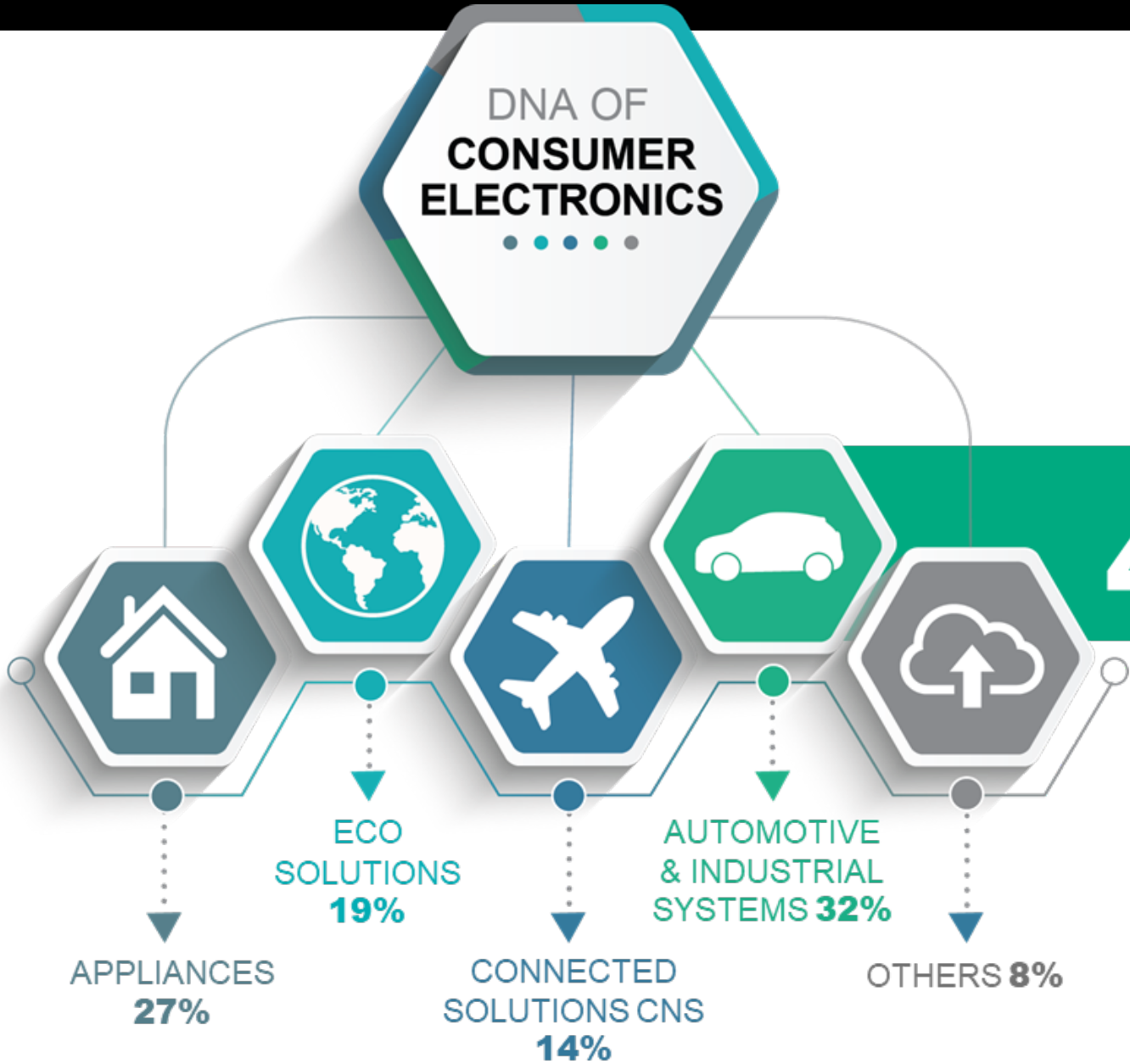


OSS & SSO

CONNECTED CAR PERSPECTIVE

