

# What the Public *Really* Thinks about Automated Vehicles: Evidence from Survey Research



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# Connected (CV) and Automated Vehicles (AV) Distinct But Symbiotic Technologies



## CONNECTED VEHICLES



Communication devices in vehicle that enable transmission of information and data to other devices present in vehicle and/or connection to external devices, services, vehicles, infrastructure.

## AUTOMATED VEHICLES

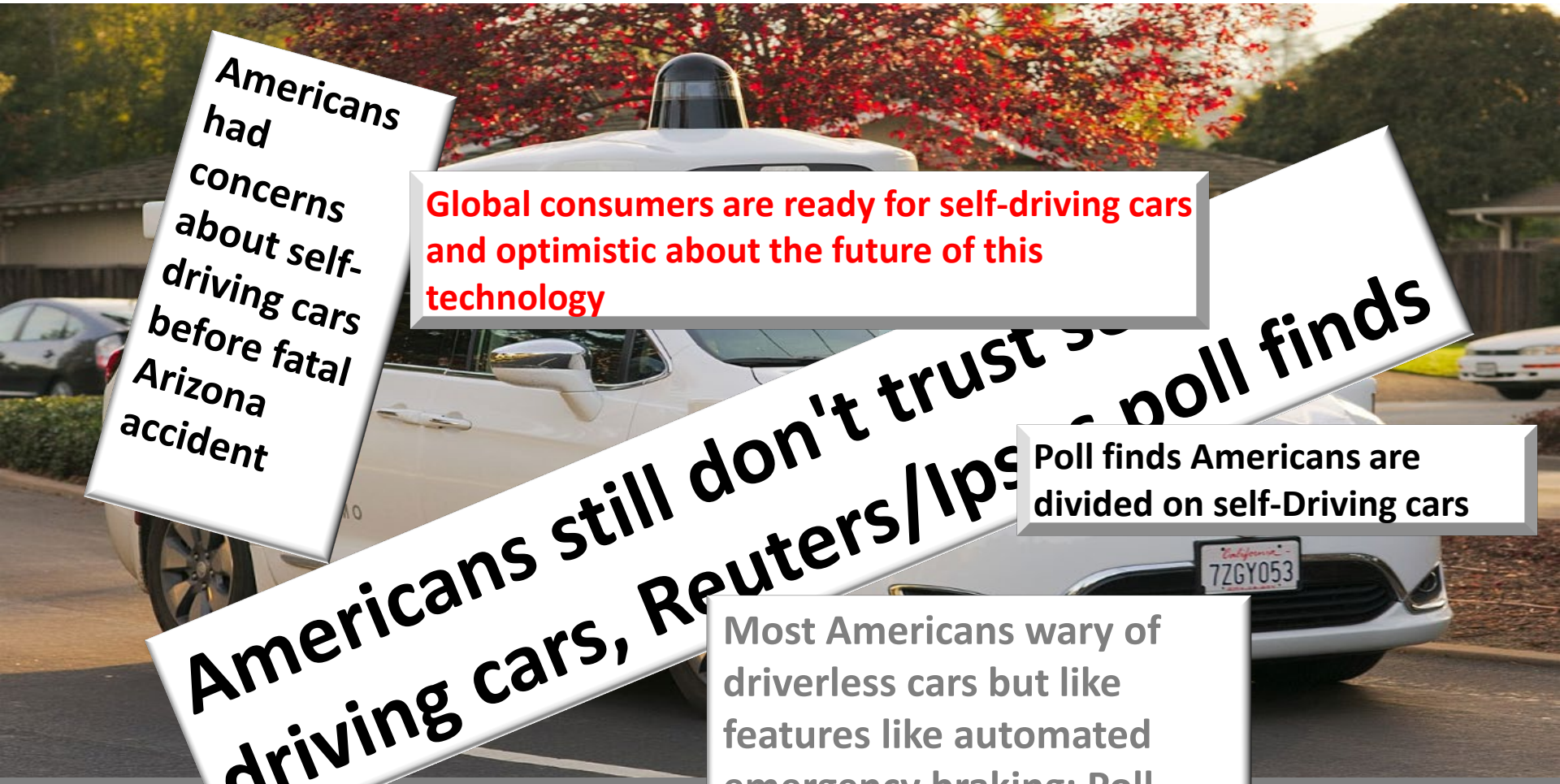
Represent a switch in driving responsibility from human to machine, encompassing a range of automated technologies, from simple driver assistance systems to fully autonomous or self-driving vehicles.

