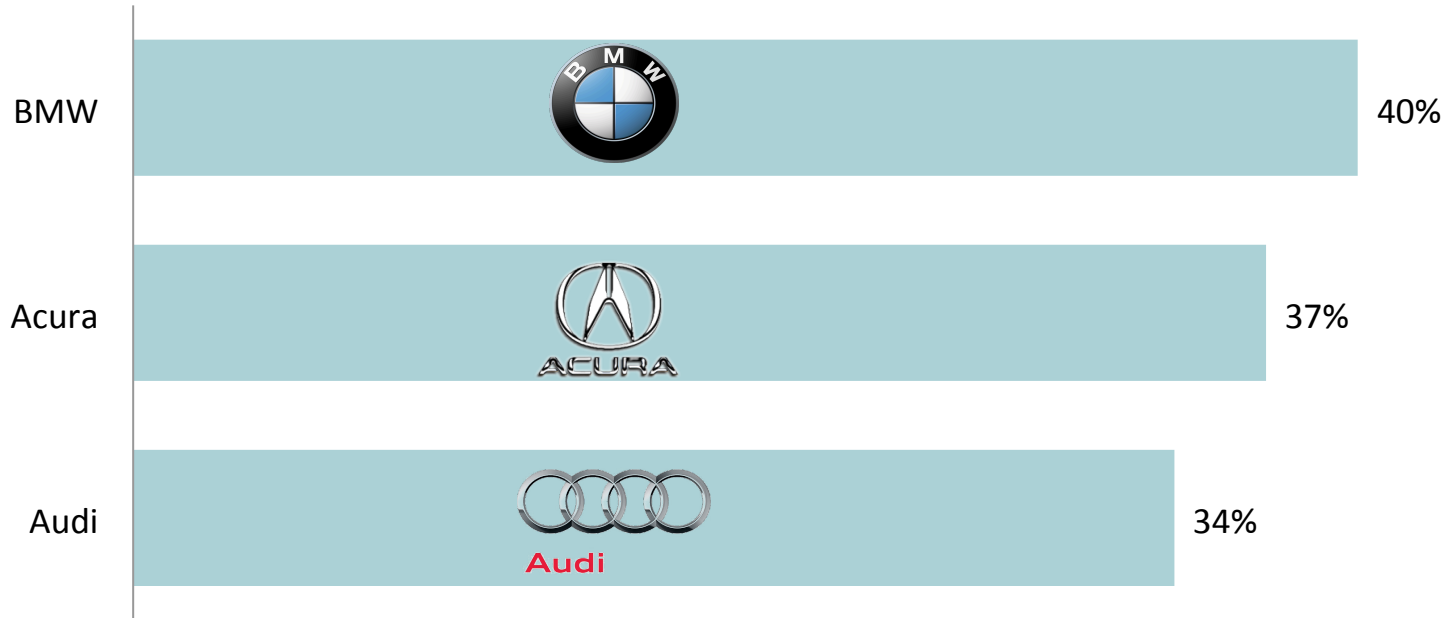# Strategy

The Electric Car Is The Test Tube

➤ Electric car customers are the most tech-savvy, which is why automakers are installing internet connections in these vehicles first.

2014 US Sales Of Plug-In Electric Vehicles That Offer Connection

Model	Cars Sold
Nissan Leaf	30,200
Chevrolet Volt	18,805
Tesla Model S	17,300
Toyota Prius	13,264
Ford Fusion Energi	11,550
BMW i3	6,092
Fiat 500e	5,132
Cadillac ELR	1,310
Honda Accord PHV	449
Kia Soul EV	359
VW e-Golf	357

Cars Sold

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Expand Connection To All Vehicles

➢ After testing connectivity features in their electric models, automakers will expand connection offerings to luxury and economy vehicles.

