

# Consumer Acceptance of Autonomous Vehicles

3 Key Insights for the Automotive Industry

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# Introduction

Car manufacturers are always looking to stay one step ahead of automobile trends so they can develop products that consumers and commercial fleet purchasers will buy in the future. There's a general industry consensus that autonomous vehicles are the future, as evidenced by significant research and development investments by automotive players and tech giants alike.

Auto makers are even placing their bets on an autonomous vehicle future with smart product placement in futuristic Hollywood movies, like the sleek red 2054 Lexus sports car featured in Tom Cruise's *Minority Report*. In a stunning representation of what tomorrow's transportation infrastructure might look like, complete with driverless cars that resemble lounges, and highways that transport vehicles flawlessly and safely in every conceivable direction – even vertically – most moviegoers likely walked away with the notion that such a future is not only possible, but likely.

But, for car manufacturers, getting from now to Hollywood's ideal of 2054 is a timeline that is full of minefields. Although there is general agreement over an autonomous future for mobility, there is much ambiguity surrounding how to achieve it, and

how best to navigate it for success. Much of that ambiguity stems from prevalent views and perceptions about autonomous cars within the industry, and from misleading hype and misinformation from the media.

Vehicle automation and Mobility-as-a-Service are inextricably linked. However, it is the subject of much speculation and conversations about the future of car ownership are often times distorted by subjective points of view. For example, among one of the most pervasive industry views is this notion that, once driverless cars are readily available as a service, consumers will no longer want to privately own an autonomous vehicle. Why, after all, would a person buy a car, if they can't enjoy driving it? Others argue ownership isn't necessarily tied to manual driving.

As a location technology company, HERE can best help car manufacturers and mobility providers navigate through this transformation that has already begun. HERE is committed to supporting our customers during this historic time of change, and part of that mission entails clearing the air of hype and vagueness around important subjects with methodical and comprehensive consumer research relevant to all stakeholders. Our findings can help shape crucial decisions, strategies and product R&D efforts going forward.

# Consumer Acceptance Study of Autonomous Vehicles

To provide some clarity around the service versus ownership model, HERE conducted a consumer acceptance study on autonomous cars. The project focused on two opposing concepts to better understand the underlying consumer demand.

## **Autonomous Car-as-a-Product (CaaP):**

This “ownership model” concept features a fully autonomous vehicle that is available for private purchase. Consumers would have the option to use the fully autonomous mode, or switch to manual mode and drive the vehicle themselves. Car-as-a-Product without full automation exists today as the privately-owned vehicle.

## **Autonomous Car-as-a-Service (CaaS):**

This “service model” concept features an on-demand service deploying fully autonomous vehicles. Consumers can use them only in fully autonomous mode; they do not have the option of taking control and driving the vehicle. Car-as-a-Service without full automation exists today – taxis, car sharing, ride sharing services.

The research conducted in June 2016 featured two phases. A qualitative phase involved 48 consumers with different car usage and preferences across six varied locations (dense cities, sprawl, rural) in an online community. A quantitative phase involved further 2,000 nationally-representative consumers in USA and Germany in an online survey.

The objective was simple – compare the acceptance and intended usage of the two concepts to determine exactly how consumers currently relate to car ownership and driving, once vehicle automation becomes reality.

# Key Research Findings and Insights

The consumer research study yielded many interesting results; some expected, some surprising. The findings encompassed a range of attitudes and perceptions around mobility, automation, technology engagement, comfort levels, trust, desire for control, and many other areas.

However, the focus here is what the findings of this research mean to OEM entities that have a major role in autonomous vehicles. In fact, automakers will likely experience the most disruptive transformation in the history of the industry. Changes in driving behavior, major shifts in the transport modes people prefer, and how society addresses infrastructure are just some of the potentially disruptive consequences of autonomous vehicles. And the way forward is much less defined.

