AUTOMOTIVE

Transportation evolving

Autonomy and mobility as a service

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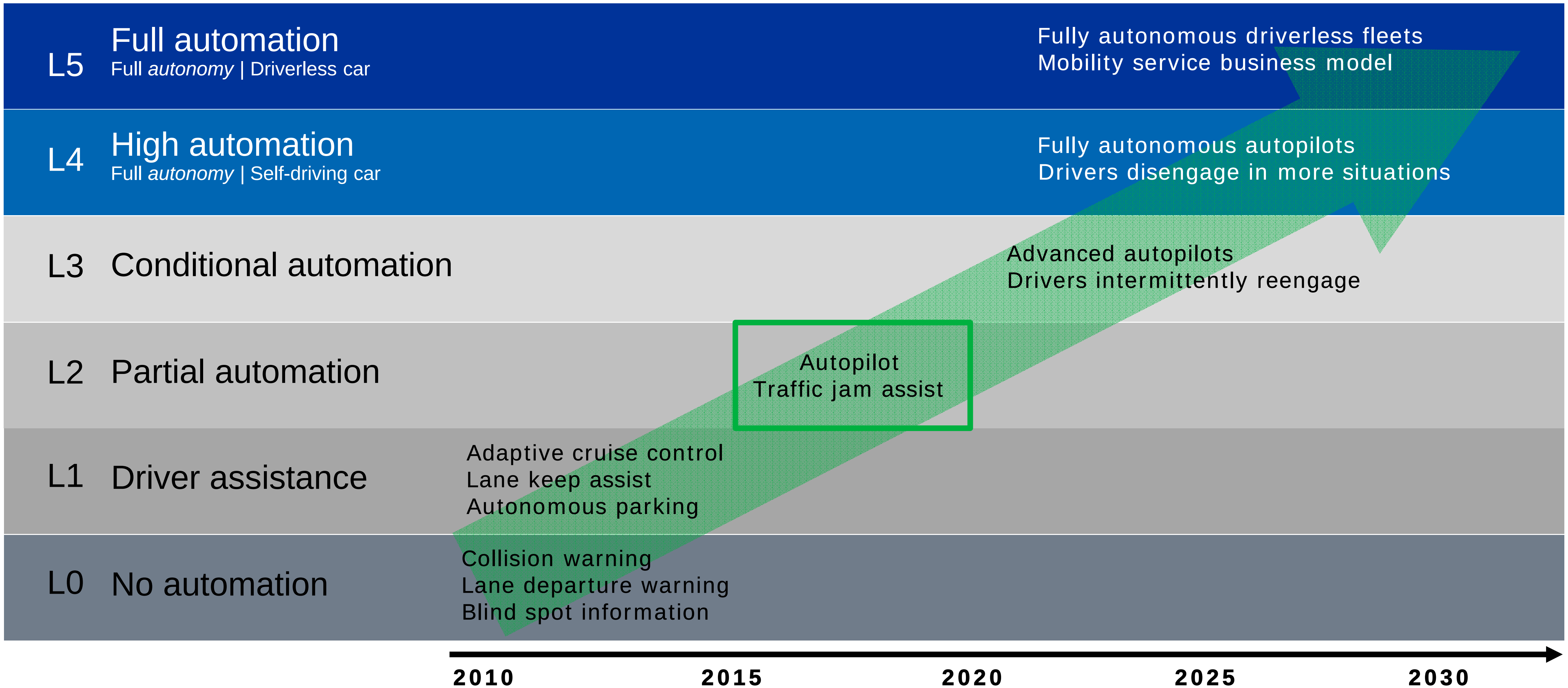
ADAS and autonomy

ADAS continues to advance at a rapid pace

Lexus LS	Intuitive pedestrian detection with active steering
Tesla Model S/X	Autopilot 2.0 hardware suite
Mercedes-Benz E-Class	Evasive steering assist and active lane change assist
Audi A8	Piloted driving supported by laser scanner
BMW 7 Series	Remote control parking
NVIDIA AI & computing	Tesla | Mercedes 2017 | Audi 2020 ZF, Bosch manufacture Drive PX2