Electric > Luxury > Economy

Benefits

How Automakers Benefit From Connecting Cars

Generating Data

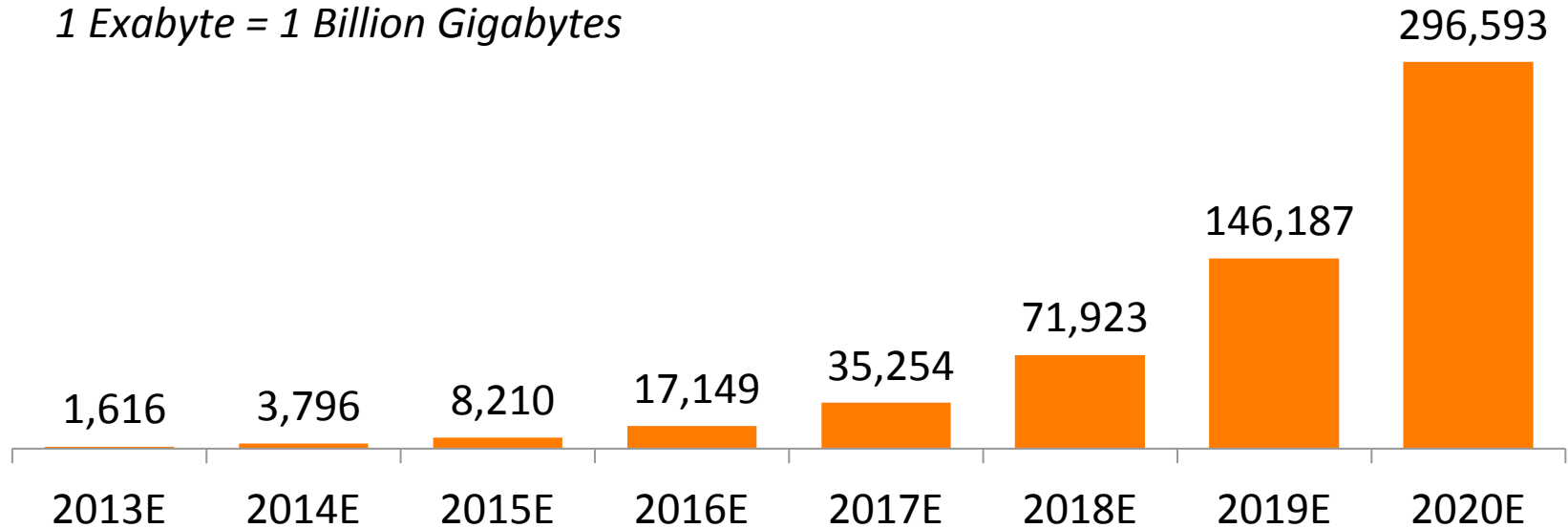Pushing Over-The-Air Updates

Adding Products & Services

Improving Car Safety

1. Generating Data

➤ Automakers use connected car data to learn about their car's use and improve future models.

Exabytes of Data Produced by Global Connected Cars

1 Exabyte = 1 Billion Gigabytes

Bar chart: Exabytes of Data Produced by Global Connected Cars

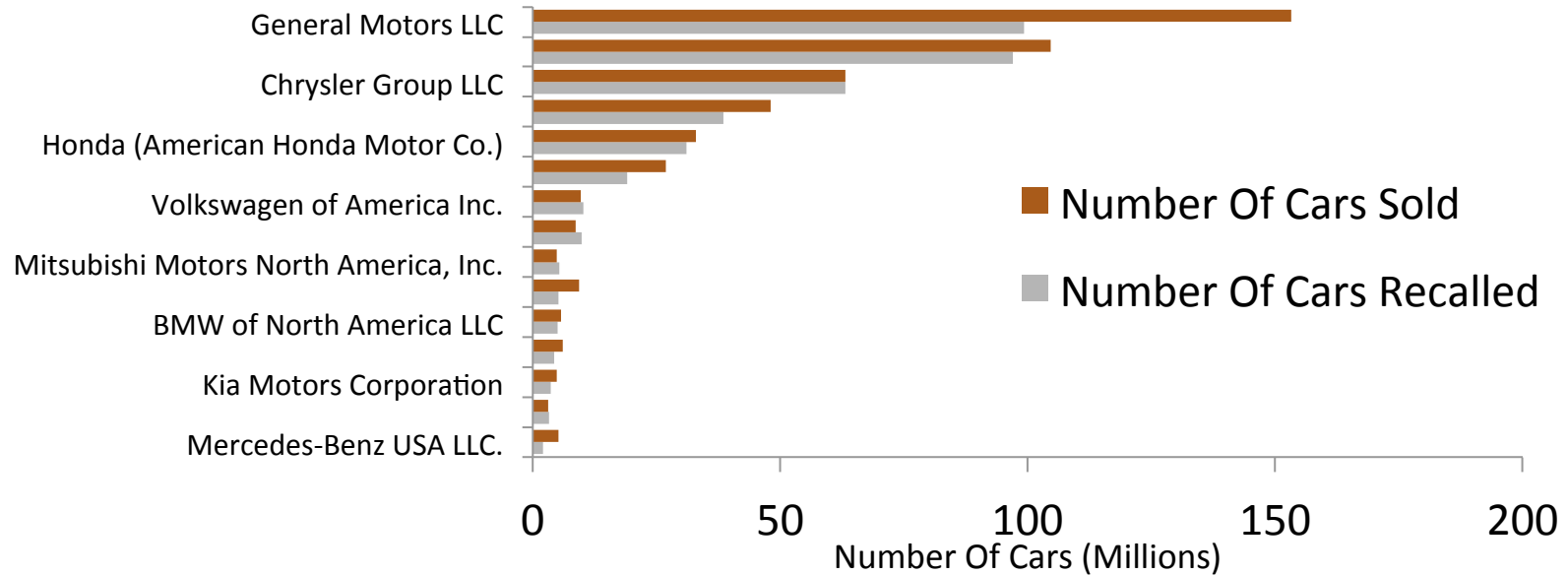| Year	Value
2013E	1,616
2014E	3,796
2015E	8,210
2016E	17,149
2017E	35,254
2018E	71,923
2019E	146,187
2020E	296,593

2. Pushing Over-The-Air Updates

➢ Cars are no longer stagnant when they leave the lot. Connection enables real-time software updates to cars.

Cars Recalled Between 1985-2014

Chart: Number Of Cars (Millions) by manufacturer, showing Number Of Cars Sold and Number Of Cars Recalled for General Motors LLC, Chrysler Group LLC, Honda (American Honda Motor Co.), Volkswagen of America Inc., Mitsubishi Motors North America, Inc., BMW of North America LLC, Kia Motors Corporation, and Mercedes-Benz USA LLC.