Fortunately, as we looked to narrow the study findings down to those key takeaways that have the potential to have the greatest impact on OEMs, some clarity emerges. At HERE, the hope is that a focus on these three areas will challenge current thinking and provide a basis for lively discussion.

## Yes, people would still want to buy cars

Most in the industry would agree that there will be a point in the not-too-distance future where autonomous vehicles will reign. At that time, people will essentially have one of two options when they travel: autonomous car ownership, CaaP, or an on-demand autonomous car service, CaaS. So, given that scenario, which is more acceptable and relevant to consumers today? And how will automation truly impact car ownership?

They are important questions because they compel automakers today to consider how best they can chart a course for tomorrow with the greatest possibility of growth and overall success. The vehicles currently available were developed two to four years prior to release, with the future in mind. That means OEMs today are making decisions for new platforms that will be available in 2019 to 2021. The main objective and focus of automakers throughout history has been to sell vehicles, but the autonomous future introduces the paradigm shifting concept of selling mobility services.

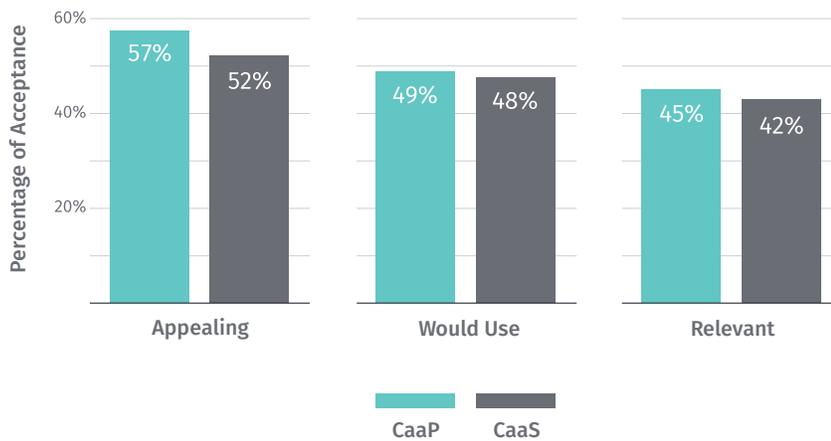
To begin to comprehend consumer sentiments and perspectives on these issues, our study sought to understand the appeal and relevance of both the autonomous ownership and service models. And what may be surprising to some in the automotive universe are results that showed equal footing all around – consumers would want both access to both ownership and service models.

**Both concepts scored high on appeal:** 57 percent of respondents find autonomous CaaP appealing; 52 percent of the respondents find autonomous CaaS appealing.

**Respondents preferred the use of both concepts:** 49 percent of respondents would use an autonomous CaaP; 48 percent of respondents would use an autonomous CaaS.

**Respondents found the use of these concepts less relevant today:** 45 percent of respondents find autonomous CaaP relevant; 43 percent of respondents find autonomous CaaS relevant.

## Both ownership and service models will be demanded by consumers



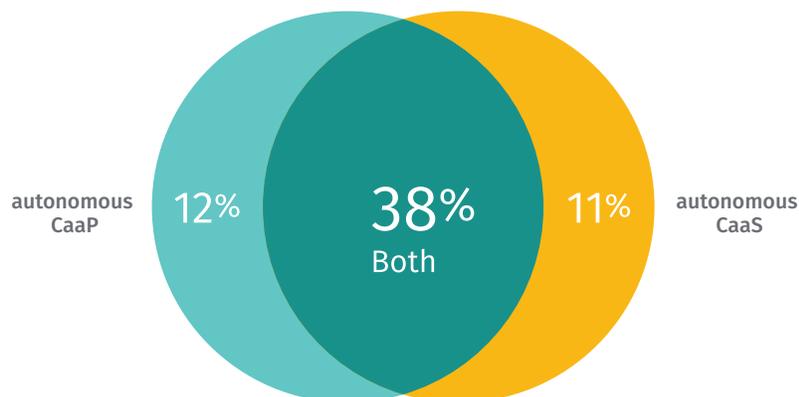
And what about car ownership? Even though our autonomous CaaP model stipulates the option for manual driving, how will the introduction of automation impact the decision to buy, or simply request a ride with the push of a button or voice command?

