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The race to autonomous driving

Winning American
consumers' trust

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Robinson, and Gina Pingitore
Illustration by Traci Daberko

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The race to autonomous driving

Winning American consumers' trust

By Craig Giffi, Joe Vitale, Ryan Robinson, and Gina Pingitore
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Are US consumers ready for self-driving cars? Our survey shows that they're increasingly interested in automation, particularly if it improves safety. The bad news: They're less and less willing to spend their own money to make the future of mobility a reality.

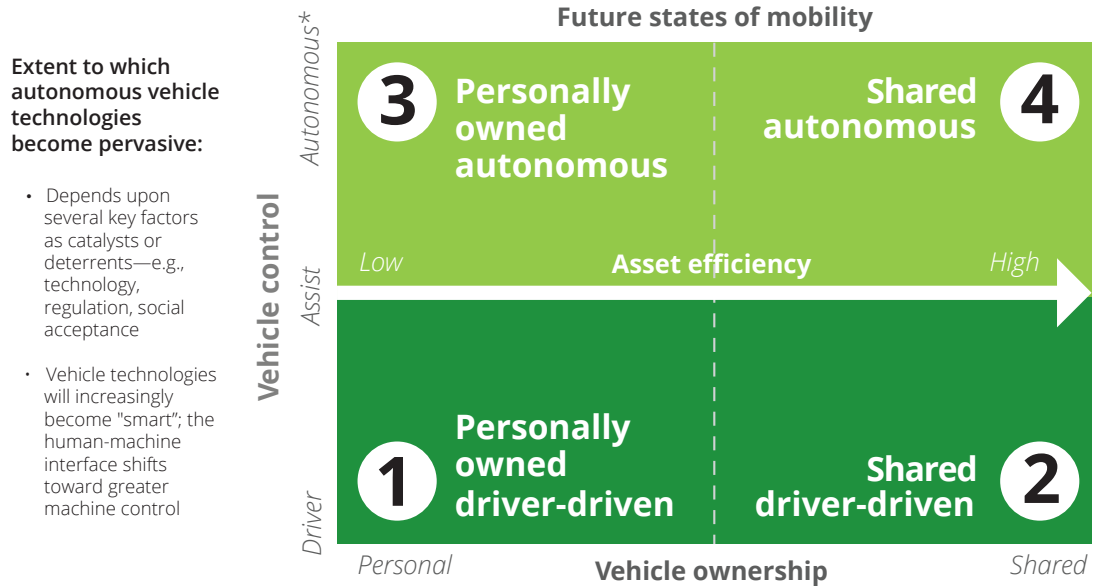
TOWARD A SELF-DRIVING FUTURE

Science-fiction visionaries have long promised us all kinds of futuristic transportation options, and while jetpacks and teleportation are still some ways off, the technologies are finally in place to make self-driving cars a reality. It's time for automakers to put the pedal to the metal as they compete with technology companies and other industry disruptors to put partially or fully autonomous vehicles on American roads.

The auto industry has a head start: After decades of investments, today's vehicles offer many partially autonomous features like lane departure systems, adaptive cruise control, and emergency braking. Emerging technologies could enable even more vehicle-to-vehicle and vehicle-to-infrastructure connectivity, making the leap to fully driverless cars even smaller. In fact, executives from several leading automakers foresee advanced self-driving technology being available by 2021 or even sooner;¹ some envision vehicles without steering wheels or pedals to be driven by advanced technology and sensors and not people. While used first in commercial applications such as the transportation of goods, or for ride-hailing services such as Uber, the ability to offer fully autonomous vehicles to the public could be right around the corner.

In Deloitte's *The future of mobility*,² the authors outline a framework for the future of personal mobility shaped by two key uncertainties: the extent to which vehicles are owned vs. shared, and the extent to which vehicles are controlled by humans vs. technology (figure 1). Since trends unfold differently around the world, Deloitte envisions that these states will likely co-exist, requiring automakers to simultaneously meet the mobility needs of disparate groups of people. This means that companies wanting to profit from the evolution in mobility need to better understand which new technologies consumers want and for which of them they are willing to pay.

Figure 1. Future states of mobility



Extent to which autonomous vehicle technologies become pervasive:

- Depends upon several key factors as catalysts or deterrents—e.g., technology, regulation, social acceptance
- Vehicle technologies will increasingly become "smart"; the human-machine interface shifts toward greater machine control

Extent to which vehicles are personally owned or shared:

- Depends upon personal preferences and economics
- Higher degree of shared ownership increases system-wide asset efficiency

*Fully autonomous drive means that the vehicle's central processing unit has full responsibility for controlling its operation and is inherently different from the most advanced form of driver assist. It is demarcated in the figure above with a clear dividing line (an "equator").

Source: Deloitte analysis.

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Although opinions differ on both the pace at which automakers and service providers could introduce autonomous car technology and the impact of shared vehicle ownership, most agree that the stakes involved are extremely high. With approximately \$2 trillion in annual revenues,³ the extended US auto industry is one of the most important in both the US and global economies. While the two dimensions defined by Deloitte's *future of mobility* framework are

indeed critical, we believe a third uncertainty—consumer preferences and willingness to pay—requires careful analysis and understanding by companies to know where they should play and how they can win.

As part of Deloitte's continuous assessment of consumer behavior via our Global Automotive Consumer Insight Platform, we recently surveyed more than 22,000 consumers in 17 coun-

tries to shed light on consumers' preferences on these key dimensions and to answer other important questions that can help automakers prioritize and better position their R&D strategies and investments. Here's a quick look at the good, the bad, and the risky news for automakers in the US market.⁴

The good news is twofold: First, US consumer interest in advanced vehicle automation has increased since 2014, especially among the younger generations. Second and more important, all US consumers surveyed agree on what's most useful: safety-related technologies. Across all US consumer segments surveyed, features that improve driver and pedestrian safety are perceived as much more valuable than those that enable connectivity, comfort, or even fuel efficiency.