Source: ISeeCars.com:2014, NHTSA:1980-2014
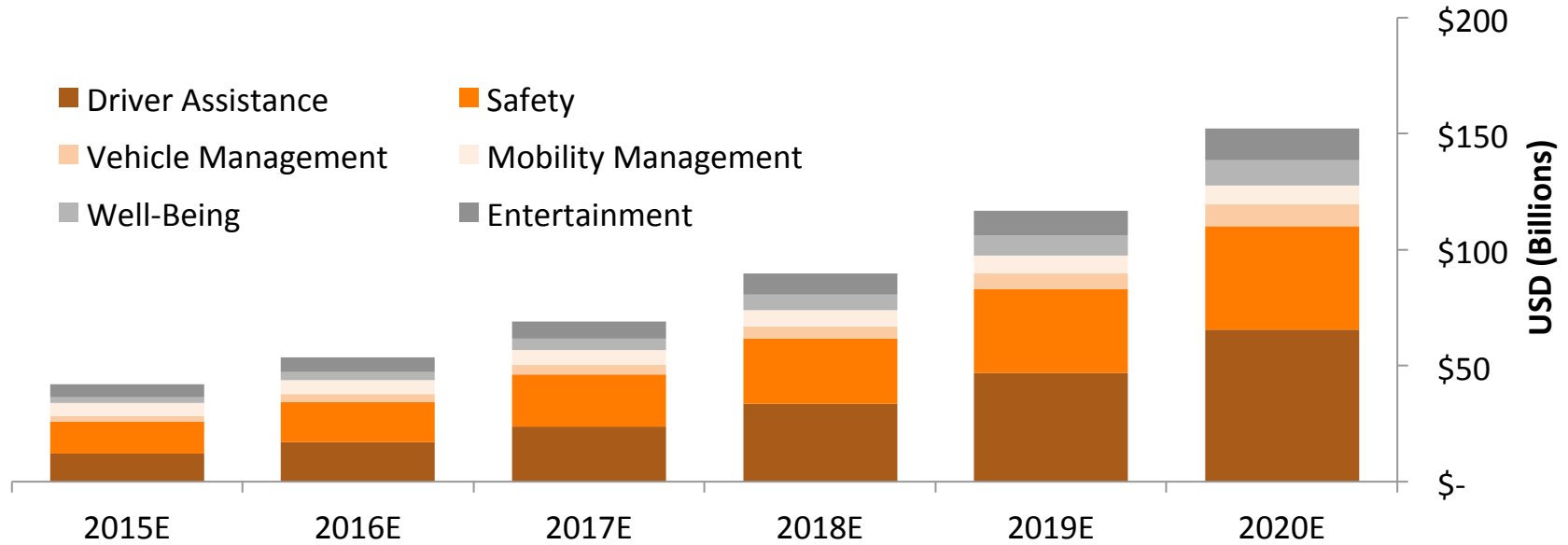
3. Adding Products & Services

➤ Car makers and tech companies are trying to monetize connection by adding products and services.

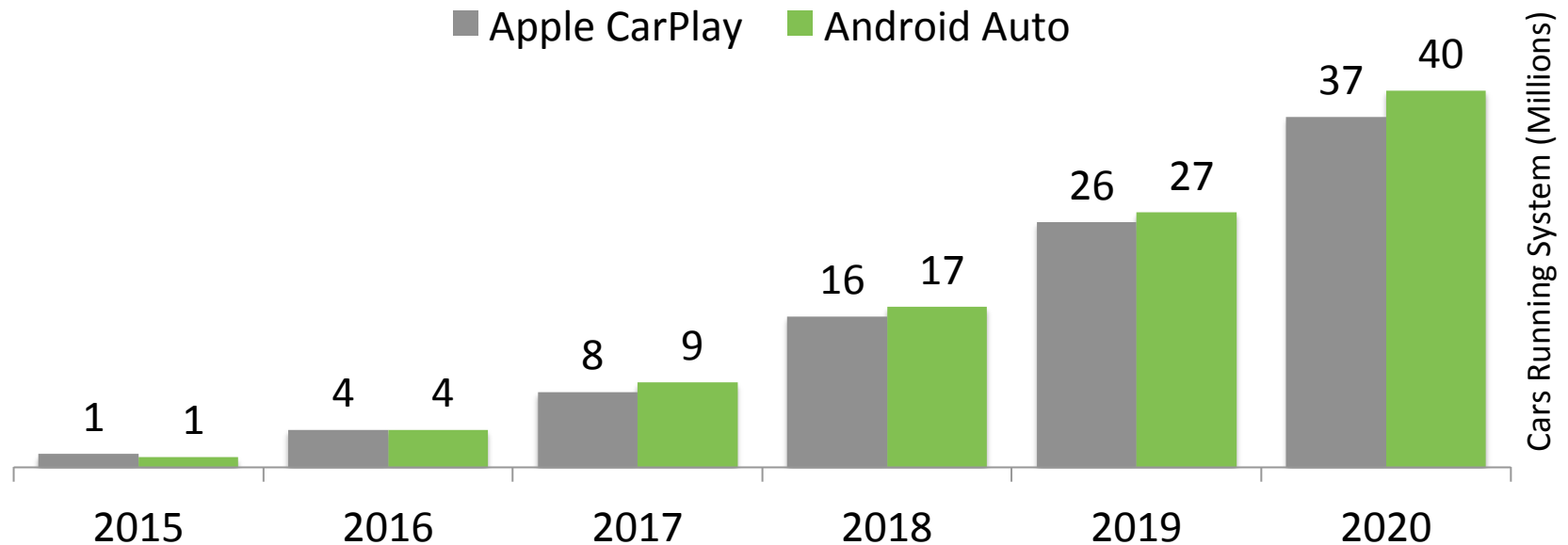## Global Revenue From Extra Connected Products/Services