These are difficult questions. Owning a car, identifying with a vehicle, is ingrained in popular culture, with particularly strong roots in American culture. For many people, their choice of vehicle – from the brand name to the color to the license plate – is a direct reflection on their tastes, lifestyle and attitudes, which they gladly project to the world. Adding to this mix is the

question of what autonomy does to the joy of driving, and whether a perceived diminished role will impact the desire to own.

At HERE, we expected to see current car owners and driving aficionados prefer more autonomous CaaP than autonomous CaaS. This is because only the autonomous CaaP would allow ownership and manual drive in our concepts, and autonomous CaaS would not for either. But, interestingly, what we saw was that current car ownership and the enjoyment of driving have no influence on the intended use of both autonomous ownership and service models.

## Willingness to use autonomous CaaP and autonomous CaaS



What does this all mean? Of course, as the automotive landscape changes over time, the consumer relationship with cars will evolve. But these results offer some assurance that car ownership won't die because of automation. And, on the other end of the spectrum, car ownership doesn't preclude the attraction of use of autonomous car services.

For OEM's, these findings indicate that automakers would be well-served to consider their offerings as a part of a bigger mobility portfolio, with CaaS and CaaS playing different roles. **We believe that the automotive industry will eventually offer both - an ownership model, and a mobility service agreement, in one form or another.**

In fact, some manufacturers are already beginning to offer mobility services options, and one major automaker is already positioning themselves as a mobility provider. Examples of services include car manufacturers that offer car sharing networks, and one luxury brand that offers on-demand drivers for owners of their vehicles.

Instead of thinking in terms of whether ownership or service model is the more likely path into the future, the focus should be on how to create mobility solutions that embrace both.

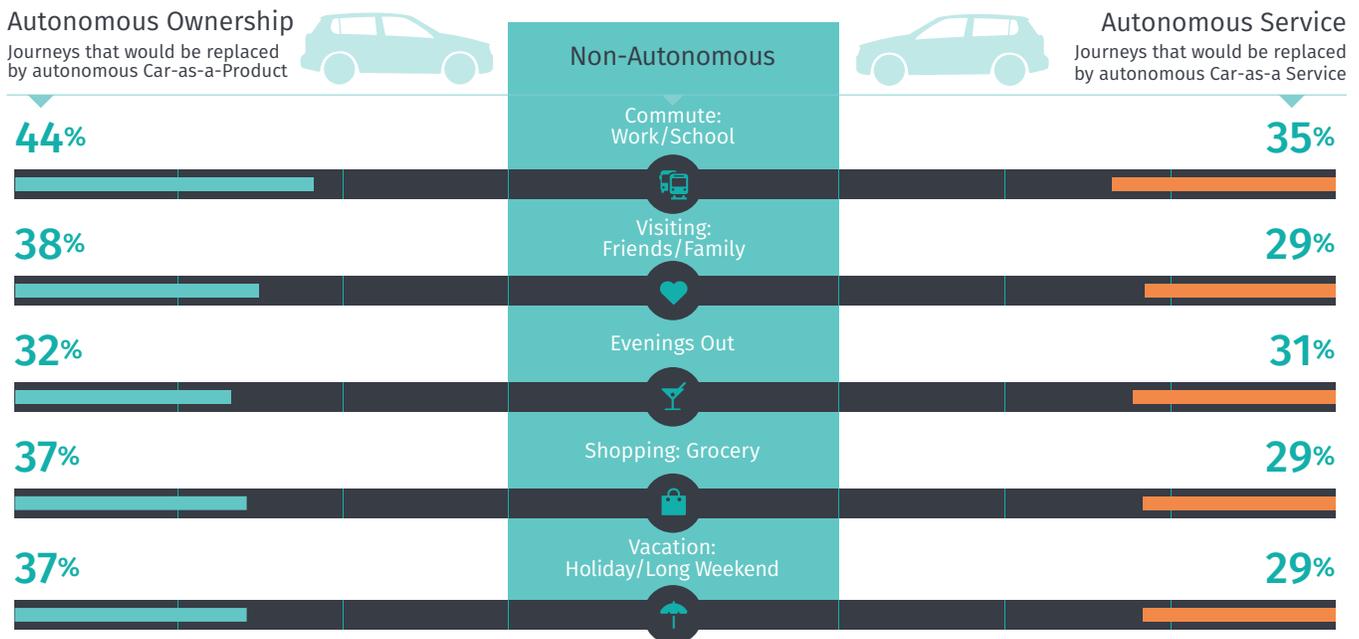
## Autonomous vehicle won't just change the industry... it will change everything.