The bad news is also twofold: US consumers' stated willingness to pay for these technologies has decreased over the last two years, putting pressure on original equipment manufacturers (OEMs) looking for ways to build enough value in these features to gain a decent return on their costly R&D efforts. In addition, fewer than half of US consumers surveyed say they trust traditional OEMs to bring fully autonomous vehicles to market, opening the door for new entrants to gain a critical foothold at the nascent stage of this emerging shift in personal mobility.

A risk in the waiting: Although car-hailing companies such as Uber are commercial suc-

cesses, they have yet to make a substantial impact on overall vehicle sales, with the US auto industry reaching record unit sales volumes over the past several years. But that doesn't mean automakers can sit back and relax. Our findings suggest that even though a majority of American consumers don't currently use ride-hailing to get around, those who do see car ownership as less necessary. And this is particularly true for younger people hailing cars—among the US consumers we surveyed, they are four times more likely to question the need to own a car in the future than older car-hailers. So, as exposure to ride-hailing services increase, even more consumers are likely to consider abandoning vehicle ownership—a risk that automakers should weigh seriously.

HERE'S THE GOOD NEWS FOR AUTOMAKERS

Two-thirds of US consumers want advanced vehicle technologies

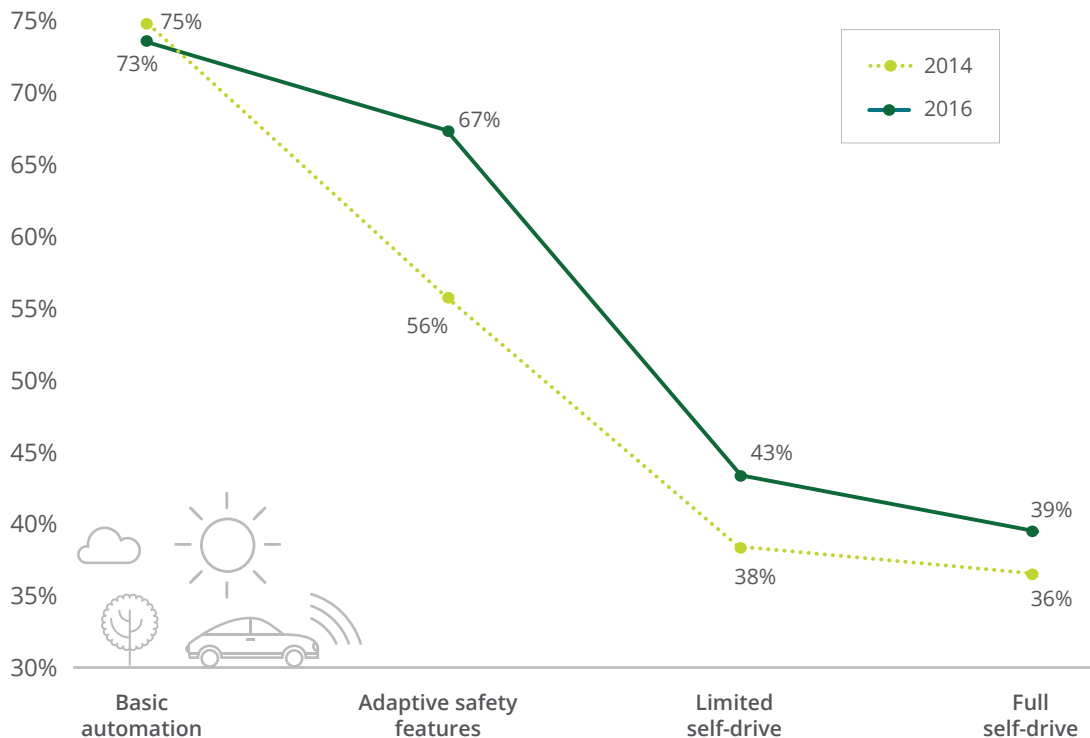
Our findings confirm that interest in advanced vehicle technologies is on the rise. We asked US consumers to rate the desirability of four graduated levels of vehicle automation as defined by the National Highway Traffic Safety Administration.⁵ Compared to the desirability reported in our 2014 study, more US consumers are interested in advanced vehicle automation features, moving beyond basic automation such as anti-lock braking or traction control to more advanced functionality in which the vehicle can assume a more proactive role with features such as emergency braking, adaptive

cruise control, and lane-keeping assistance. Our findings show that 67 percent of US consumers have a strong desire for these adaptive safety features and similar automation, an increase of 11 percentage points over the 2014 results (figure 2).

US consumer interest in both partial and fully self-driving technologies also seems to have increased, albeit more modestly. Interest in partial self-drive features such as parking assist is at 43 percent (up from 38 percent), while

interest in full self-drive has risen to 39 percent (from 36 percent). These small yet notable increases are consistent with other recently published studies, such as those by the University of Michigan⁶ and AAA.⁷ Collectively, these findings suggest that American consumers' desire for more autonomous driving features in their vehicles is slowly but steadily increasing, perhaps as they get more comfortable with the vision of the automotive future that the industry is actively marketing and demonstrating.

Figure 2. Percentage of US consumers interested in different levels of vehicle automation technology (2016 versus 2014)



Sample size: 2014 N=1,913 2016 N=1,722
Source: Global Automotive Consumer Insight Platform, Deloitte.