Language defined: Real-world examples of SAE levels

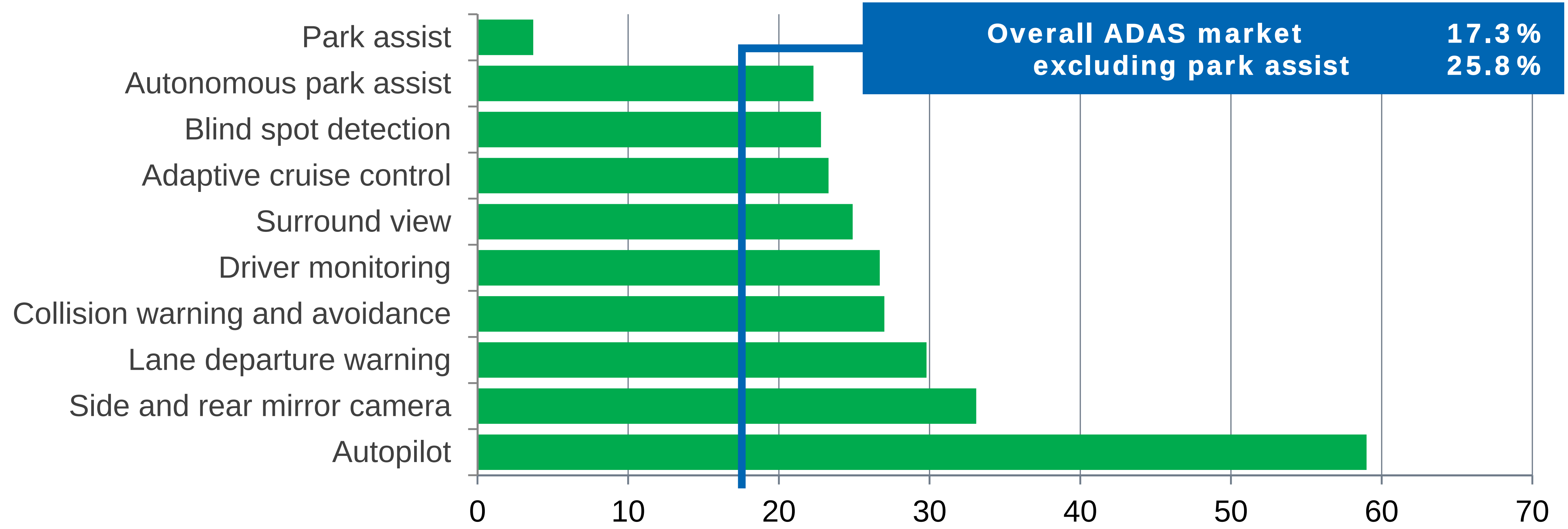
Autonomous = level 4 and Level 5



Based on Society of Automotive Engineers levels of automation (SAE J3016)