The second key research insight most relevant to OEMs focuses on exactly how autonomous vehicles will be used, and how that impacts not only the automotive world, but other major areas, such as transport modes, transportation infrastructure, and even society as a whole.

First, the study revealed that all transport modes will be impacted significantly by autonomous vehicles, with the frequency of certain types of trips shifting positions in popularity, and others simply being replaced. Both the autonomous ownership and service models affected all transport modes in these ways.

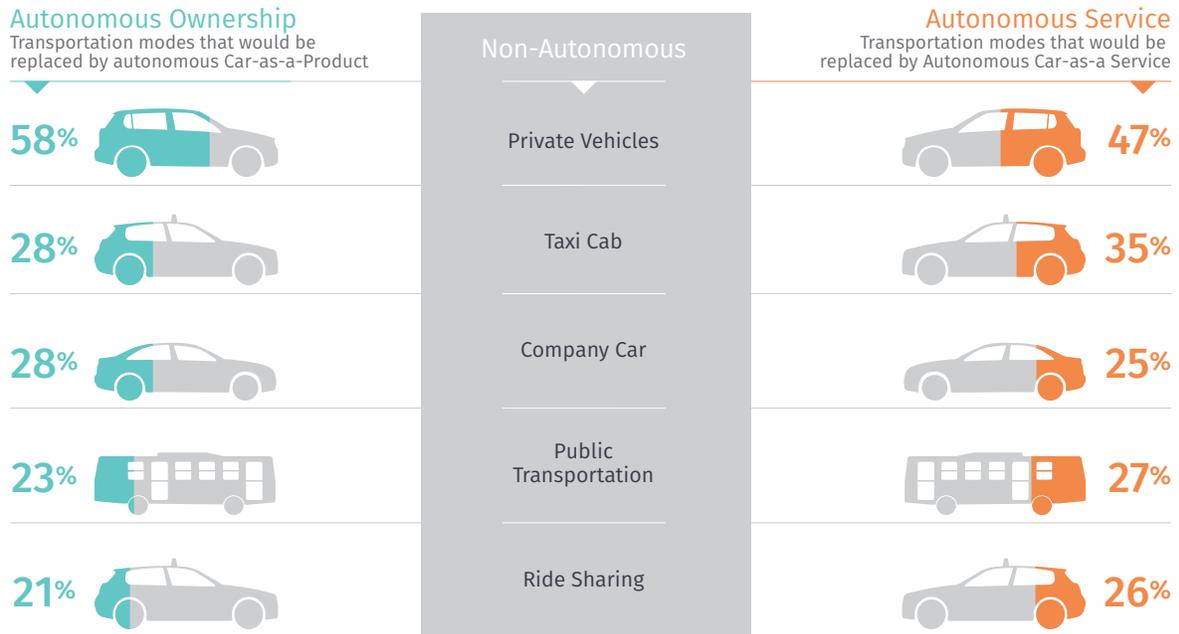
Both autonomous CaaS and CaaS would be used for commutes in the first place. Other trip types vary between autonomous CaaS and CaaS, as people see different values in them.