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Younger consumers can drive demand for more automation

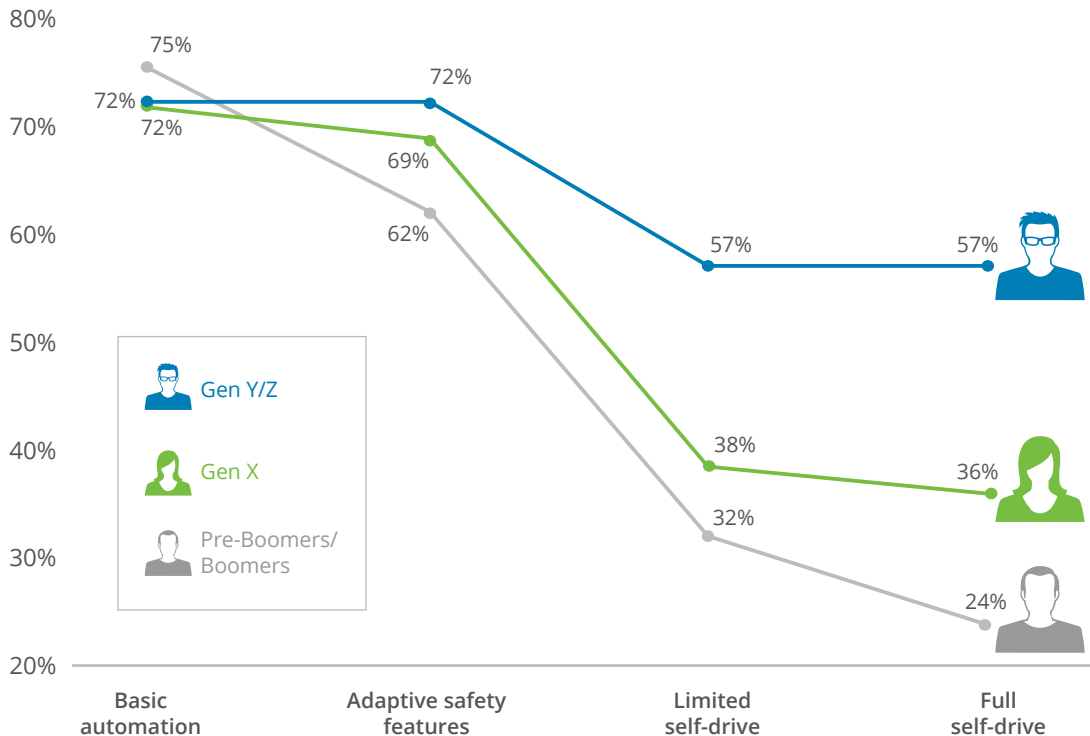
Younger consumers may offer a sweet spot for automakers and tech players, as nearly 60 percent of Gen Y/Z respondents in the United States (that is, those born after 1976) indicate strong interest in both partial and fully self-driving cars (figure 3), a significantly higher percentage than all other US age groups surveyed. A joint MIT/New England University report showed similarly high percentages of younger drivers expressing a desire for partial

self-driving functionality.⁸ And when it comes to fully self-driving cars, studies conducted by J. D. Power confirm that more than half of Gen Y (56 percent) and Gen Z (55 percent) respondents say they would trust fully self-driving cars, compared with 41 percent of Gen X, 23 percent of Baby Boomers, and just 18 percent of pre-Boomers.⁹

BUT ARE CONSUMERS WILLING TO PAY FOR THESE TECHNOLOGIES?

While it is good news for the US automotive industry that American consumers' interest in

Figure 3. Percentage of US consumers interested in different levels of vehicle automation technology (2016, by generation)

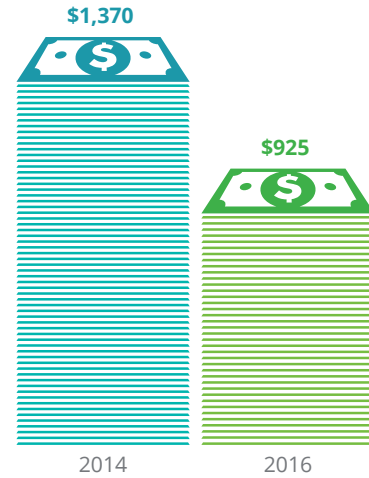


Sample size: Pre-Boomers/Boomers N=712 Gen X N=299 Gen Y/Z N=710
 Source: Global Automotive Consumer Insight Platform, Deloitte.

advanced vehicle technologies has increased, enthusiasm is tempered by survey findings that suggest there is also growing restraint in what they are willing to pay for these features. Our recent findings show that the amount US consumers say they will pay for various advanced vehicle technologies has declined by 30 percent compared to 2014, from \$1,370 to \$925 (figure 4).¹⁰

Perhaps more concerning, a significant share of American consumers suggest that the auto industry should bear the entire cost for bringing these advanced technologies to market, saying they are unwilling to pay any more for these features—even those designed to improve safety (figure 5).¹¹