Advanced driver assist systems growing rapidly

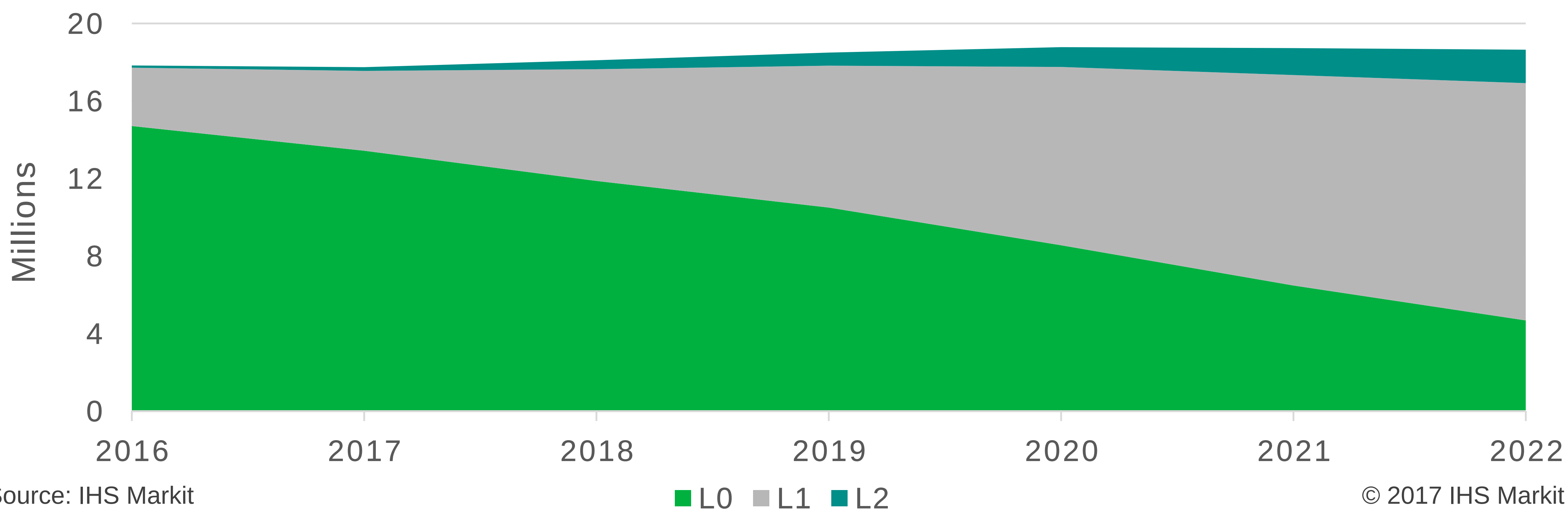
ADAS unit compound annual growth, 2017–22



