EVOLUTION OF MOBILITY: AUTONOMOUS VEHICLES
Mass Adoption of Autonomous Vehicles is the Inflection Point for a Shift in Mobility

40% REDUCTION IN CONSUMER SALES

TODAY

FUTURE

CONSUMER-OWNED VEHICLE MILES

FLEET-OWNED VEHICLE MILES

Source: Cox Automotive
CONSUMER TRUST IN AUTONOMOUS VEHICLES LOSES GROUND
### Consumer Desire for Autonomous Features is High

#### Feature Interest for Next Vehicle

<table>
<thead>
<tr>
<th>Feature</th>
<th>Must Have</th>
<th>Nice to Have</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collision warning alert system</td>
<td>65%</td>
<td>23%</td>
</tr>
<tr>
<td>Collision avoidance system</td>
<td>63%</td>
<td>23%</td>
</tr>
<tr>
<td>Adaptive headlights</td>
<td>66%</td>
<td>16%</td>
</tr>
<tr>
<td>Lane keeping assist</td>
<td>64%</td>
<td>15%</td>
</tr>
<tr>
<td>360-degree camera</td>
<td>64%</td>
<td>14%</td>
</tr>
<tr>
<td>Adaptive cruise control</td>
<td>60%</td>
<td>18%</td>
</tr>
<tr>
<td>Active parking assist</td>
<td>57%</td>
<td>12%</td>
</tr>
<tr>
<td>Smartphone app integration</td>
<td>52%</td>
<td>16%</td>
</tr>
<tr>
<td>Phone OS integration</td>
<td>52%</td>
<td>18%</td>
</tr>
<tr>
<td>Heads-up display</td>
<td>55%</td>
<td>10%</td>
</tr>
<tr>
<td>Wi-Fi hotspot</td>
<td>53%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Source: 2018 Cox Automotive Evolution of Mobility Study
More Than Half of Consumers Agree that New Technology Makes Better Drivers

54%

NEW TECH FEATURES MAKE PEOPLE BETTER DRIVERS

Source: 2018 Cox Automotive Evolution of Mobility Study
But Consumers Feel Less Comfortable with Full Autonomy

68% would feel uncomfortable riding in an AV fully driven by a computer

Compared to 39% who feel uncomfortable in a vehicle driven by a stranger

84% think people should always have the option to drive themselves even in an AV

Compared to 16% who would feel comfortable letting an AV drive them without the option of being able to take control

Source: 2018 Cox Automotive Evolution of Mobility Study
**Survey Definitions of Autonomy Levels**

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Cruise control, Anti-lock brakes, or Lane-keeping assist</td>
</tr>
<tr>
<td>1</td>
<td>Cruise control, Anti-lock brakes, Lane-keeping assist</td>
</tr>
<tr>
<td>2</td>
<td>Corrects lane drifting and avoids forward/rear collisions</td>
</tr>
<tr>
<td>3</td>
<td>Vehicle can take over driving in the city or on highways, but requires a human driver for unmarked roadways or highly congested areas</td>
</tr>
<tr>
<td>4</td>
<td>Vehicle can operate all aspects of driving. Humans can still drive if they want to</td>
</tr>
<tr>
<td>5</td>
<td>Vehicles don’t contain steering wheel or pedals, and can’t be driven by humans</td>
</tr>
</tbody>
</table>

As defined by SAE (Society of Automotive Engineers) levels for automated driving systems.
Autonomy is Not a New Idea…

- **2003**: Parking assist technology emerges (Toyota Prius)
- **2009**: Self-driving car project launches
- **2013**: Major OEMs start working on self-driving technology
- **2015**: Auto-pilot introduced
- **2016**: Uber tests
Awareness of Autonomy has Exploded

AV AWARENESS

<table>
<thead>
<tr>
<th>Level</th>
<th>2016</th>
<th>2018</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 3</td>
<td>58%</td>
<td>78%</td>
<td>+20%</td>
</tr>
<tr>
<td>Partial autonomy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 4</td>
<td>56%</td>
<td>78%</td>
<td>+22%</td>
</tr>
<tr>
<td>Full autonomy (+ human)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 5</td>
<td>40%</td>
<td>64%</td>
<td>+24%</td>
</tr>
<tr>
<td>Full autonomy (no human)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: 2018 Cox Automotive Evolution of Mobility Study
Safety Perceptions of Autonomous Vehicles Have Dropped

AV SAFETY PERCEPTIONS

“Safe” (%Agree)

<table>
<thead>
<tr>
<th>Level</th>
<th>2016</th>
<th>2018</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 3</td>
<td>73%</td>
<td>59%</td>
<td>-14</td>
</tr>
<tr>
<td>Partial autonomy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 4</td>
<td>64%</td>
<td>45%</td>
<td>-19</td>
</tr>
<tr>
<td>Full autonomy (+ human)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 5</td>
<td>47%</td>
<td>28%</td>
<td>-19</td>
</tr>
<tr>
<td>Full autonomy (no human)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: 2018 Cox Automotive Evolution of Mobility Study
And Roads Deemed Less Safe With Fully Autonomous Vehicles

ROADWAYS WOULD BE SAFER IF ALL VEHICLES WERE FULLY AUTONOMOUS
(vs. operated by people)