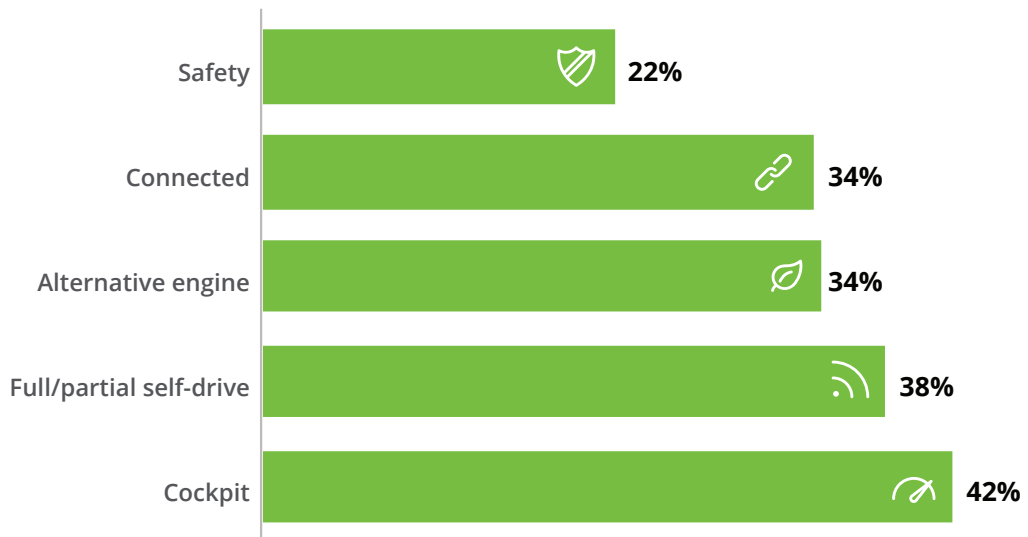
Figure 4. Average amount US consumers are willing to pay for all advanced features



Sample size: 2014 N=1,739 2016 N=1,759
 Source: Global Automotive Consumer Insight Platform, Deloitte.

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Figure 5. Percentage of US consumers not willing to pay any more for vehicle features



Sample size: N=1,759
 Source: Global Automotive Consumer Insight Platform, Deloitte.

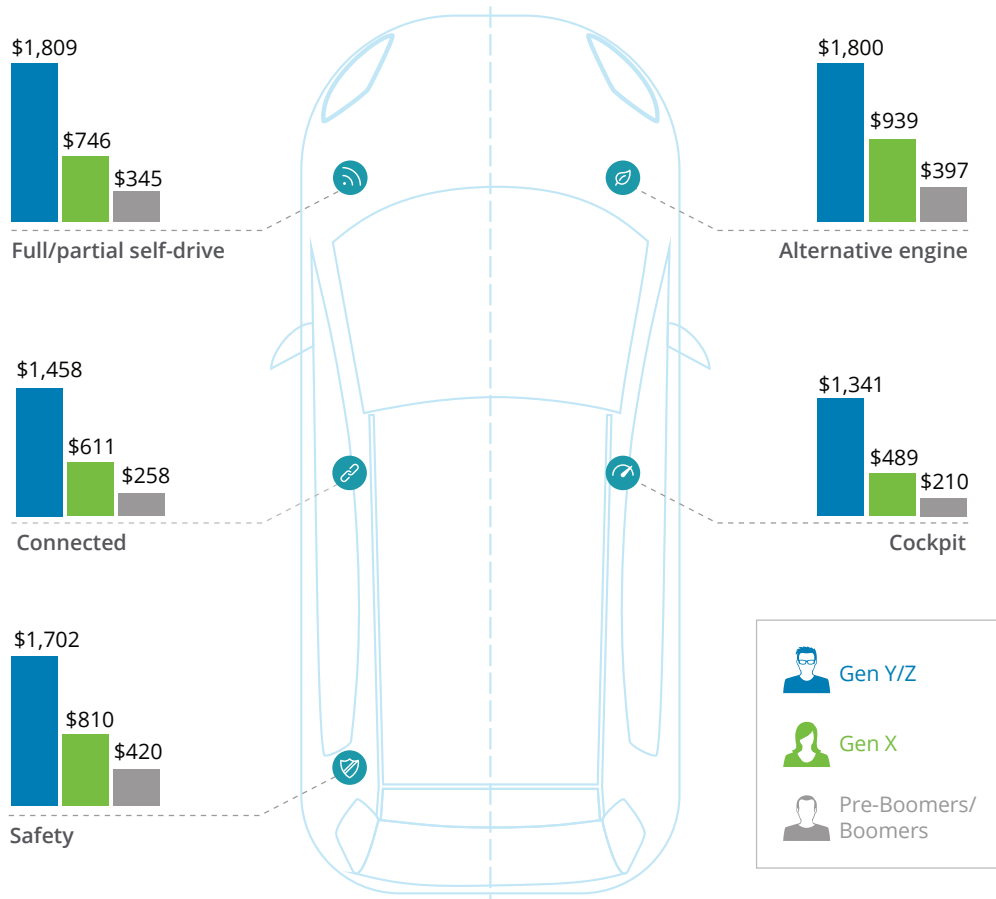
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Other reports also show consumers are resistant to paying for new vehicle technologies.¹² These findings signal a significant challenge for automakers: Consumers clearly want advanced technologies, but automakers have not yet successfully articulated a compelling reason why car buyers should pay extra for them.

Fortunately for automakers, not everyone is resistant to paying for advanced automotive fea-

tures. Gen Y/Z consumers in the United States say they are willing to pay, on average, over \$1,600 for many of these specific features; this is about \$900 more than Gen Xers say they are comfortable paying, and \$1,300 more than the mere \$300 that Boomers and pre-Boomers say they are comfortable paying (figure 6).¹³ Recent J. D. Power data confirms notable differences across the generations in their stated willing-

Figure 6. Average amount US consumers are willing to pay for advanced technologies (by generation)



Sample size: Pre-Boomers/Boomers N=731 Gen X N=308 Gen Y/Z N=719
 Source: Global Automotive Consumer Insight Platform, Deloitte.