Source: IHS Markit

Automated driving forecast summary shows slow transition

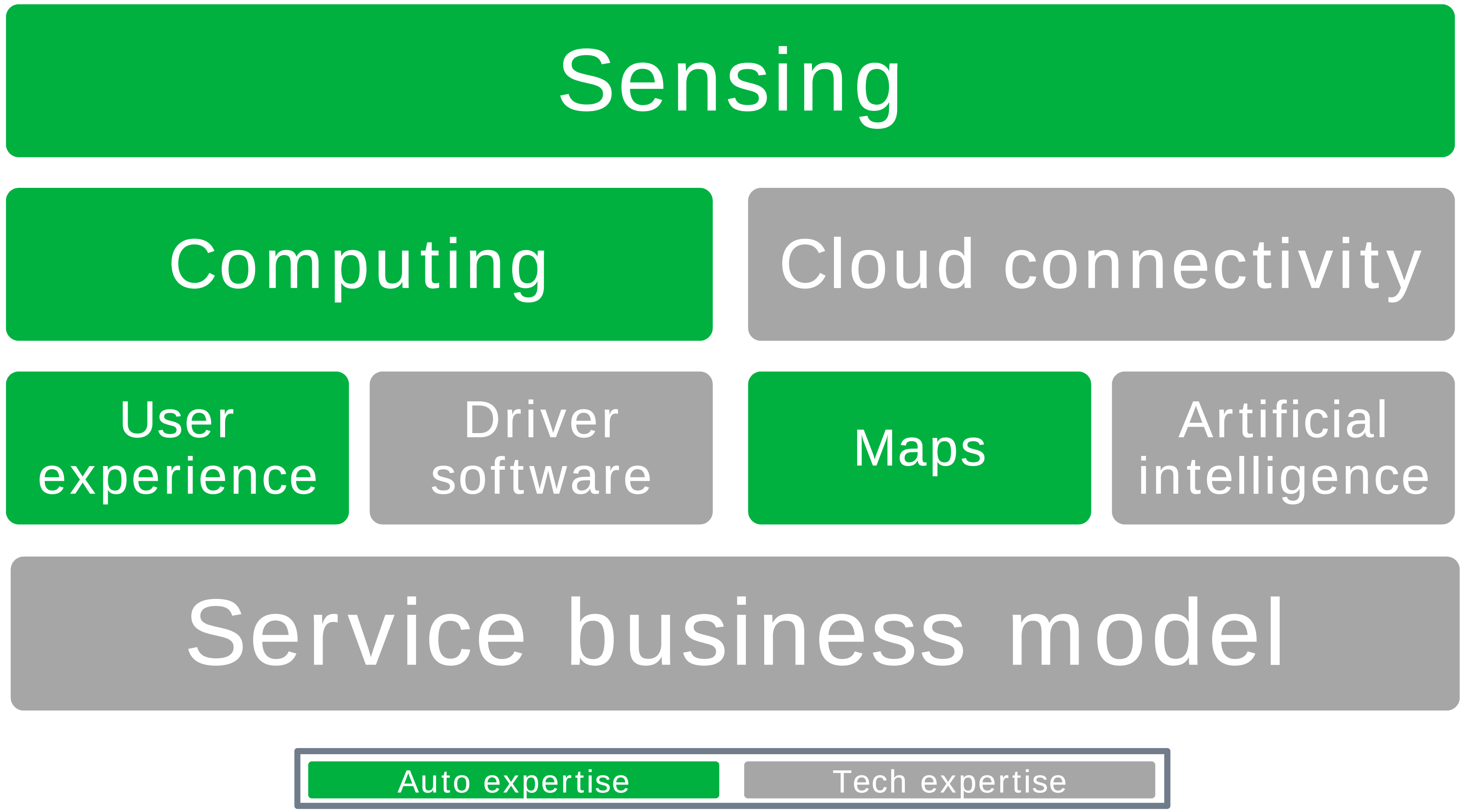
North America light vehicle production by SAE level 0–2



Source: IHS Markit

New capabilities are needed to enable autonomy

Automakers and suppliers gaining expertise via acquisition, partnership, internal development



How will the transportation industry obtain that expertise?

Investment frequency in auto tech in 2016 increased to 87 deals, up 30% over 2015

Investment funding in auto tech in 2016 increased to USD1,049 million, up 91% over 2015

Auto tech investment activity related to:

Autonomous driving software	Connected vehicle and data
Automotive cybersecurity	V2V communication
Driver safety tools	Fleet telematics

Source: CB Insights, January 2017

Top-10 auto tech deals in 2016

Company	Amount	Description
Zoox	USD200M	Autonomous EV mobility-as-a-service in new vehicle types
Metromile	USD103M	Pay-per-mile insurance
Quanergy	USD90M	Lidar supplier
Kymeta	USD62M	Satellite communications antennae using metamaterials
Zoox	USD50M	Autonomous EV mobility-as-a-service in new vehicle types
Metromile	USD50M	Pay-per-mile insurance
Pearl	USD50M	Aftermarket ADAS building to autonomous
Navya	USD33M	Autonomous ground shuttles in Paris, Lyon, Las Vegas
Autotalks	USD25M	Fabless semiconductor focusing on V2X
Veniam	USD22M	Connecting vehicles to expand wireless networks

Source: CB Insights, January 2017

Transportation and mobility attracts big money and names

Honda part of Grab $750M funding round	TomTom acquires Autonomos	BMW i Ventures increases fund size 5X	Intel Capital to invest $250M over two years
Argo AI receives $1B from Ford	Gett follows VW's $300M with $100M	Peloton wins $5M DOE grant	Zoox hits $1.55B valuation
Volvo Cars plans IPO with $532M funding	Ola plans $600M funding round	LeEco secures $600M loan	Nauto raises $9M

Self-driving: How to get started?