John Avery, Group Manager,
SW, Advanced Engineering

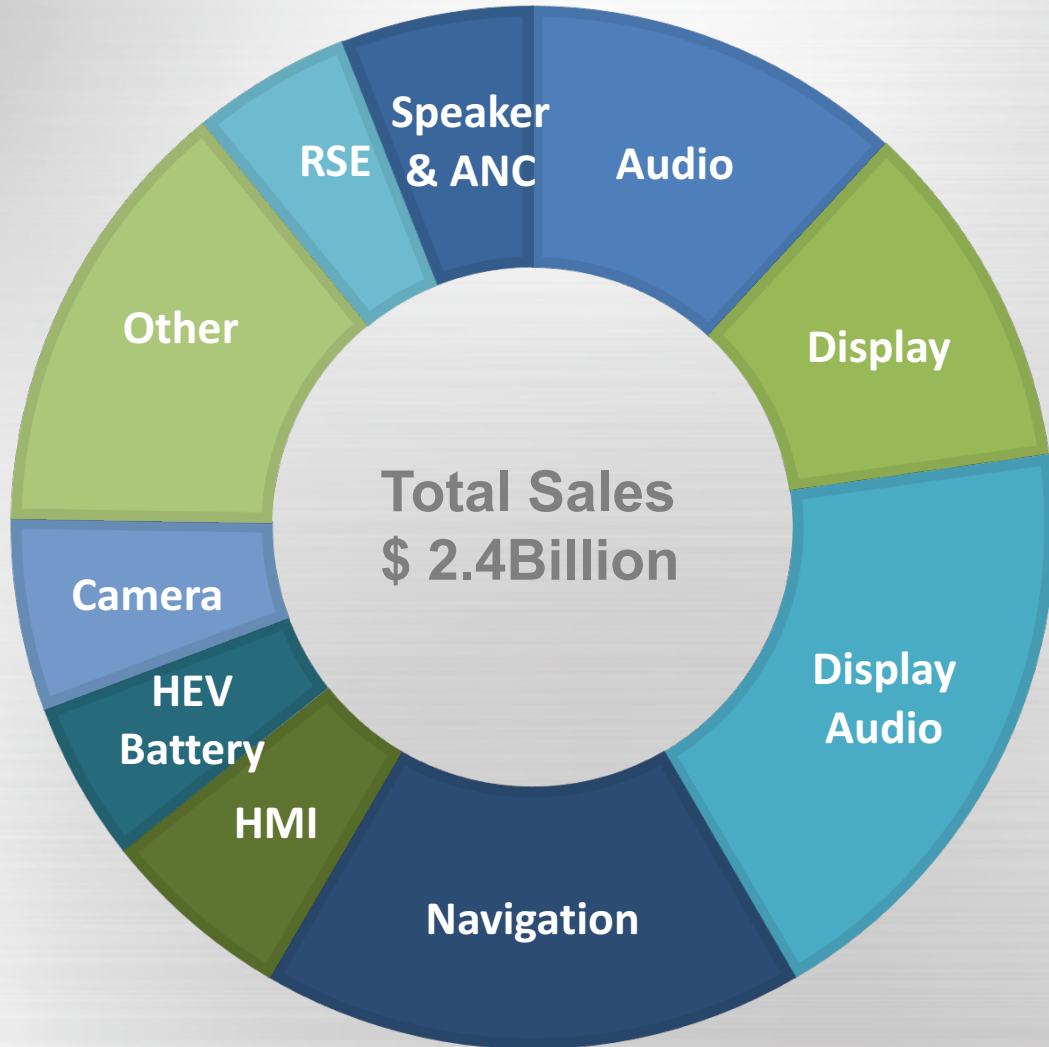