Source: 2018 Cox Automotive Evolution of Mobility Study
AV Preference Has Shifted From Level 4 to Level 2

MOST APPEALING AUTONOMY LEVEL

Source: 2018 Cox Automotive Evolution of Mobility Study
Nearly Half Would Never Buy a Level 5 Autonomous Vehicle

Source: 2018 Cox Automotive Evolution of Mobility Study
Older Generations Are More Apprehensive

W O U L D N E V E R B U Y A L E V E L 5

<table>
<thead>
<tr>
<th>Generation</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEN Z</td>
<td>48%</td>
</tr>
<tr>
<td>GEN X</td>
<td>56%</td>
</tr>
<tr>
<td>MILLENNIALS</td>
<td>39%</td>
</tr>
<tr>
<td>BABY BOOMERS</td>
<td>71%</td>
</tr>
</tbody>
</table>

Source: 2018 Cox Automotive Evolution of Mobility Study
Urbanites More Open to Fully Autonomous Vehicles

Source: 2018 Cox Automotive Evolution of Mobility Study
52% are aware that autonomous technology is being tested on real cars on public roads and highways.

Source: Cox Automotive Uber Self-Driving Car Incident Consumer Poll (March 2018)
75% Agree that AVs need real world testing in order to be perfected

BUT...

54% prefer this testing take place in a different town or city from where they live

54% would not feel comfortable walking near roads these tests take place

50% would not feel comfortable driving on the same roads these tests take place

Source: Cox Automotive Uber Self-Driving Car Incident Consumer Poll (March 2018)
Actual Phoenix Waymo User

“I’ve taken a Waymo here in Tempe, AZ, where they’ve been in service for a while. I think it’s pretty cool. I think it’s the wave of the future, and I think that more people will actually be taking these cars. *I felt safe the entire time.*”
61% Aware of Uber’s self-driving incident

BRANDS ASSOCIATED...

58% Uber

6% Volvo

Source: Cox Automotive Uber Self-Driving Car Incident Consumer Poll (March 2018)
Who Should Shoulder Responsibility in an Accident is a Point of Disagreement

27% Software Developer

26% OEM

24% Vehicle Rider/Owner

Source: Cox Automotive Uber Self-Driving Car Incident Consumer Poll (March 2018)
CONCLUSIONS
Despite some setbacks, the desire for autonomous features is strong and growing.

Education highlighting AV effectiveness is key to alleviate consumers’ safety concerns.

Consumer advocacy and real-world experience with the technology is key to adoption.
QUESTIONS?
About the Study

Evolution of Mobility

2016

Driver of the Future: Autonomous Vehicles
2,264 Consumers

Emerging In-Vehicle Car Technology
1,334 Consumers

We interviewed 1,250 consumers
EVOLUTION OF MOBILITY STUDY

**PHASE 1:**
Understand consumer acceptance of emerging mobility options over last 3 years
1,250 consumers ages 12+
Release: Q3

**PHASE 2:**
Understand dealer awareness, perceptions and readiness of emerging mobility trends
400 automotive dealers
Release: Late 3Q18

**PHASE 3:**
Understand the mobility choices consumers would make assuming all mobility options were available, considering trade-offs on monthly costs, convenience, etc.
2,000 consumers ages 12+
Release: 4Q18
Over the last three years, Cox Automotive has done research to investigate the trends in ride & car sharing, autonomous vehicles, and car technology. In 2018, the Evolution of Mobility study revisited these topics to see where the trends were headed, and explore a newcomer to the scene: car subscriptions.
## Phase 1 Methodology

### Ride & Car Sharing Trend Research

Fielded: August 3rd - 9th, 2015

- **n=2,464**
  - n=1,916 18-64
  - n=548 12-17

Generations:
- Gen Z: n=641
- Millennials: n=850
- Gen X: n=532
- Baby Boomers: n=441

Transport Density groups:
- Urban: n=344
- Suburban: n=1,264
- Rural: n=289

Must have used one transportation method in the past 6 months

### Car Driver of the Future: Autonomous Vehicles

Fielded: May 20th - 27th, 2016

- **n=2,264**
  - 1,992 18-64
  - n=272 12-17

Generations:
- Gen Z: n=376
- Millennials: n=642
- Gen X: n=680
- Baby Boomers: n=566

Transport Density groups:
- Urban: n=383
- Suburban: n=1,521
- Rural: n=348

Must have used one transportation method in the past 6 months

### Emerging In-Vehicle Car Technology

Fielded: September 22nd - 27th, 2016

- **n=1,334**
  - n=1,020 18+
  - n=314 16-17

Generations:
- Gen Z: n=376
- Millennials: n=298
- Gen X: n=341
- Baby Boomers: n=243
- Silent Generation: n=76

Transport Density groups:
- Urban: n=200
- Suburban: n=870
- Rural: n=250

Must have a driver’s license

### Evolution of Mobility

Fielded: May 8th - 14th, 2018

- **n=1,250**
  - n=1,006 18+
  - n=244 12-17

Generations:
- Gen Z: n=340
- Millennials: n=262
- Gen X: n=313
- Baby Boomers: n=287
- Silent Generation: n=48

Transport Density groups:
- Urban: n=143
- Suburban: n=684
- Rural: n=171

Must have used one transportation method in the past 6 months