	Key information	Comment
Ride hailing	▸ State-sponsored pilots ▸ Private R&D and testing	▸ Singapore (Delphi, Nutonomy) ▸ Pittsburgh (Uber, Delphi)
Special routes	▸ Simple and fixed city trips ▸ Campus fixed trips ▸ Airport shuttle (two-year test) ▸ Between train stations	▸ Las Vegas, January 2017 (Navya) ▸ Santa Clara University (Auro) ▸ New Zealand (Navya) ▸ Paris (EasyMile)
Self-driving only zones	▸ Small city section at first ▸ Urban mega-centers	▸ Campus, military base, airport ▸ China, likely as low emission zones
Low-speed driving	▸ Urban or closed communities	▸ To limit and avoid crashes
Route- or lane-specific	▸ Commuter routes ▸ HOV lane for self-driving	▸ Replace current ride-share routes ▸ Seattle-Vancouver proposal

Mobility

What is mobility?

The ability to move;

the capacity for movement

What is new mobility?

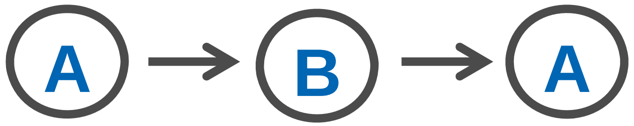
The ability to move in our new world of technology and choice;

the capacity for efficient movement in new connected and customized transportation ecosystems

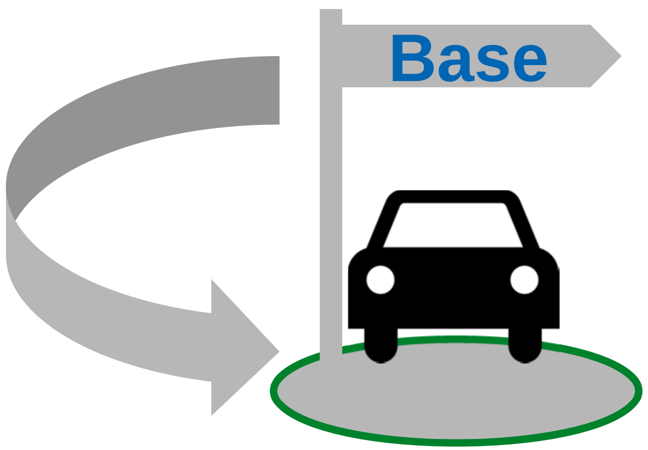
Personal mobility is evolving

Defining new mobility: Car sharing

Return to base



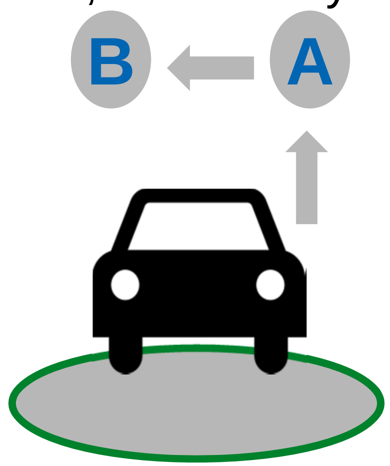
- Start and destination fixed, same station



Major players:
- Zipcar, Hertz on Demand; Cambio; Autolib; EVCard/Net; Zoomcar; Orix;Park24

Return to base

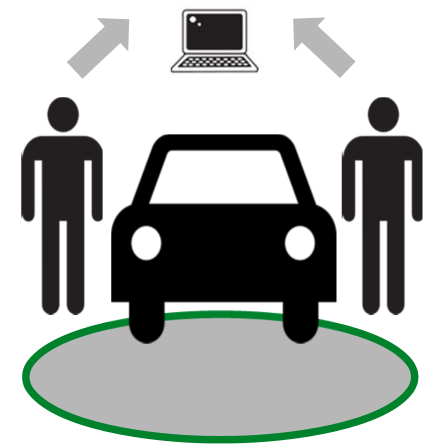
- Start and destination flexible, defined by user