Legend:
- Driver Assistance
- Safety
- Vehicle Management
- Mobility Management
- Well-Being
- Entertainment

Y-axis: USD (Billions) — $200, $150, $100, $50, $-

X-axis: 2015E, 2016E, 2017E, 2018E, 2019E, 2020E

Source: Strategy&: 2014, BI Intelligence Estimates: 2015

Major Tech Companies Will Help Build Connected Car Platforms

➢ Apple, Google, Microsoft, and Blackberry are partnering with automakers to build connected car products.

Number of Cars with Android Auto vs. Apple CarPlay

■ Apple CarPlay ■ Android Auto

Cars Running System (Millions)

Year	Apple CarPlay	Android Auto
2015	1	1
2016	4	4
2017	8	9
2018	16	17
2019	26	27
2020	37	40

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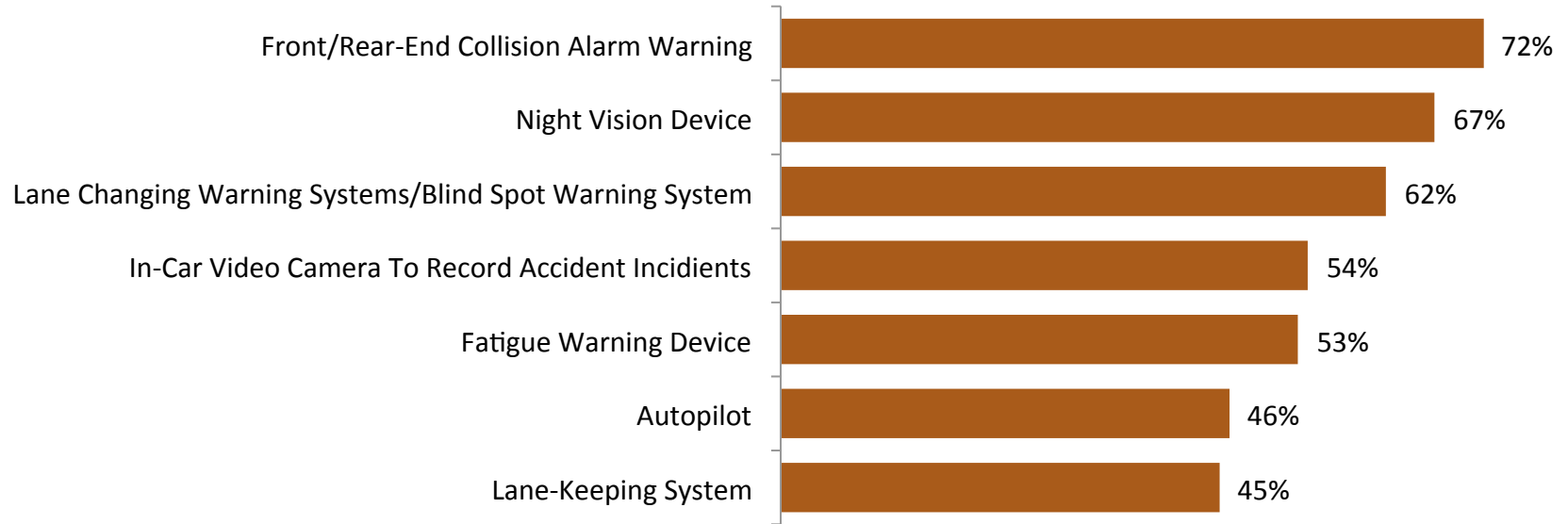
Source: IHS, BI Intelligence Estimates, 2015

4. Improving Car Safety

➢ Airbags, seat belts, advanced braking systems, and other innovations have made roads safer.