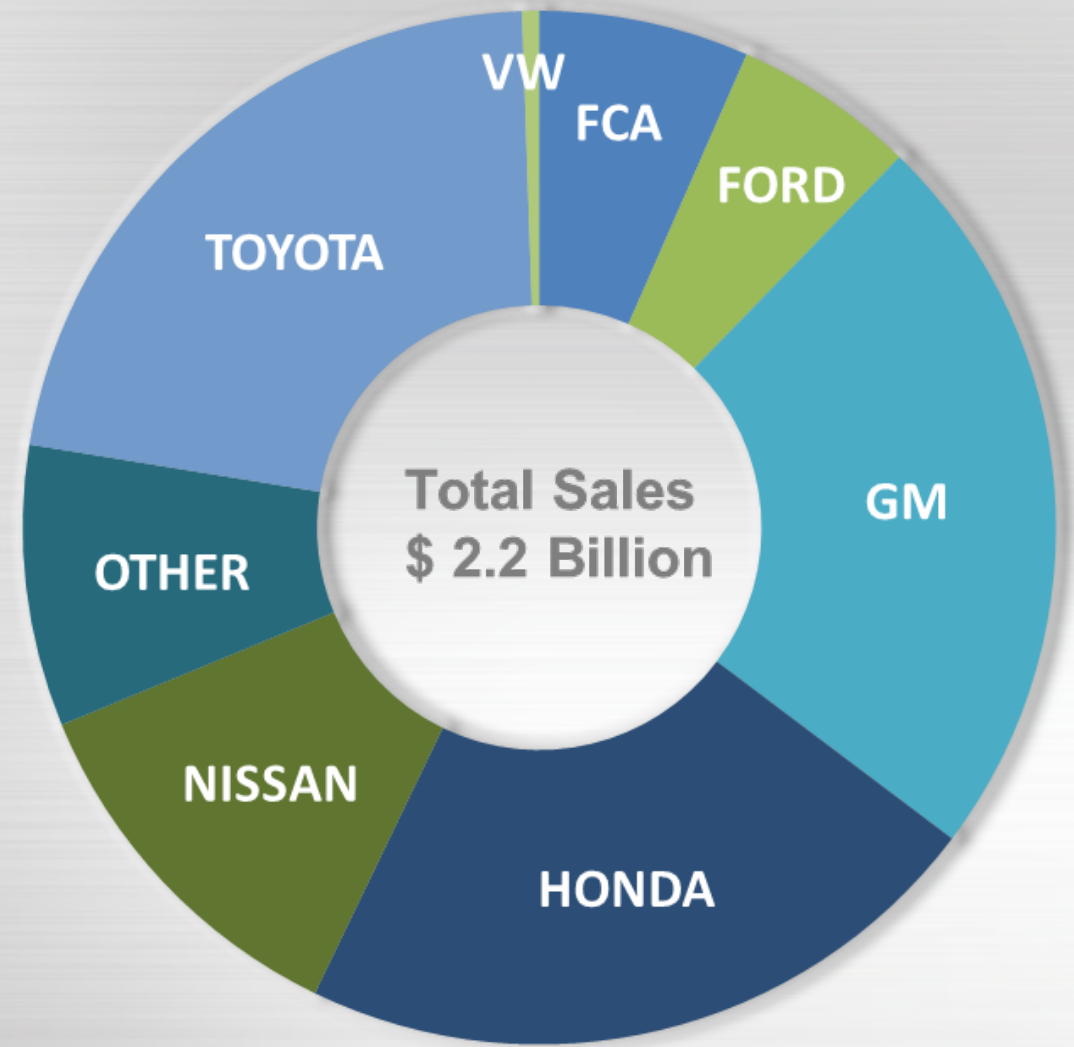
4 KEY BUSINESS SEGMENTS = **\$70 BILLION**