Major players:
- Maven; car2go; ReachNow; Communauto; LeEco-Yidao

Peer to peer

- Consumers lend their private car (via agency or internet platform)

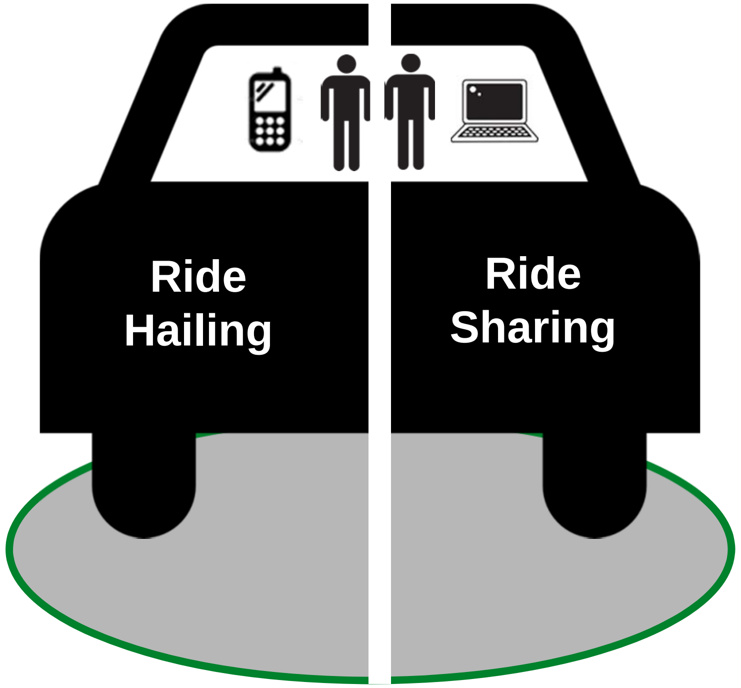


Major players:
- Turo; WhipCar; Getaround; Drivy; Ridengine; PPZuche; ATzuche

Defining new mobility: Ride hailing and sharing

Ride hailing

- Online platform provider
- Drivers providing own cars
- Riders booking cars or trips
- Payment via platform
- Mainly short journeys
- City-focused



Ride sharing

- Online marketplace
- Owner offers “seats” to destination
- Riders use marketplace to select destination
- Contribution to driver expense (e.g., fuel, toll)
- Mainly long journeys
- Intercity focus