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ness to pay, with younger Americans indicating greater willingness to spend on advanced technologies than older consumers.¹⁴

For the young and old, safety comes first

When it comes to investing in advanced vehicle technologies, automakers would be wise to focus their resources on features that consumers find most valuable. Out of the 32 features tested in our study, the top 5 among US consumers are related to safety and include technologies that:

- Recognize the presence of objects on the road and avoid collisions
- Inform the driver of dangerous driving situations
- Automatically block the driver from dangerous driving situations
- Automatically take action in medical situations
- Enable remote shutdown in case of theft¹⁵

Safety has long been a key differentiator for automotive brands, but instead of reactionary, physical safety features such as anti-lock brakes, crumple zones, and airbags, next-generation digital safety technologies are focused on preventing incidents from occurring in the first place. It is also interesting to note that the forward-looking safety features that top

consumer wish lists also can be effectively described as enabling the car to perform certain tasks on its own (that is, autonomous technology). So even though US consumers seem cautious about self-driving cars, they are already buying, using, and wanting many of the technologies that would make fully autonomous vehicles a reality.

Safety features also top the list in other recently published reports. For example, in AAA's *2016 Vehicle technology survey*, 41 percent of respondents favor lane departure warning technology as the top advanced technology.¹⁶ Likewise, a May 2016 Michigan Department of Transportation study of public perceptions of connected and automated vehicle technologies rates safety technologies highest; most notably, 54 percent of respondents cite blind-spot detection.¹⁷

Another potential benefit of focusing development efforts on safety features is seen in findings that indicate they may be “gateway technologies.” According to J. D. Power's *2016 US automotive performance, execution, and layout study*, safety technologies also make a new car more appealing and boost owner satisfaction.¹⁸

To best gauge future consumer acceptance of partially and fully self-driving cars, automakers should keep a keen eye on evolving consumer interest in safety technologies. And this means knowing which consumer segments are particularly motivated by these features. While

Gen Y/Z consumers find safety features among the most valuable, safety technologies resonate even more strongly among older consumers, particularly women.¹⁹ In fact, 89 percent of Baby Boomers in the AAA study cite safety as a reason for wanting semi-autonomous technology in their next vehicle, compared with 78 percent of Millennials.²⁰

Automakers should take note that focusing on advanced safety technology may be the best opportunity to get a return on investment, since US consumers are least likely to reject the idea of paying more for the enhanced physical security these features provide (figure 5).

BAD NEWS FOR SOME AUTOMAKERS

By comparison, US consumers aren't that interested in service-enabling technologies

When asked for technologies they found least useful, the US consumers surveyed pointed to vehicle features that:

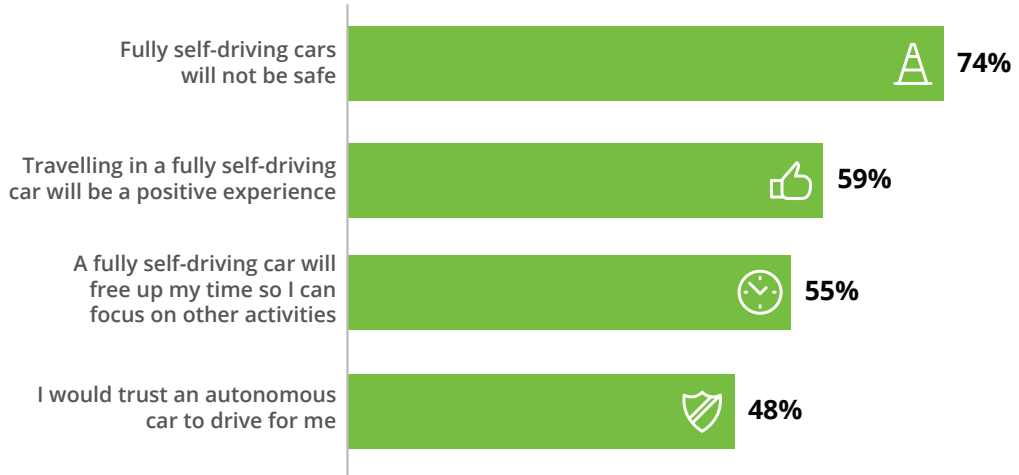
- Automatically pay toll road, parking, and priority/commuter lane fees
- Empower customers with the ability to design and personalize vehicles
- Allow drivers to control automated systems in their homes
- Enable ultra-small, low-speed, self-driving vehicles for urban environments
- Help manage daily activities

Not only do automotive companies need to place winning bets on the technologies in which they are investing—they should better understand which technologies to approach cautiously. Companies that are doubling down on in-vehicle technology that allows occupants to better manage their daily activities or control various home-based systems may need to reevaluate their technology strategy. One of the main reasons these features fall to the bottom of the list is that many consumers are already comfortable using their smartphones to accomplish these tasks and see little added value in having them embedded in the vehicle's center stack. Indeed, this may be an important lesson for auto executives still convinced that the war between in-vehicle technology and “brought-in” technology (in the form of smartphone apps) is worth waging. It is also a good example of understanding market trends and consumer preferences to know where to play and how to win.