US Car Crash Fatalities

Source: Federal Highway Administration, US Census
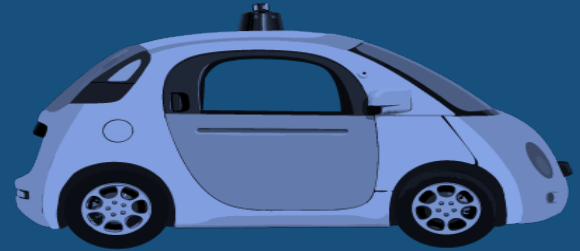
BI INTELLIGENCE
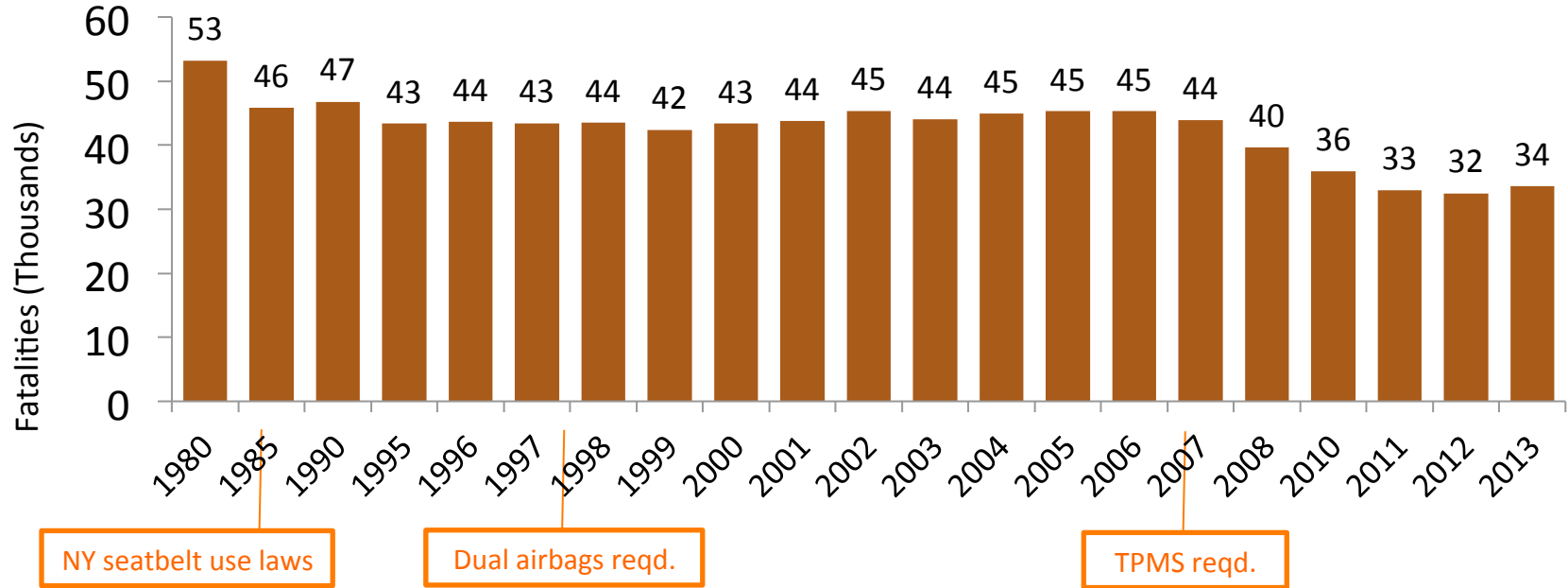
And Consumers Want Safety Features

Q: *Which of the following information technologies/driving support systems would you like to use in your car? (Global) n=10,000*

Feature	Percentage
Front/Rear-End Collision Alarm Warning	72%
Night Vision Device	67%
Lane Changing Warning Systems/Blind Spot Warning System	62%
In-Car Video Camera To Record Accident Incidents	54%
Fatigue Warning Device	53%
Autopilot	46%
Lane-Keeping System	45%

Source: Accenture, 2014

Connected -> Self-Driving

➢ Adding safety and mapping features to connected cars will help to create the self-driving car.
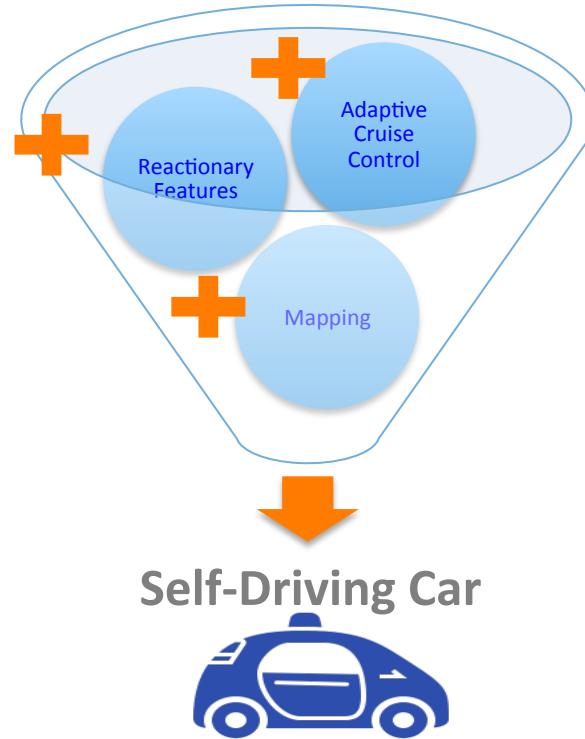
Self-Driving Car