Major players

- Uber; Lyft; Didi; Ola; Grab; Mytaxi/Hailo

Major Players

BlaBlaCar; Gocarshare; CoYatri; RidingO

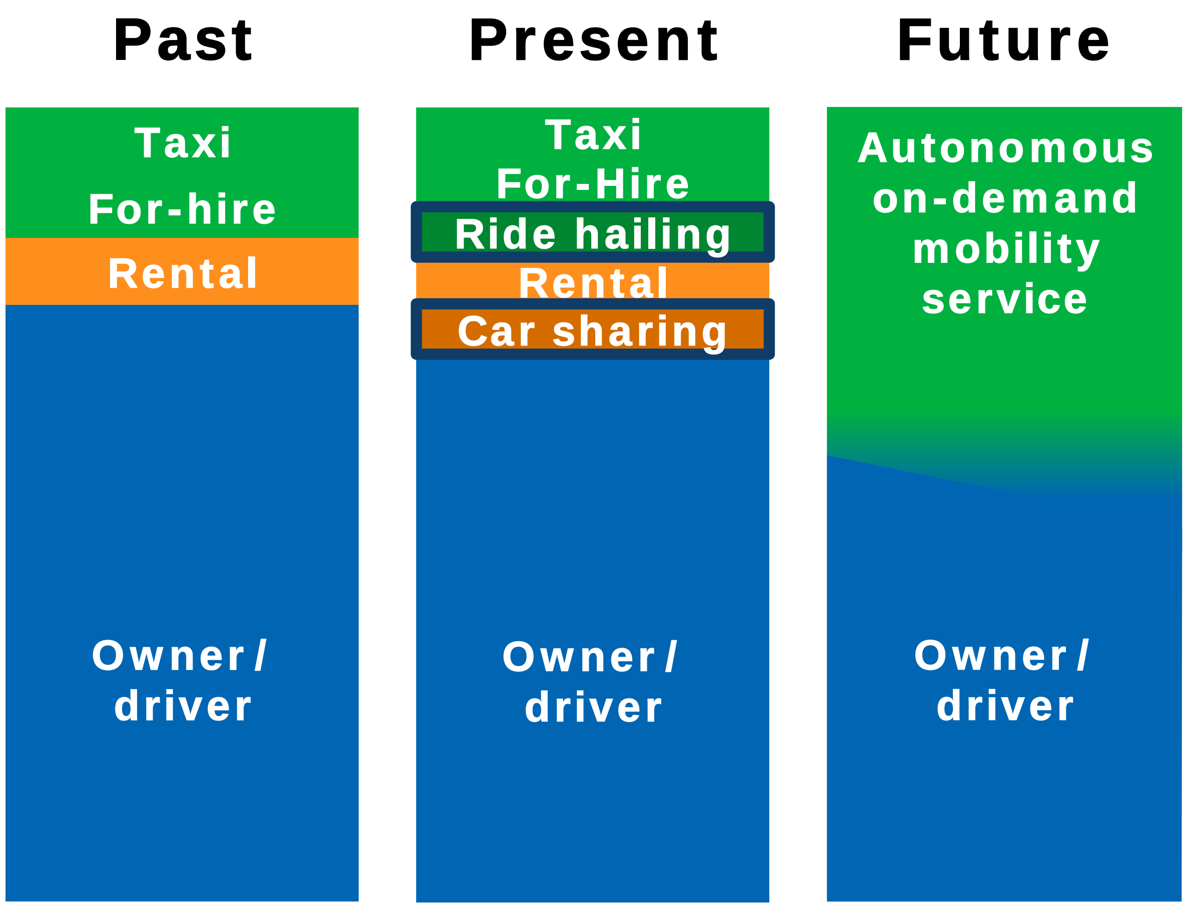
Poll question:
Have you used ride hailing or car sharing recently?

- Yes
- No

To take the poll:

- **Open the conference app**
- **Select this session from the agenda**
- **Scroll to bottom for the poll**

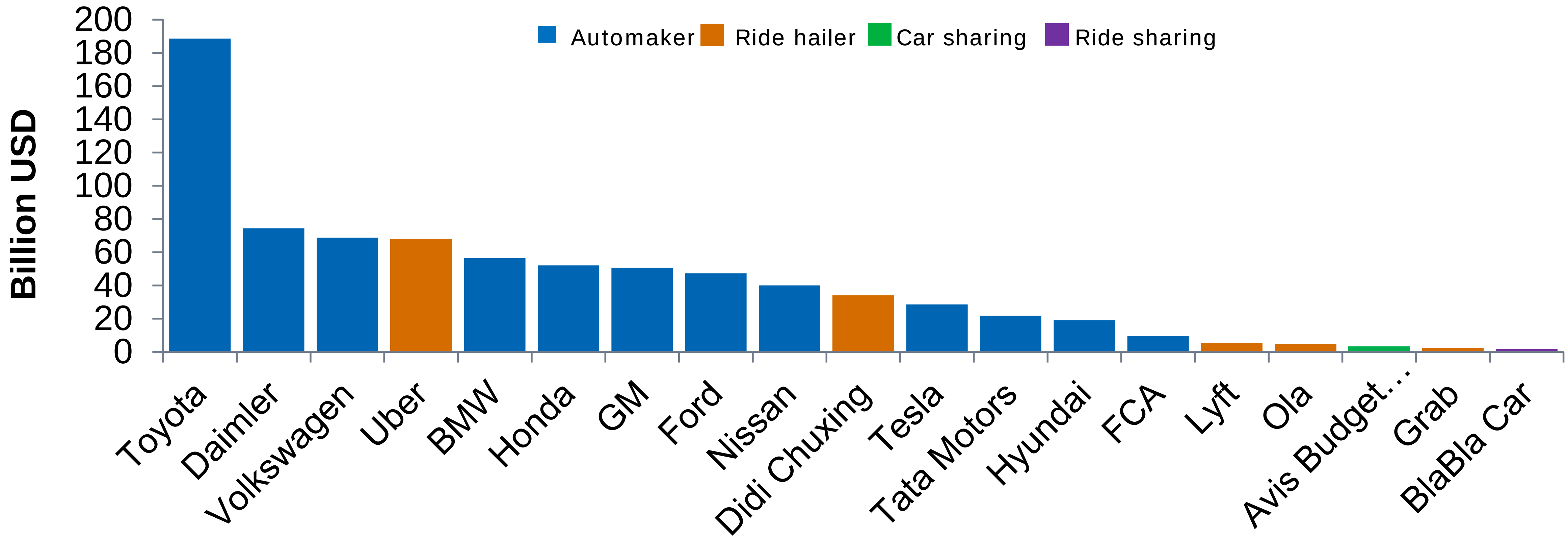
Autonomous capability will blur the lines between today's mobility business models and use cases