Consumers want in-vehicle safety features but don't trust that fully self-driving vehicles will be safe

Although the majority of US consumers surveyed think driving in autonomous vehicles would be fun and would free up time to do other things, three out of four are skeptical that self-driving cars will be safe anytime soon (figure 7). However, those surveyed would be willing to try them at the point where there is an established safety record for such cars (figure 8).²¹

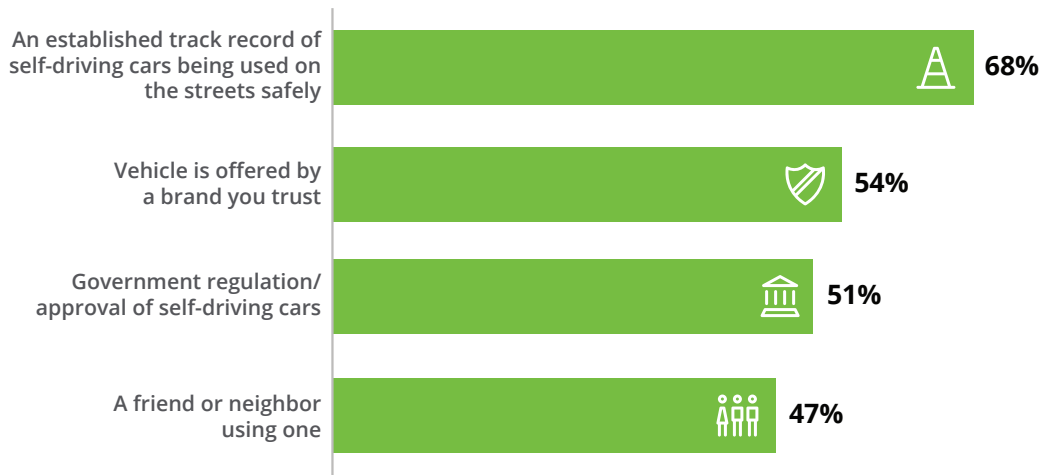
Figure 7. US consumer opinion on fully self-driving vehicles (percentage who agree/strongly agree)



Sample size: N=1,621
Source: Global Automotive Consumer Insight Platform, Deloitte.

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Figure 8. Factors making US consumers more comfortable with riding in fully self-driving vehicles



Sample size: N=1,681
Source: Global Automotive Consumer Insight Platform, Deloitte.

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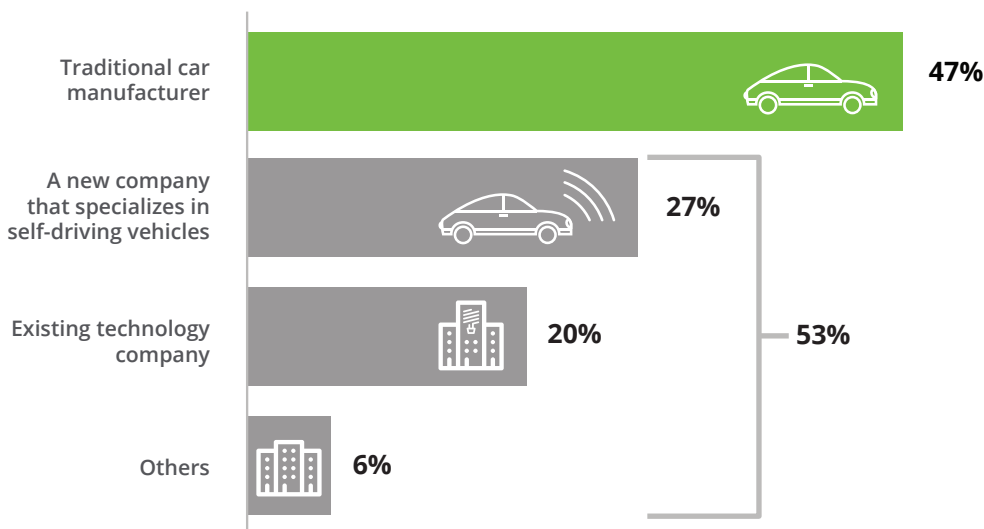
But for manufacturers, proving the safety of autonomous vehicles to the satisfaction of both regulators and consumers poses a particular challenge. Several recent reports have attempted to estimate the failure and fatality rates associated with autonomous vehicles, and the consensus is that these vehicles would have to be driven hundreds of millions of miles to sufficiently demonstrate their safety.²² However, National Highway Traffic Safety Administration Administrator Mark Rosekind is encouraging the development of autonomous technology that can drastically reduce the number of annual fatalities caused by driver error.²³ Raising public awareness of autonomous technology, Google has been running driverless cars on public roads for several years, while Uber recently launched an autonomous option to its rideshar-

ing service in Pittsburgh. Both of these experiments aim to considerably increase the amount of data on real-world autonomous driving in a very visible and consumer-friendly way.²⁴ On the other hand, tragic events involving autonomous vehicle features can cast a shadow over the technology, resulting in potential loss of consumer confidence.²⁵

THE BILLION-DOLLAR QUESTION: DO CONSUMERS TRUST AUTOMAKERS TO BRING ADVANCED AUTOMOTIVE TECHNOLOGIES TO MARKET?

MORE than 50 percent of the US consumers surveyed say they would most trust nontraditional players to bring self-driving technology to market (figure 9).²⁶ And among those who do trust OEMs, no single brand has really emerged

Figure 9. Type of company US consumers trust the most to bring full self-drive technology to market



Sample size: N=1,762
 Source: Global Automotive Consumer Insight Platform, Deloitte.