### Autonomous cars have the potential to replace a full range of journey types



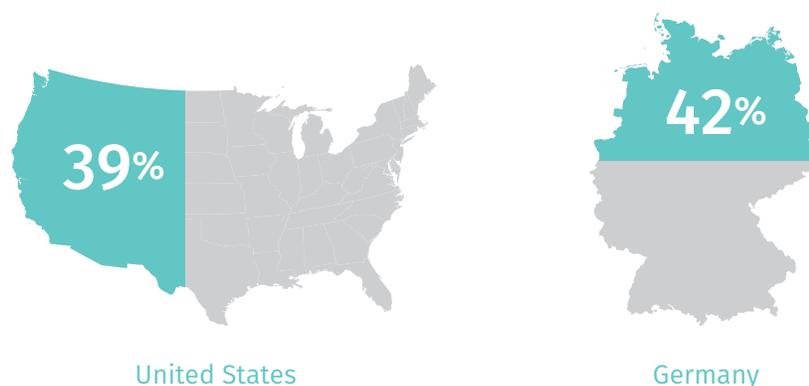
Respondents see both autonomous CaaS and CaaS to replace the non-autonomous private vehicle in the first place, but all other transport modes are also to be replaced by many.

# Autonomous cars will eventually replace all types of transportation modes



The impact on the world's mobility portfolio is impressive as well. Based on the length and frequency of usage for each transport mode, and considering the willingness to replace them, autonomous CaaP and CaaS might represent up to 42 percent of the mobility portfolio in the U.S., and 39 percent in Germany. Autonomous vehicles will become the most dominant methods of transportation.

## Autonomous cars could represent a considerable share of the world's mobility portfolio



What does that tell us? Simply that, when looking at the overall mobility pie, **OEMs have an opportunity to move beyond the car to capture a large portion of this evolving market, with autonomous CaaS and CaaP playing a role.**

Looking beyond what autonomous driving means to transport modes and mobility portfolios, there are dramatic implications for the transportation infrastructure. With evolving transportation choices that make it more desirable to use an ownership

and service model option rather than take public transportation, ride a bike, or not travel at all, the possibility of even greater congestion on roadways is real. Urban areas will be particularly impacted, and both local municipalities and federal government transportation authorities will have to make infrastructure adjustments.

Autonomous vehicles can be quite a game-changer and radically change life in other ways. People with disabilities, even the blind, will find it easier and safer to travel. Children can be driven to school, soccer practice, or a friend's house without their parents. The elderly, even those who might not be allowed to drive in today's transportation environment, will have free reign, greater control and freedom over their travels. In short, autonomous vehicles empower true social mobility for all, making urban areas much more inclusive to all residents, something that should excite the mayors and councils of all major cities.

Peering into the future in this way makes it obvious that fully autonomous vehicles aren't just a point-A-to-point-B proposition. The global impacts will be enormous. For OEM's these are insights worth pondering as they set a course for history.

#### The Power of Location

HERE Technologies enables people, enterprises and cities around the world to harness the power of location, and create innovative solutions that make our lives safer and more efficient. We transform information from devices, vehicles, infrastructure, and other sources into real-time location services that play a key role in how we move, live, and interact with one another.