PRODUCT SALES

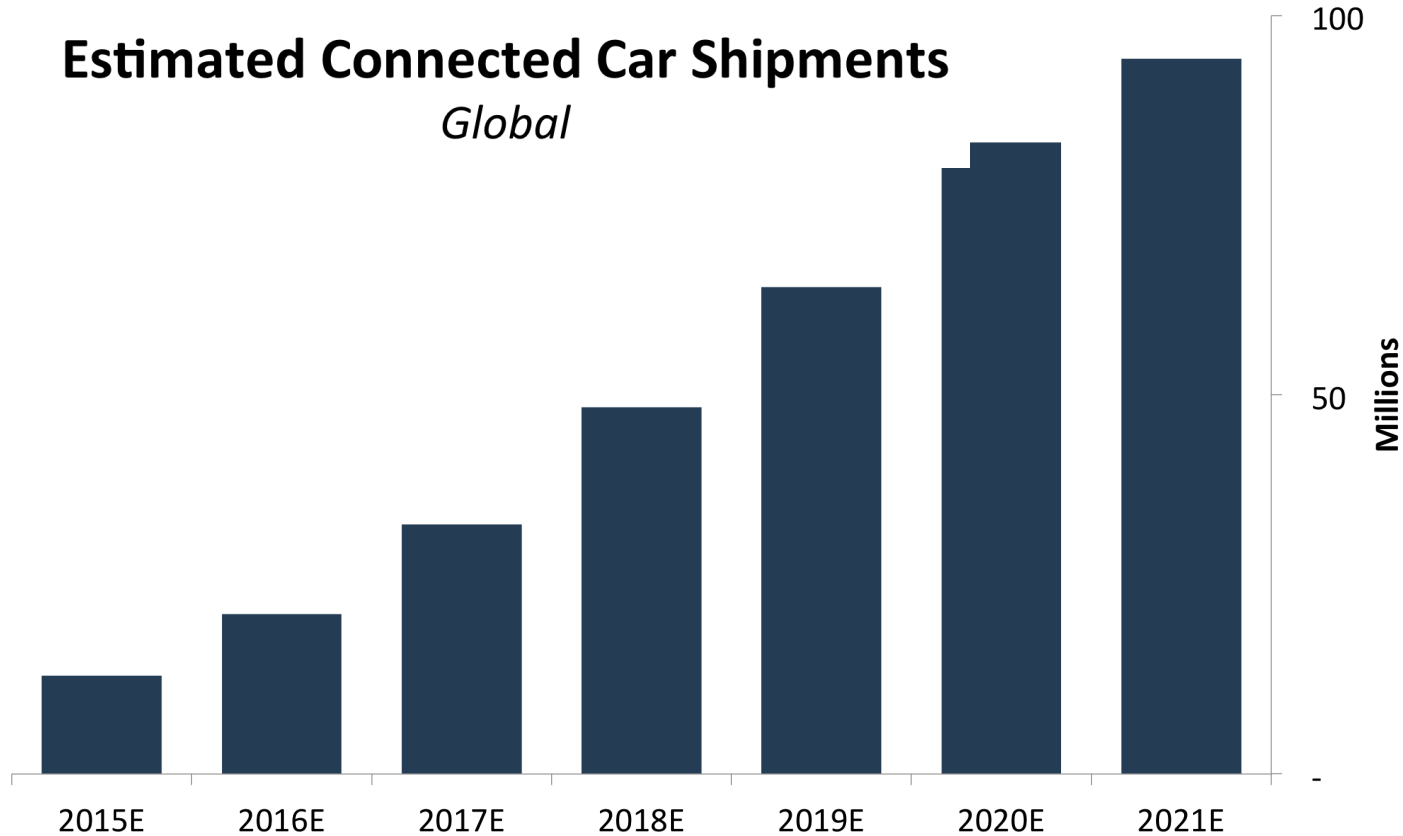


CUSTOMER SALES





Estimated Connected Car Shipments *Global*



Source: OICA, KPMG, ITU, Google Consumer Barometer, GSMA Intelligence, BI Intelligence estimates, 2016