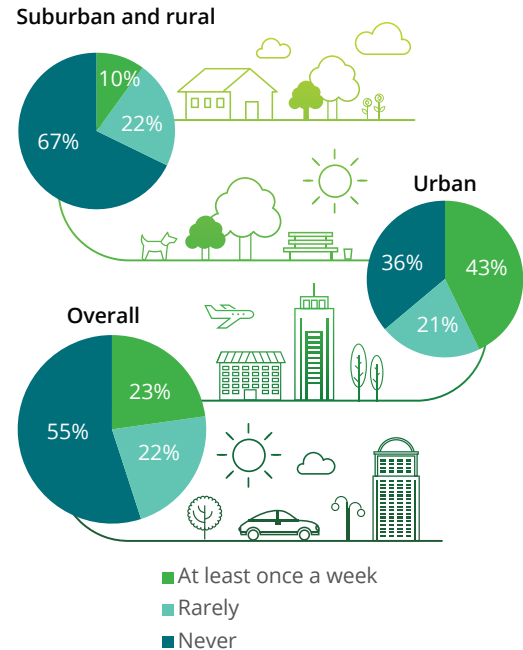
as a trusted leader in this area. These results also seem worrisome for established tech giants that have been working on self-driving vehicle projects, as only 20 percent of US consumers say they would trust them the most to bring fully self-driving technology to market. In fact, recent reports suggest that Apple has abandoned the idea of actually producing an autonomous car.²⁷ For all the media coverage of groundbreaking autonomous vehicle investments made to date, a surprising number of US consumers are still looking for a new, focused player to enter this market.

A looming risk: Ride-hailing isn't a significant threat to vehicle ownership—yet

While much has been said about the meteoric rise of ride-hailing services such as Uber, the majority (77 percent) of the US consumers surveyed never or rarely use these services (figure 10). While usage will likely continue to increase, particularly among younger US consumers, it should be noted that city centers are generally not a focal point for auto sales as compared to surrounding suburban neighborhoods.²⁸ This is primarily due to the availability of alternative modes of transportation in city centers, including mass transit and taxi networks. For this reason, it is unlikely that ride-hailing services will have a significant impact on overall vehicle demand in the near term, at least outside core urban centers.

But there is a risk. For those who do use ride-hailing services, their experience so far seems

Figure 10. Percentage of US consumers using ride-hailing services



Sample size: N=1,768

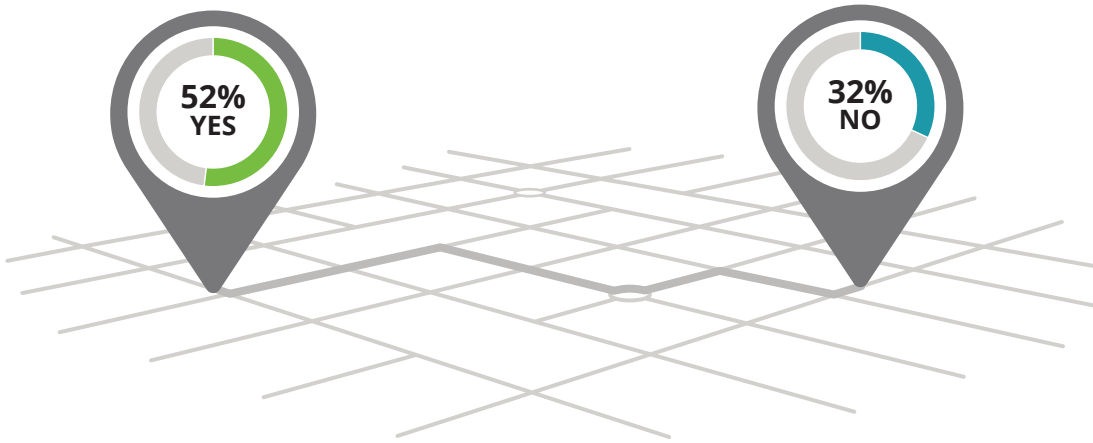
Source: Global Automotive Consumer Insight Platform, Deloitte.

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to be positive, since nearly one in two US users surveyed question their need to own a vehicle in the future (figure 11). Although it may be difficult to craft a compelling argument that these services would render car ownership obsolete anytime soon, growing availability may change the playing field for auto sales down the road.

As one might expect, questioning the need to own a vehicle is highest among younger consumers who use ride-hailing services. In fact, at 64 percent in agreement, Gen Y/Z ride-hailers

Figure 11. Percentage of US consumers who question their need to own a vehicle due to their use of ride-hailing services



Sample size: N=792

The remaining percentage of consumers haven't thought about it.

Source: Global Automotive Consumer Insight Platform, Deloitte.

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are nearly four times as likely as Boomer and pre-Boomer ride-hailers to question their need to own a vehicle in the future (figure 12).

HOW CAN THE AUTO INDUSTRY ADAPT AND THRIVE?

WHILE the march toward fully self-driving vehicles is proceeding, its path and pace may not be easy or straightforward. Yes, current and emerging technologies enable cars to function in ways once thought possible only in the movies. Not surprisingly, most US consumers aren't yet ready to give up complete control of their cars—or the idea of owning cars in the first place. Of course, almost no consumers have been exposed to fully autonomous vehicles, and a key step to ease the path and quicken adoption is to build confidence and assurance that autonomous features are safe. Such assurances

will likely take time and effort and be the result of numerous large-scale, in-market pilots launched across multiple markets. In parallel, incremental steps toward autonomy via the introduction of more active safety features are both inevitable and achievable.