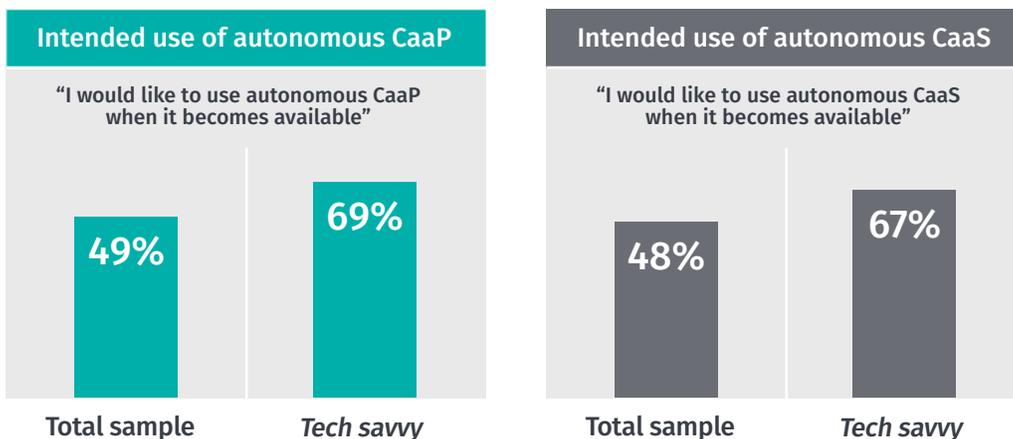
There are endless ways we can make use of location-aware data to drive better outcomes for everybody: for people, businesses, cities, the environment, society as a whole. For example, the HERE Open Location Platform offers a way to ingest, process, and analyze data from multiple sources. This is achieved by encoding location-related information for people, places and things, as well as deriving relationships between them.

## Tech-savvy consumers will lead the way. A phased approach is the way to bridge the trust gap.

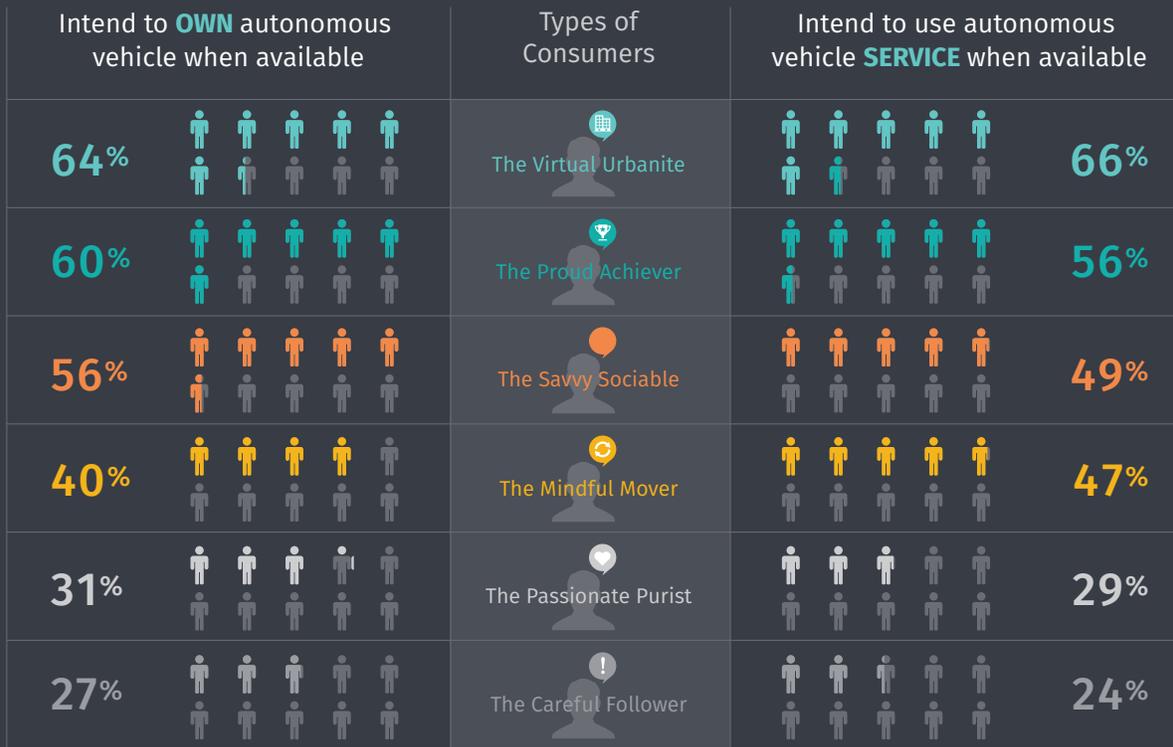
Not surprising, our consumer research also showed that certain segments of our survey group – two groupings with respondents considered tech-savvy – were especially accepting of autonomous vehicle technology. They also readily accepted both the ownership and service model.