BI INTELLIGENCE



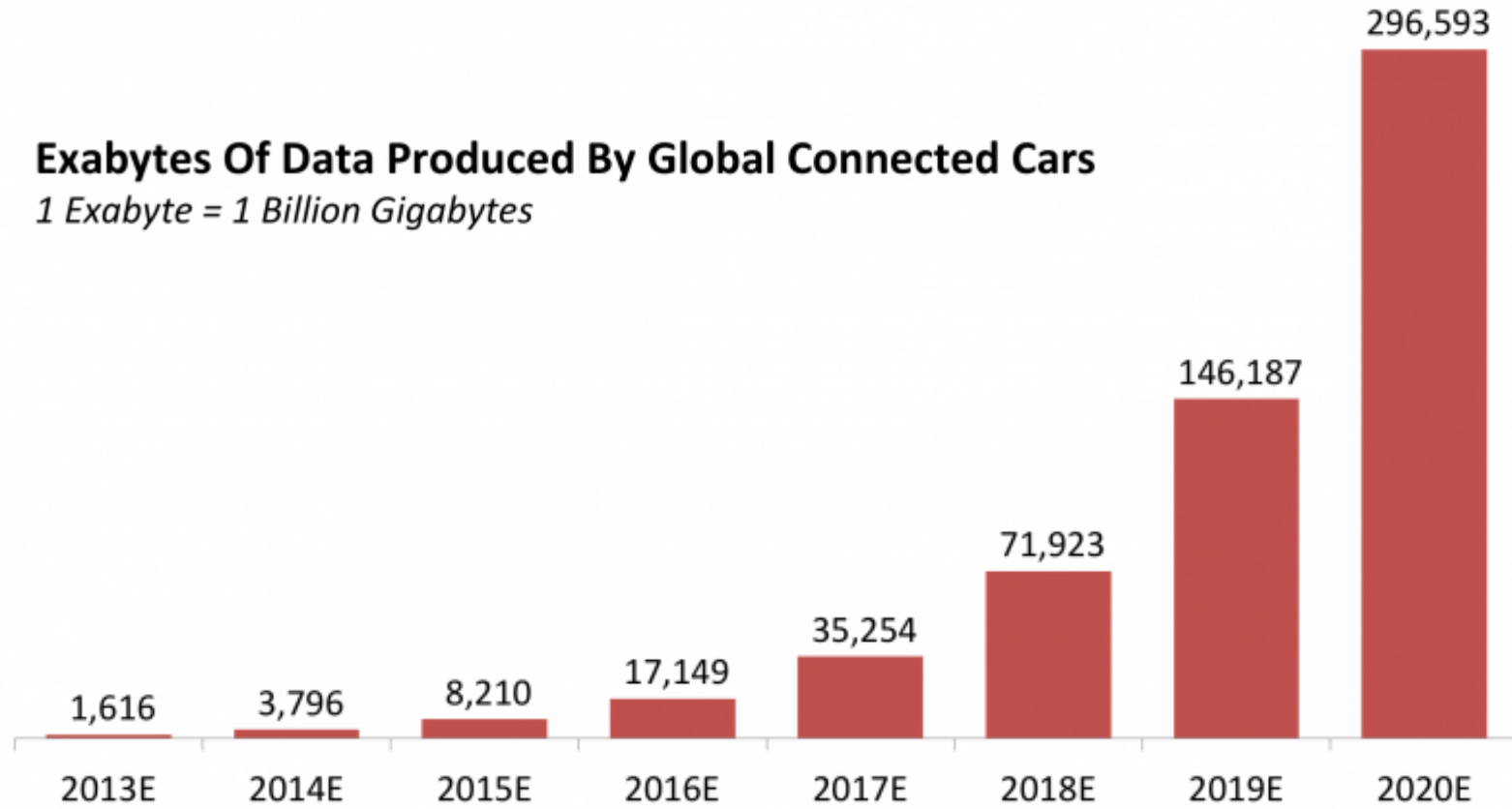
Over 380 million connected cars will be on the road by 2021





Exabytes Of Data Produced By Global Connected Cars

1 Exabyte = 1 Billion Gigabytes



Source: Ford: 2013, BI Intelligence: 2015

BI INTELLIGENCE



1

NETWORKWORLD
FROM IDG

DISRUPTOR
By Patrick Nelson, Network World | DEC 7, 2016 7:39 AM PT

OPINION

Just one autonomous car will use 4,000 GB of data/day

Self-driving cars will soon create significantly more data than people—3 billion people’s worth of data, according to Intel



Why so much data?

One reason for the car’s appetite is the hundreds of on-vehicle sensors. Cameras alone will generate 20 to 40 Mbps, and the radar will generate between 10 and 100 Kbps, Intel says.