Spectrum Of Self-Driving Cars

Semi-Autonomous

1 • Stop & Go Autopilot

2 • Remote Valet Assistant

3 • Highway Autopilot With Lane Changing
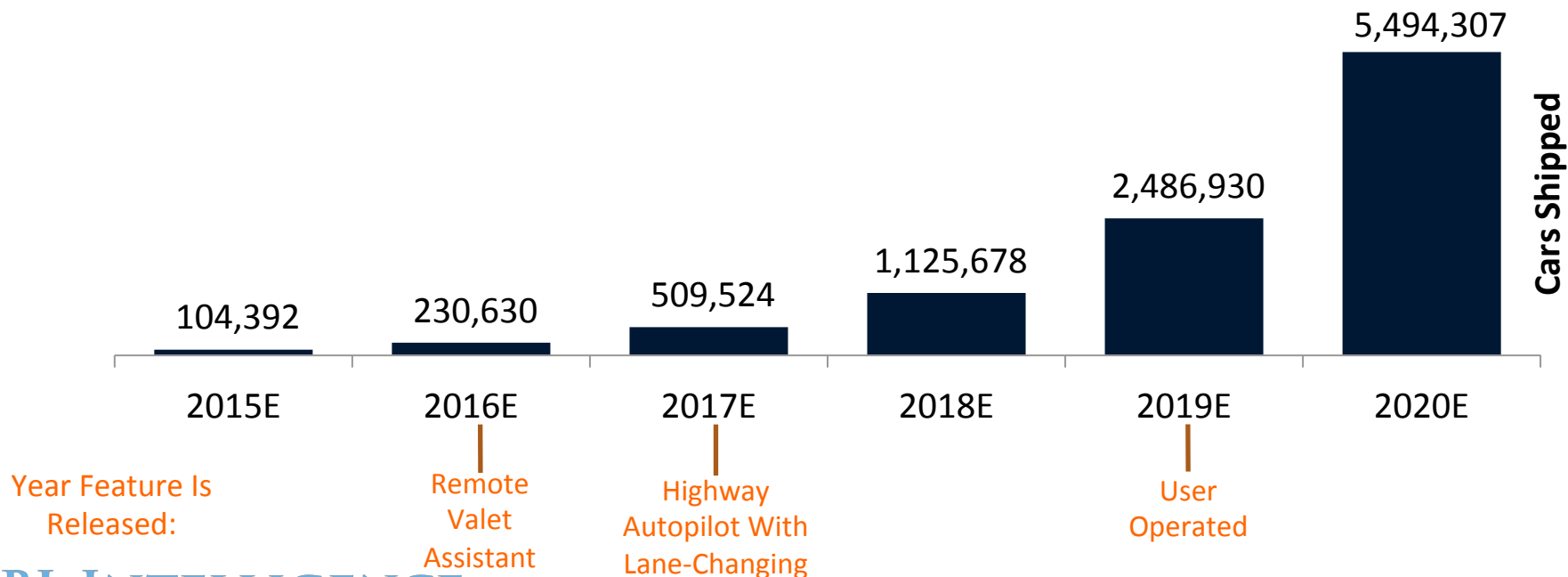
Fully Autonomous

4 • User Operated

5 • Driverless

Widescale Self-Driving Capabilities Will Be Available Soon

➤ BMW, Tesla, and a few OEMs have announced how their cars will be able to drive themselves in upcoming models.
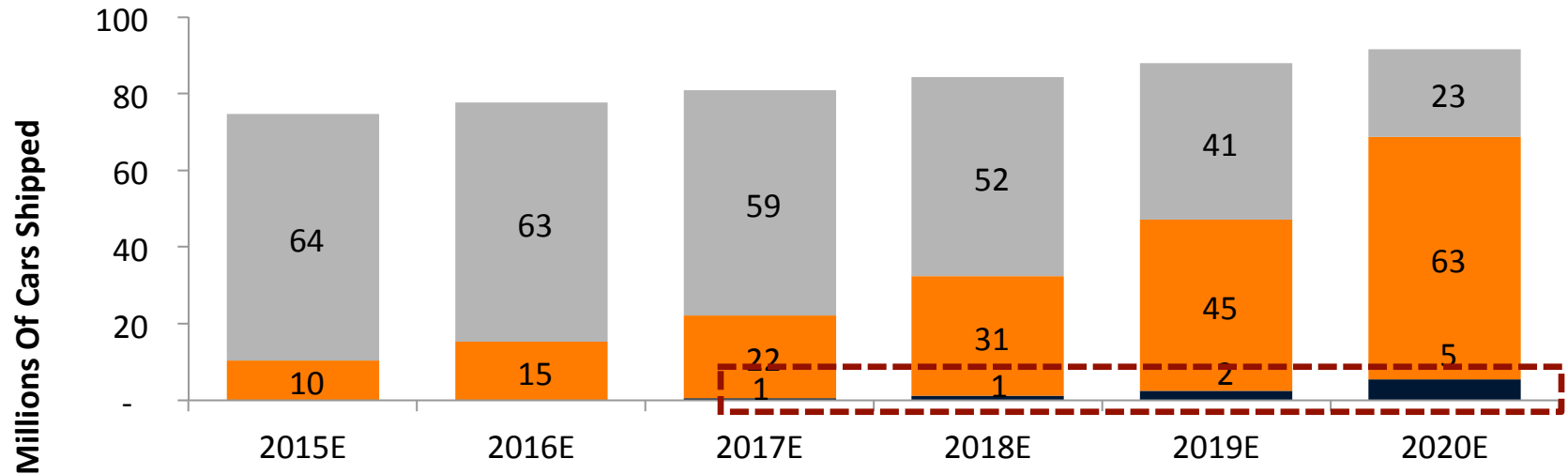
Estimated Global Shipments of Self-Driving Cars

Year	Cars Shipped
2015E	104,392
2016E	230,630
2017E	509,524
2018E	1,125,678
2019E	2,486,930
2020E	5,494,307

Year Feature Is Released:

2016E — Remote Valet Assistant

2017E — Highway Autopilot With Lane-Changing

2019E — User Operated

Source: BI Intelligence Estimates: 2015

But This Is A Fraction Of The Cars Shipped

➢ Self-driving cars will make up 8% of connected car shipments in 2020.