**The tech-savvy consumers among our respondents displayed a significantly higher acceptance overall for both concepts:** 69 percent of them would use autonomous CaaP, 67 percent would use autonomous CaaS.

### Who would use autonomous cars?



## Autonomous cars are seen as a technology innovation embraced by tech-savvy adopters



The most tech savvy consumer segments willing to use CaaP and CaaS are The Virtual Urbanite and The Proud Achiever.

As we dived further into potential insights for OEMs that could impact the strategic course they charted, specifically to bridge the prevalent current lack of trust for autonomous cars among today's consumers, the results indicated that general acceptance is more likely achieved through a phased approach.

The adage, "trust is not given, but earned," applies here. With just 19 percent of respondents stating with certainty that they would be likely to use an autonomous vehicle, clearly that trust has not yet been earned. Of course, that's not surprising, given the relative infancy of the autonomous vehicle market. The need to retain control, anxiety about giving up that control, and many other unfounded fears (often fueled by some negative press) means that we have a long way to go before most people will trust a machine to do their driving for them.

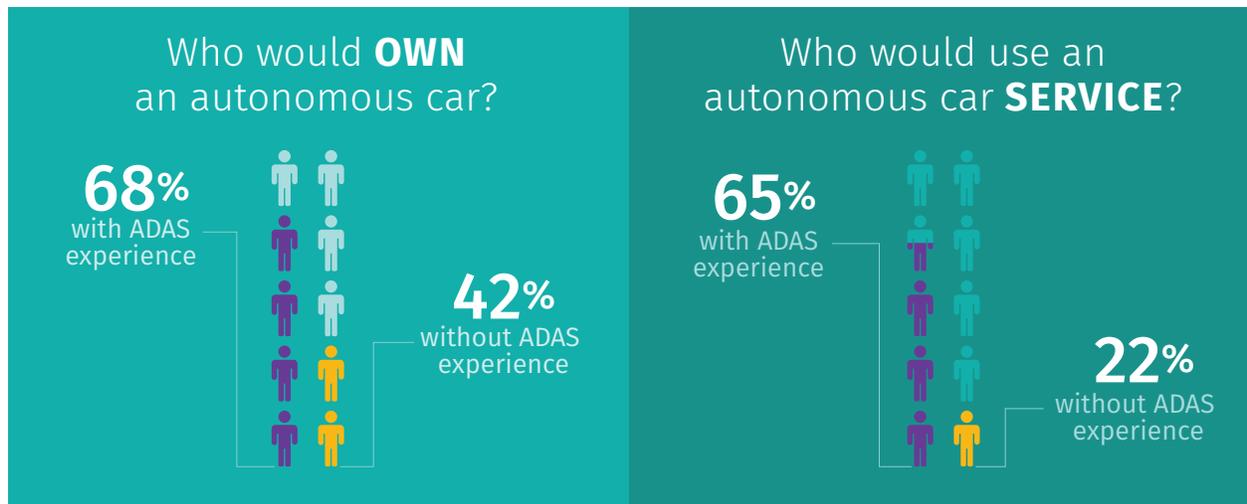
In addition to reliance on the tech savviness, OEMs have one specific *type* of technology that can be a powerful weapon in methodically earning the trust

of consumers over time – experience. And how can consumers *experience* the dependability, convenience and ease-of-use of vehicle automation? With technology that a significant portion of population of consumers, in some form or another, are already using today – Advanced Driver Assistance Systems (ADAS).