<https://qz.com/344466/connected-cars-will-send-25-gigabytes-of-data-to-the-cloud-every-hour/>
<https://www.networkworld.com/article/3147892/internet/one-autonomous-car-will-use-4000-gb-of-dataday.html>
<http://www.revdp.com/2017/02/04/5-things-you-must-know-about-my-car-my-data/>

2

QUARTZ

SPONSOR CONTENT BULLETIN BY HITACHI
Inspire the Next

Connected cars will send 25 gigabytes of data to the cloud every hour



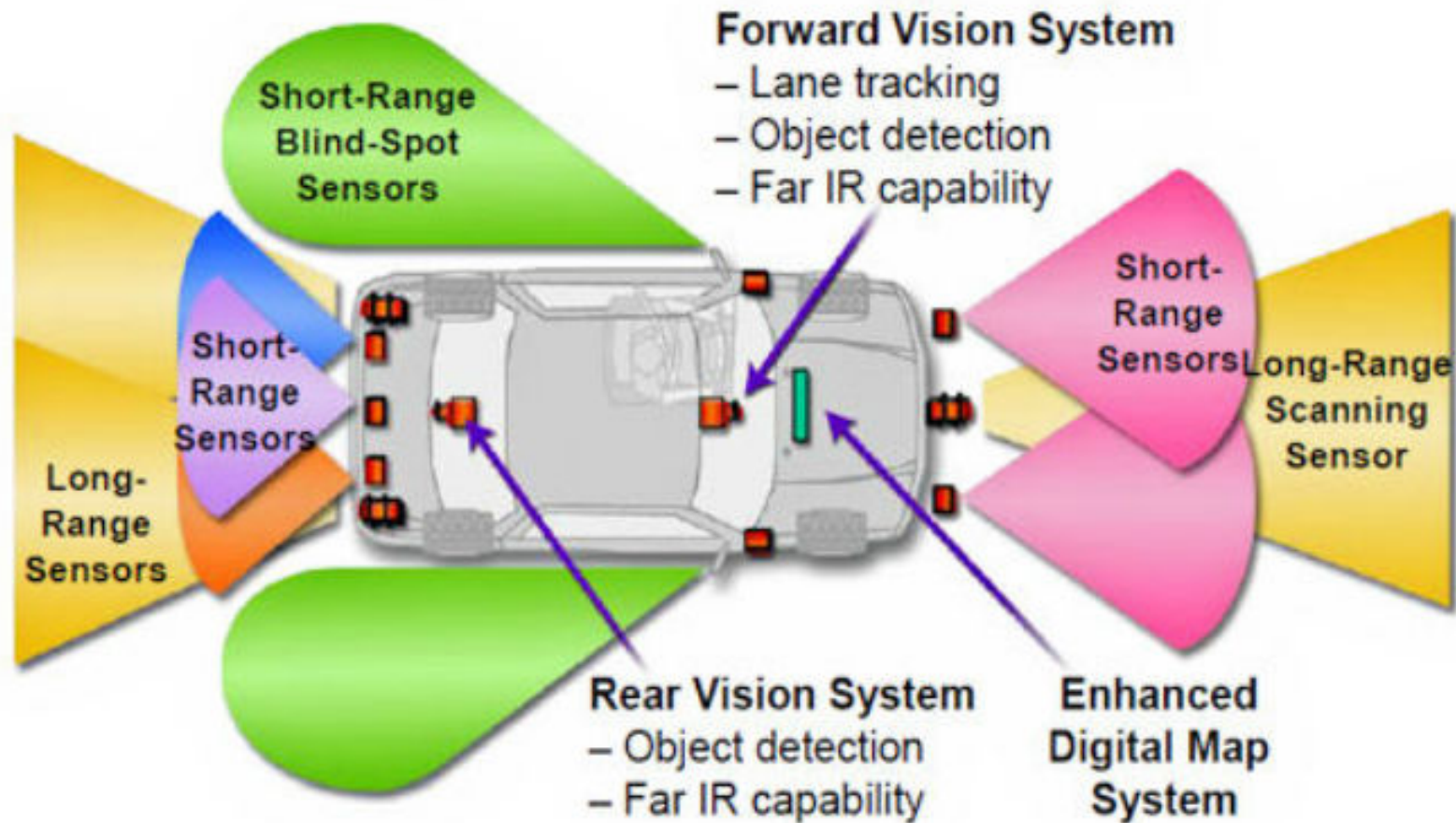
3

3 – How much data does a connected car generates?