Global Self-Driving Car Shipments As A Share Of The Car Market

Legend: ■ Self-Driving Car ■ Shipped With Connectivity But Not Self Driving ■ Nonconnected Cars

Y-axis: Millions Of Cars Shipped

	2015E	2016E	2017E	2018E	2019E	2020E
Nonconnected Cars	64	63	59	52	41	23
Shipped With Connectivity	10	15	22	31	45	63
Self-Driving Car			1	1	2	5

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Trucks And Taxis Will Be Fully Autonomous First

➢ Daimler recently unveiled their new self-driving truck, and Uber is working with Carnegie Mellon on a self-driving vehicle.
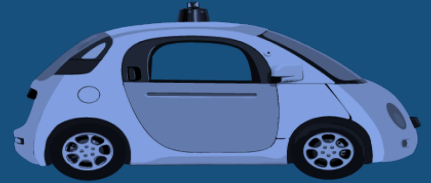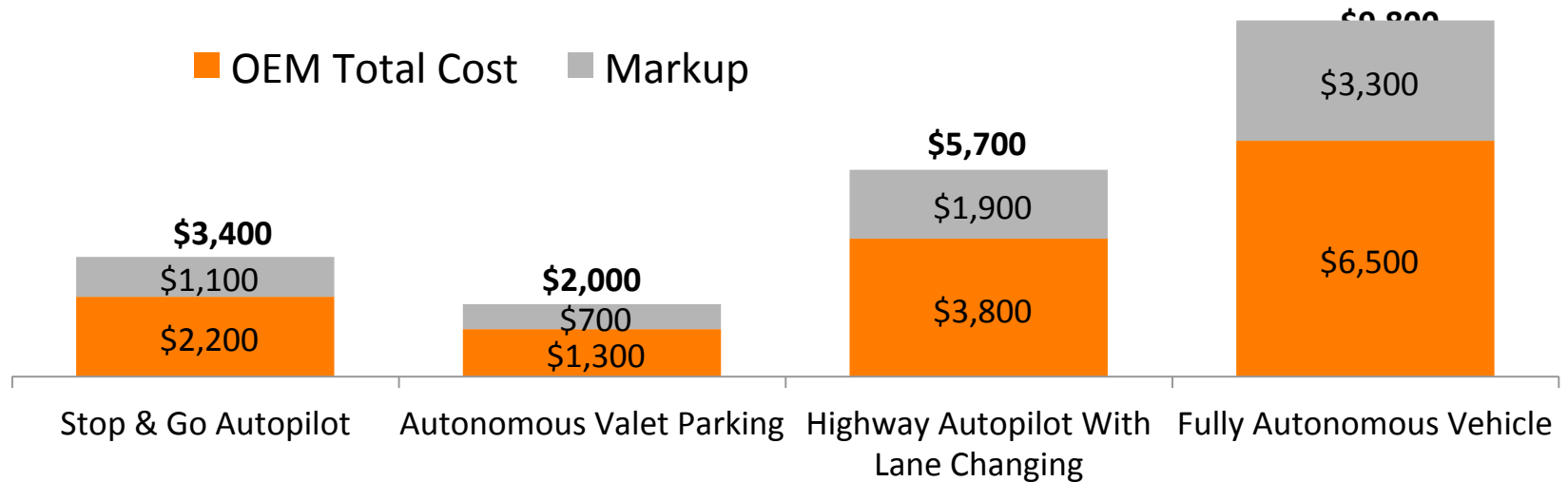
Commercial Trucking   **Taxis/Ride Sharing**   **Consumers**

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Barriers To Adoption

Regulations Vary By State

➢ State-by-state regulation of self-driving cars will be a major obstacle to getting them on the road. Other countries might be more willing to accept them.