Fully 88 percent of ADAS users are satisfied with the features, making this kind of automated technology a true bridge to help close the trust gap. That makes ADAS a success story that automakers can use as a foundation to help consumers readily embrace autonomous driving. **ADAS features should be looked upon as stepping stones toward full vehicle automation.**

And, with the number of cars that have ADAS features already large and growing – currently 11 million in Europe, USA and China – more and more people today are experiencing vehicle automation in ways that will help build trust overall in fully autonomous technology.

For example, **respondents who have at least one ADAS feature in their cars are much more willing to use both autonomous CaaSP and CaaS**: 68 percent and 65 percent respectively. And those who have no cars, or don't have any ADAS features in their cars, intend much less to use both autonomous ownership and service models: 42 percent and 22 percent.



At HERE, it's our strong conviction that OEMs should continue to follow an incremental phased approach to an autonomous vehicle marketplace by continuing to invest and deploy more automated technologies, such as ADAS. Put another way, **the way to lead people to automation is not through revolution, but evolution** – continuing to add and integrate more semi-automated features into vehicles. Clearly, the positive experiences that drivers are enjoying today from such technologies will lay the groundwork – brick by brick – for building that bridge of trust.

#### HERE HD Live Map – essential intelligence for ADAS and automated driving

The HERE HD Live Map is a cloud-based mapping service providing highly accurate and continuously updated mapping assets to support connected ADAS and highly automated driving solutions. This gives vehicles the ability to effectively “see around corners” so they can adjust for road hazards in advance, preparing and adjusting driving strategies accordingly. It's the near real-time and highly precise understanding of the environment today's automotive technology needs.

The HD Live Map helps cars see beyond their sensors capabilities. It provides a more proactive, rather than reactive driving approach, and a more strategic, rather than tactical driving approach. It achieves this by producing more efficient route planning to help make the experience safer and more comfortable for consumers, which can help grow trust in autonomous vehicle faster.

#### HERE Electronic Horizon – an ADAS solution

HERE Electronic Horizon is embedded software that ingests detailed road network information from the cloud to makes ADAS features more intelligent for informed decisions without driver involvement. The software translates map information with detailed road characteristics into actionable data for the vehicle - extending its awareness beyond what the on-board sensors can see.

ADAS features and functions this software can enhance includes:

- Adaptive cruise control
- Powertrain control (for fuel savings)
- Automatic speed control
- Adaptive lighting
- Night vision and object recognition
- Highly Automated Driving (HAD)

Electronic Horizon software is the first-to-market to support ADASIS version 3, and is compliant to all ADASIS standards and other OEM proprietary formats. HERE Electronic Horizon is built on a highly accurate and trusted HERE map content and supports a seamless connection between navigation and automated functionality – an essential leverage point for encouraging trust in automated car systems.

# Conclusion

The consumer acceptance study encompassed a broad range of topics and yielded a variety of findings that offer meaningful insights to many stakeholders in the automotive industry.

What was offered here were three primary and actionable insights:

1. Don't assume ownership will become obsolete; people will still want to buy an autonomous car.
2. Prepare and plan for the substantial changes in mobility, infrastructure, and more.
3. Keep implementing ADAS technology – it is the path forward to fully autonomous vehicles.

In summary, a mobility transformation is only just beginning. This is a transformation that, in the long run, will significantly change not just car ownership and usage, but society as a whole. But, this will take time.

## About us

HERE Technologies, the Open Location Platform company, enables people, enterprises and cities to harness the power of location. By making sense of the world through the lens of location we empower our customers to achieve better outcomes – from helping a city manage its infrastructure or an enterprise optimize its assets to getting drivers to their destination safely. To learn more about HERE, including our new generation of cloud-based location platform services, visit [360.here.com](https://360.here.com)