Will shared mobility have an impact? Although most US consumers don't currently use ride-hailing services, current trends in population movement to urbanized areas, coupled with a rising number of urbanites using ridesharing programs, could make for a larger impact on vehicle ownership than one might think. Take, for example, that in 2007, for the first time, over half of the world's population lived in a city. And this trend is expected to accelerate, with approximately 66 percent of the world's population (87 percent in North America) forecast to live in cities by 2050.²⁹ As general

consumer preferences shift to value access over ownership, these trends do not seem pointed in traditional automakers' favor. One only needs to think of what Netflix did to Blockbuster or what Airbnb is doing to hotels and ask: Why should automakers be different? Indeed, some technology companies—namely Google—have explicitly rejected an incremental approach to self-driving cars, arguing that moving directly to full autonomy is safer and, implicitly, that consumers will embrace the technology once it is available.³⁰ It's worth recalling the apocryphal Henry Ford quote, "If I had asked my customers what they wanted, they would have said a faster horse."³¹

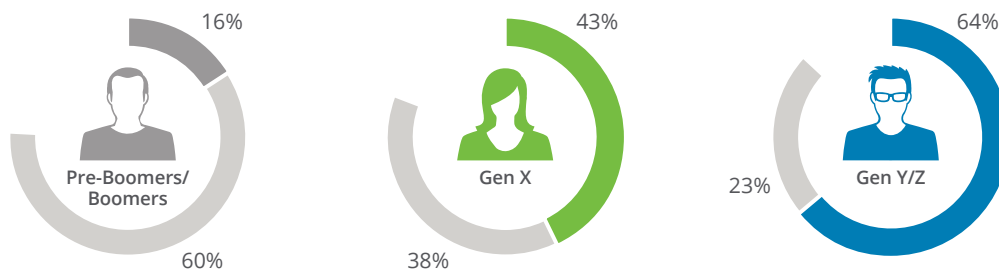
And the amount of money at stake for disruptors is compelling. With the extended US automotive industry capturing an estimated \$2 trillion in annual revenues,³² new entrants are emerging along numerous fronts. Additionally, autonomous drive and shared mobility may

offer significant economic benefits to passengers (~\$0.97/mile for traditional ownership vs. ~\$0.31 for autonomous, shared mobility),³³ thus providing further incentives for consumers to adopt shared autonomous models. The disrupter view envisions the emergence of a new mobility ecosystem that could offer substantial benefits to consumers. If new entrants are able to break the dominant paradigm of ever-expanding driver-assist functionality and deliver shared, fully autonomous vehicles to market, it is possible that consumer attitudes toward these new forms of mobility could shift quickly and dramatically.

Top five considerations for auto industry executives

1. Better understand and monitor consumers' preferences and their willingness to pay: While it might be easy to get caught up in the rush associated with technological advancement and the revenue opportu-

Figure 12. Percentage of US consumers who question their need to own a vehicle due to their use of ride-hailing services (by generation)



Sample size: Pre-Boomers/Boomers N=149 Gen X N=121 Gen Y/Z N=521
 The remaining percentage of consumers in each category haven't thought about it.

Source: Global Automotive Consumer Insight Platform, Deloitte.

nities that new mobility models present, consumers still ultimately dictate both the pace of transformation and the market rate of new technologies. While consumers often don't know what they want or will pay for a new technology, they can adopt and even become dependent on them quickly—think of how the smartphone became dominant in less than seven years. But consumers are highly unpredictable and sometimes reject things that seem to be in their best interest, as anyone who shrugs at health guidelines for diet and exercise knows all too well. So it is certainly reasonable to suspect consumers may not warm as quickly as pure logic would dictate to the promise of vehicles that would never crash or the economic benefits of sharing rather than owning a vehicle, since both require people to change their fundamental behavior.

2. Upside for those focusing on safety features: Even though US consumers may be a bit leery of autonomous cars driving around on today's city streets, the advanced technology features they do want are on the spectrum of self-driving capabilities. Marketing these technologies as safety features is a good way of getting Americans comfortable with various aspects of vehicle autonomy and is consistent with their current preferences and willingness to pay. To achieve this, it is critical that automakers invest in actively marketing the benefits of advanced vehicle features, while delivering flawless performance and execution of these features in the market, in order to

gain consumer trust and confidence. Building a compelling value proposition is critical for OEMs looking to monetize investments in future vehicle technologies.

3. Prioritize R&D investments: Safety technologies are more important than fuel efficiency technologies, which are themselves more appealing to US consumers than pure self-driving technologies. At the bottom of the priority list, relatively speaking, are connected and service-enabler technologies. It should be noted that, while there could be consumers who are most interested in specific technologies up and down this list, OEMs would be well served to critically assess their R&D strategies to better align their investments with broad consumer interest.

4. Tap into the broader innovation ecosystem, and consider new partnerships: Let's face it: Typical automotive product development timelines are long, even for traditional vehicles. It can be difficult for any OEM to maintain the frenetic pace of its R&D efforts in the best of times. Also, many car companies are currently following their own proprietary strategies when it comes to developing autonomous features. This equates to astronomical costs for each player, which are likely difficult to sustain over the long term, particularly in a global environment characterized by hyper-competition and challenging profit margins. In addition, government agencies are contemplating the establishment of standards in an

effort to put some boundaries around these technologies going forward, which may result in further costs for OEMs. As such, automakers would be well served to develop alliances and investigate potential synergies with suppliers, tech providers, and, perhaps, fellow carmakers in an effort to reduce costs and streamline advanced R&D efforts.

5. Recognize both the significant generational and geographic differences in consumer preferences: All of our recently collected global consumer data suggest that consumers' preferences vary substantially when looked at through a generational lens (Baby Boomers, Gen X, Millennials, and so on) or through a geographic lens, whether that is urban vs. suburban or rural consumers, or consumers' preferences in one country vs. another. While the industry has capitalized on the de-

velopment of global vehicle platforms and even fairly common models for sales and service, it is interesting to note that on the critical uncertainties associated with the future of mobility, including vehicle ownership and consumer preferences for different forms of technology, consumer preferences vary significantly by generation and by geography. This suggests the need for a much more detailed type of analysis to understand consumers, and new, more individualized ways of targeting, marketing, and selling to all consumers. The deeper insights necessary could be delivered through the use of more advanced data analytics. But one thing is clear: The future is less likely to adhere to broad-based global product and service platforms and should address the new and individual needs and preferences of consumers everywhere. **DR**

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