Legal Status Of Self-Driving Cars

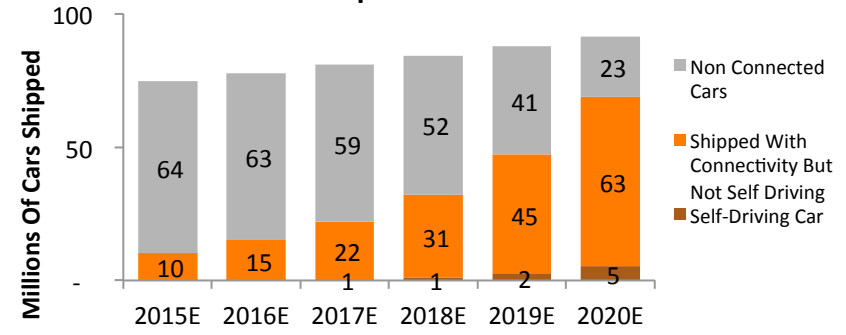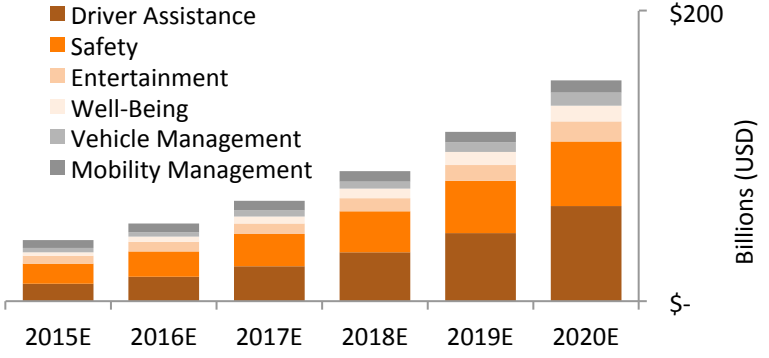Current Status — ■ Passed ■ Under Consideration ■ Failed
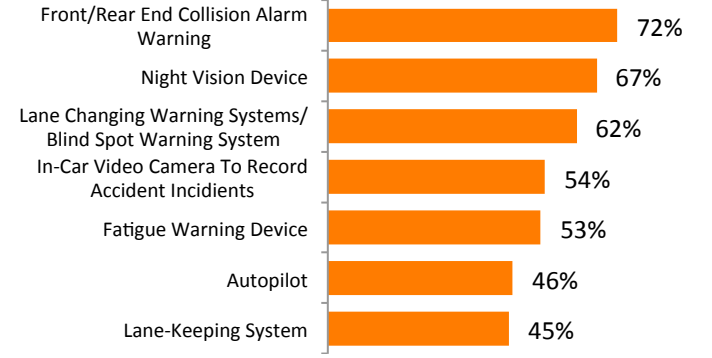
Source: Gabriel Weiner and Bryant Walker Smith, Automated Driving: Legislative and Regulatory Action, cyberlaw.stanford.edu/wiki/index.php/Automated_Driving:_Legislative_and_Regulatory_Action
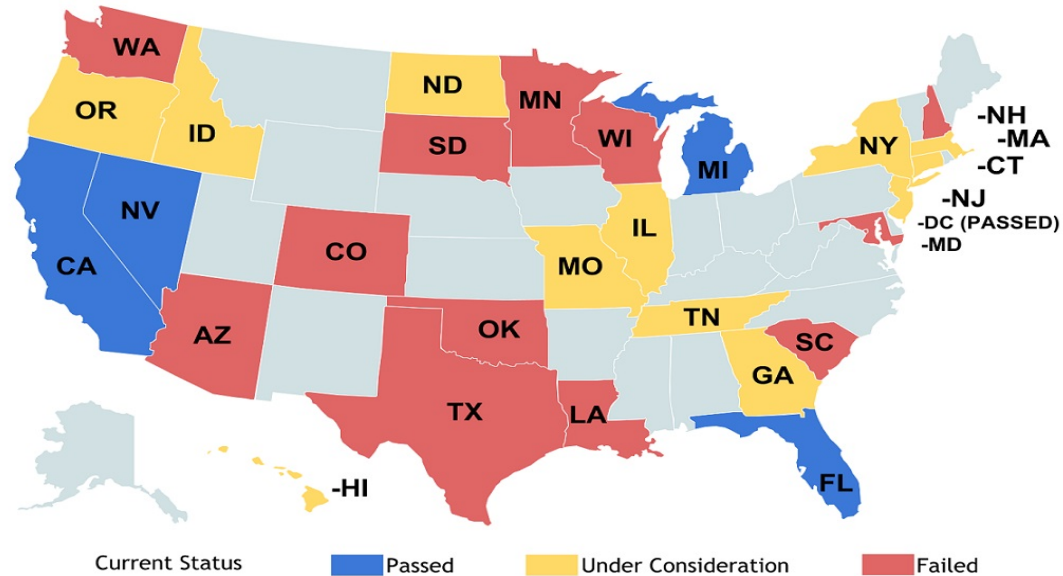
Recap

Self-Driving Car Shipment Forecast

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Car Shipment Forecast

Millions Of Cars Shipped

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Shipped With Connectivity But Not Self Driving	10	15	22	31	45	63
Self-Driving Car			1	1	2	5
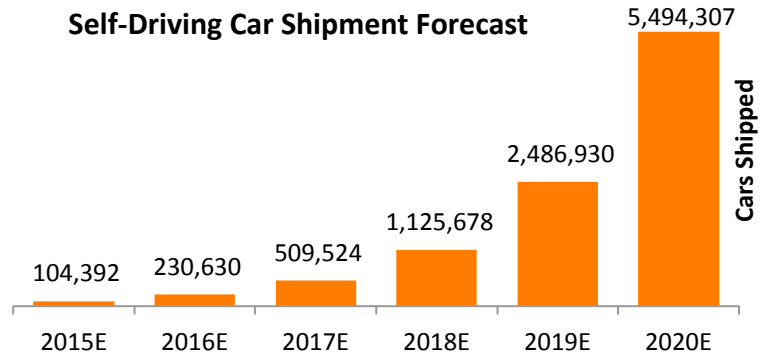
Global Revenue From Connected Car Features

- Driver Assistance
- Safety
- Entertainment
- Well-Being
- Vehicle Management
- Mobility Management

Billions (USD) $200 $-

2015E 2016E 2017E 2018E 2019E 2020E

Desired Safety Features

Feature	Percent
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