Today’s cars can have more than 40 microprocessors and tens of sensors. Sensors include speedometers, accelerometers, thermometers, chemical concentration monitors, pressure sensors, GPS, video, radar, etc., etc... Acting alone, or combined, they measure speed, acceleration, road conditions, tire pressure, distance from moving traffic and driver focus, to mention a few. With this data, it becomes trivial to assess driver behavior, vehicle’s performance, efficiency, safety as well as car location. Millions of measurements are done each minute, and it all adds up to a great deal of data. **A connected-car generates up to 25GB of data per hour.** That’s equal to about a dozen HD movies and exceeds the storage capacity of most smartphones today.



LOTS OF SENSORS, MANY VISUAL

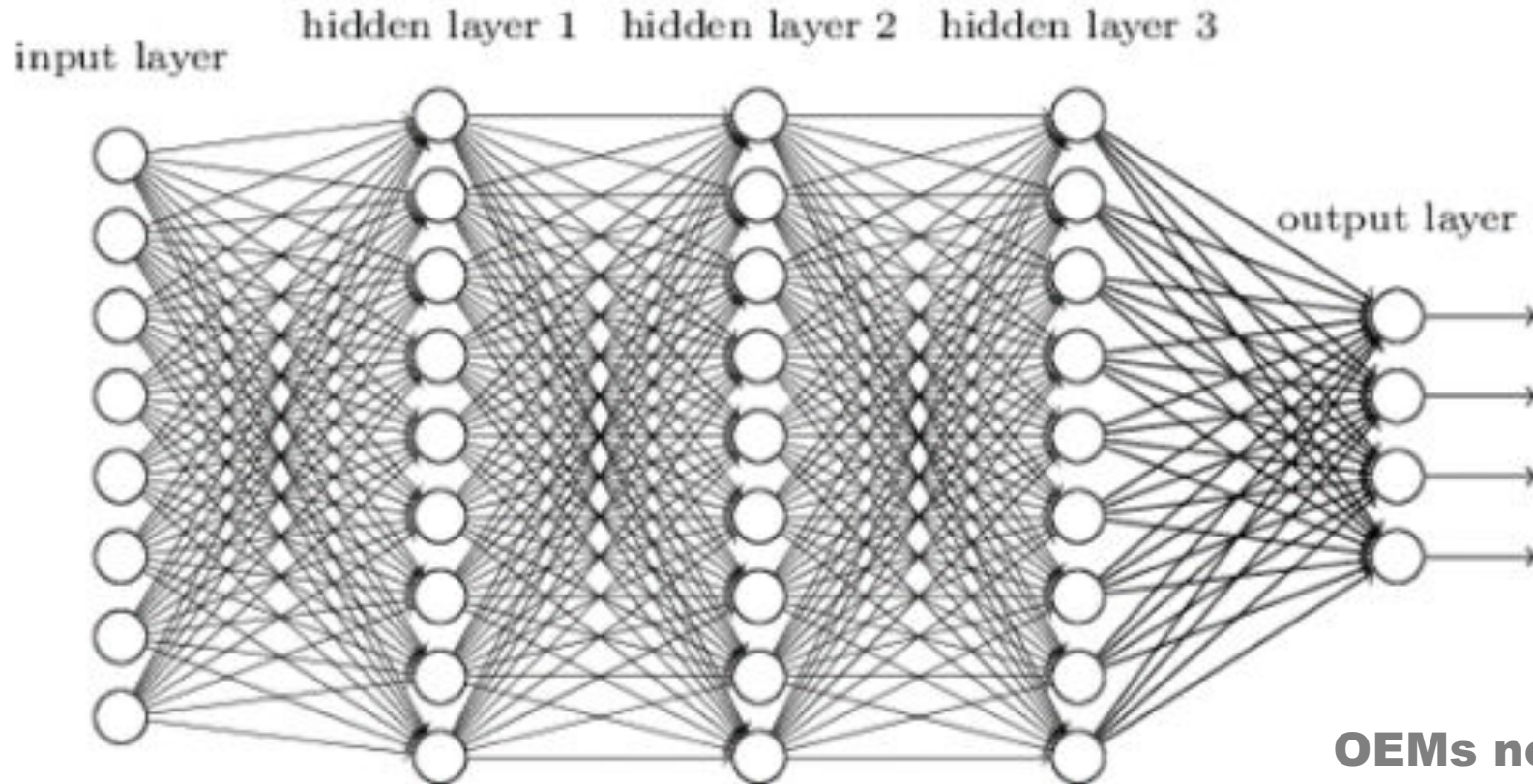


- > Lidar
- > Radar
- > Cameras
- > Ultrasonics
- > ...