Technology giants (re)defined the mobility conversation…

In only five years, ride hailing reaches market cap valuations of incumbent automakers

Market cap and estimated valuation comparison of automakers and mobility entrants



Notes: Uber Technologies BlaBla, Grab, Lyft, Ola, and Didi Chuxing are estimated market valuations
Source: NYSE/Nasdaq, Bloomberg, TechCrunch

Ride-hailing leaders around the world

USD5.5–6.0B valuation	USD68.0B valuation	USD33.8B valuation	USD5.0B valuation	USD3.0B valuation
294 cities US only	542 cities worldwide	400 cities in China	102 cities in India	35 cities in Southeast Asia
3M MAU as of July 2016	40M MAU as of October 16	40M MAU as of October 2016	40M users of Ola Wallet as of 2015	
13.9M trips in July 2016	62M trips in July 2016	600M trips monthly average 2016		5.1M trips monthly average 2014
+12% trips over June 2016	+15% trips over June 2016	+100% trips over 7 months		

MAU – monthly active users

Data collected from various, inconsistent sources | Metrics and timeline not always comparable

…but automakers are adjusting to new mobility services and are also (re)framing the conversation

General Motors – Maven

13,500+ users and 30M+ miles
400 vehicles total in 13 US markets

- City
  - Traditional "return to base" car sharing
  - Up to 108 miles per day
  - Exploring one-way rentals, delivery
- Residential
  - Small, closed community usage
  - Targeting large operators to build scale
- Hub / express drive
  - Longer term rentals for Uber and Lyft

BMW – ReachNow

32,000 users and 1.1M miles
800 vehicles total in 3 US markets

- ReachNow free-floating car sharing
- Ride
  - On-demand premium ride hailing
- Fleet solutions
  - Residential shared vehicles
- Share
  - P2P car-sharing, delivery and return
- Reserve
  - Longer-term personal rentals, delivery

Mobility business models for long-term success

Smartphone access and digital payment	Digital access and payment plus deep vehicle integration
Flexibility of commitment for drivers	Global company infrastructure enables consistent service
Widely deployed but single-purpose platform	Existing customers yields quality client base, targeted recruitment
Connecting users and partners with minimal friction	Heavy users and brand loyalists require minimal education
Variable quality of service	Consistently high value and quality of service

Simplicity may drive rapid adoption but loyalty may be forgotten when faced with similar competition…

…whereas rich experiences attract value-seekers and inspire loyalty in heavy users and relatively niche markets.

THANK YOU!

ありがとうございました

謝謝

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