THE DEEP LEARNING ALGORITHM

Deep neural network

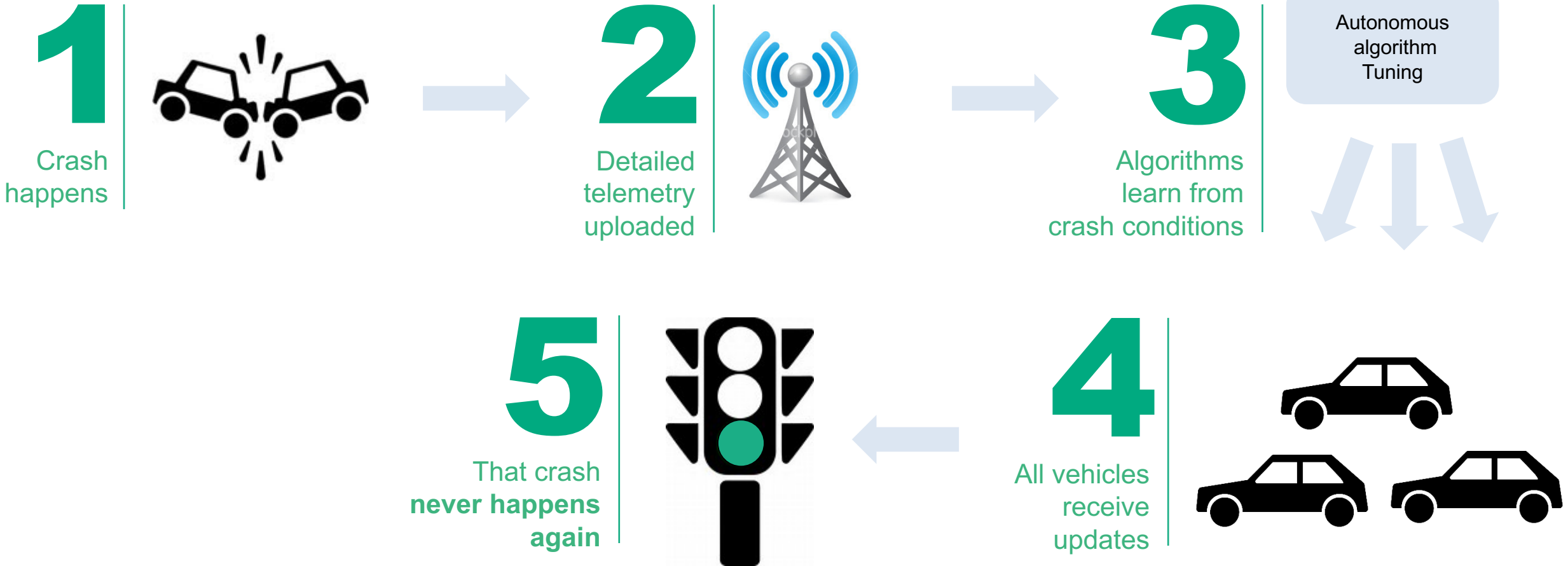


- > Not based on If/Then logic, just data
- > Requires **huge** amounts of data (the more the better, generally)

OEMs need this data to make autonomous driving safer



INDUSTRY MUST WORK TOGETHER





1

Automotive safety is a human issue, not a company issue and requires an industry approach:

- > Shared protocols, tools
- > Common expectations as vehicles from different vendors share environment
- > Accelerate development on hard problems rather than compatibility issues

2

Massive amounts of data means carriers are important stakeholders in connected car future

- > Best practices for data collection
- > Data formats and compression standards
- > Proper prioritization and quality assurance

3

OSS access for databases and models (not just for code)

- > Defining common use of DL models and databases is equally as important as code

It's probably too early to require too much standardization today, as much innovation is still underway.

Soon development will occur faster, if players follow standards.

THANK YOU

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