An ***autonomous*** vehicle is one in which there is no human driver and refers to the higher levels of vehicle automation

# Levels of Automation

<b>LEVEL</b>	<b>0</b> None	<b>1</b> Assistance	<b>2</b> Partial	<b>3</b> Conditional	<b>4</b> High	<b>5</b> Full
<b>What car does</b> 	<b>Nothing</b>	<b>Assists:</b> Accelerate, brake, <u>or</u> steer	<b>Assists:</b> Accelerate, brake, <u>and</u> steer	<b>Everything</b> for short periods of time	<b>Everything</b> restricted operating environment	<b>Everything</b>
<b>What driver does</b> 	<b>Everything</b>	<b>Everything</b> with <u>some</u> assistance	<b>Everything</b> with <u>more</u> assistance	<b>Remain</b> <b>alert</b> ready to resume control	<b>Nothing</b> restricted operating environment	<b>Nothing</b>
<b>Where to Find</b>	Your (grand) parents car	Present fleet	Present Fleet Tesla Autopilot	Audi Traffic Jam Pilot	Industry vision	Sometime in the future

# What the public thinks about self-driving vehicles



Americans had concerns about self-driving cars before fatal Arizona accident

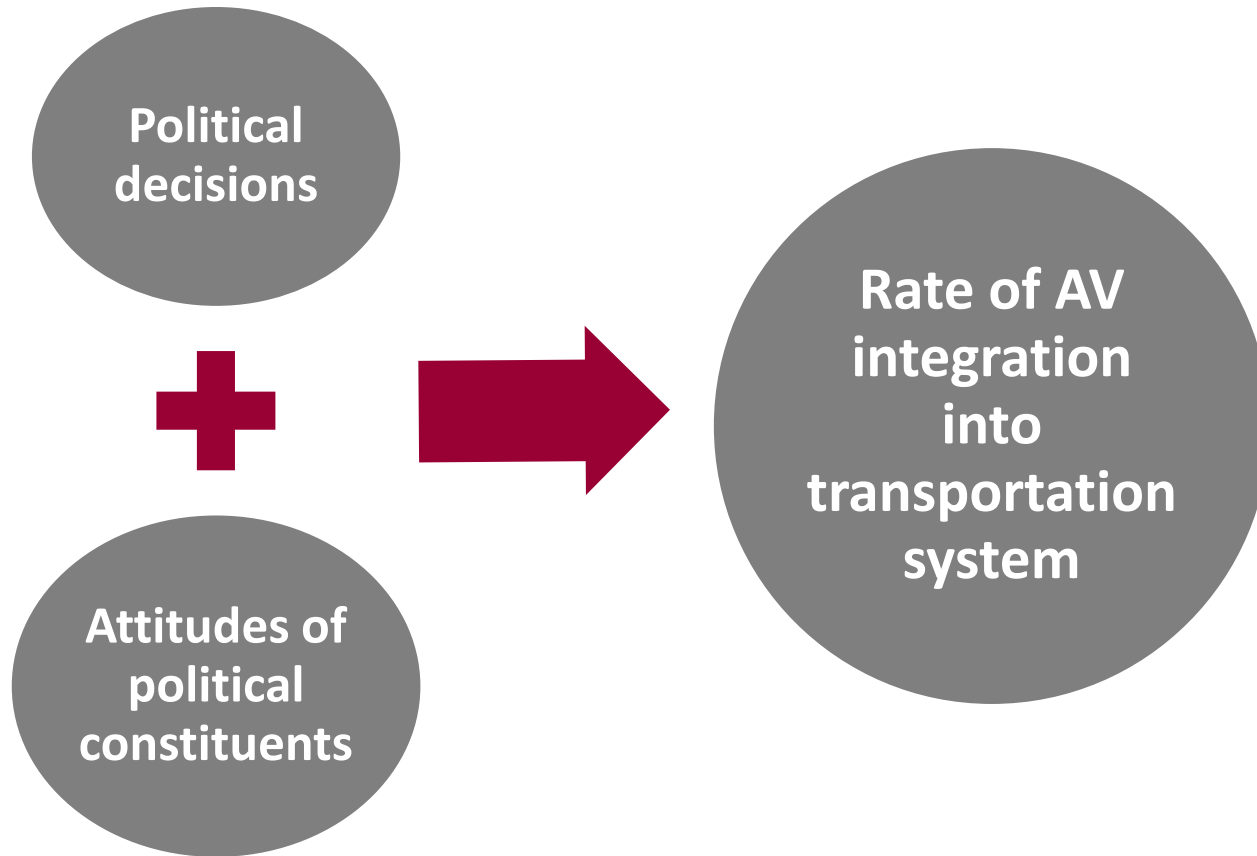
Global consumers are ready for self-driving cars and optimistic about the future of this technology

Americans still don't trust self-driving cars, Reuters/Ipsos poll finds

Poll finds Americans are divided on self-Driving cars

Most Americans wary of driverless cars but like features like automated emergency braking: Poll

# Why do we care what the public thinks?



# What the public really thinks about AVs?

Which public? Which vehicles?

1

**Nations differ** significantly in their acceptance and trust

2

**People differ** significantly in their acceptance and trust

3

Acceptance and trust differ significantly across **different automated vehicles**

# What the public really thinks about AVs?

## Which public?

1

**Nations differ significantly in their acceptance and trust**

2

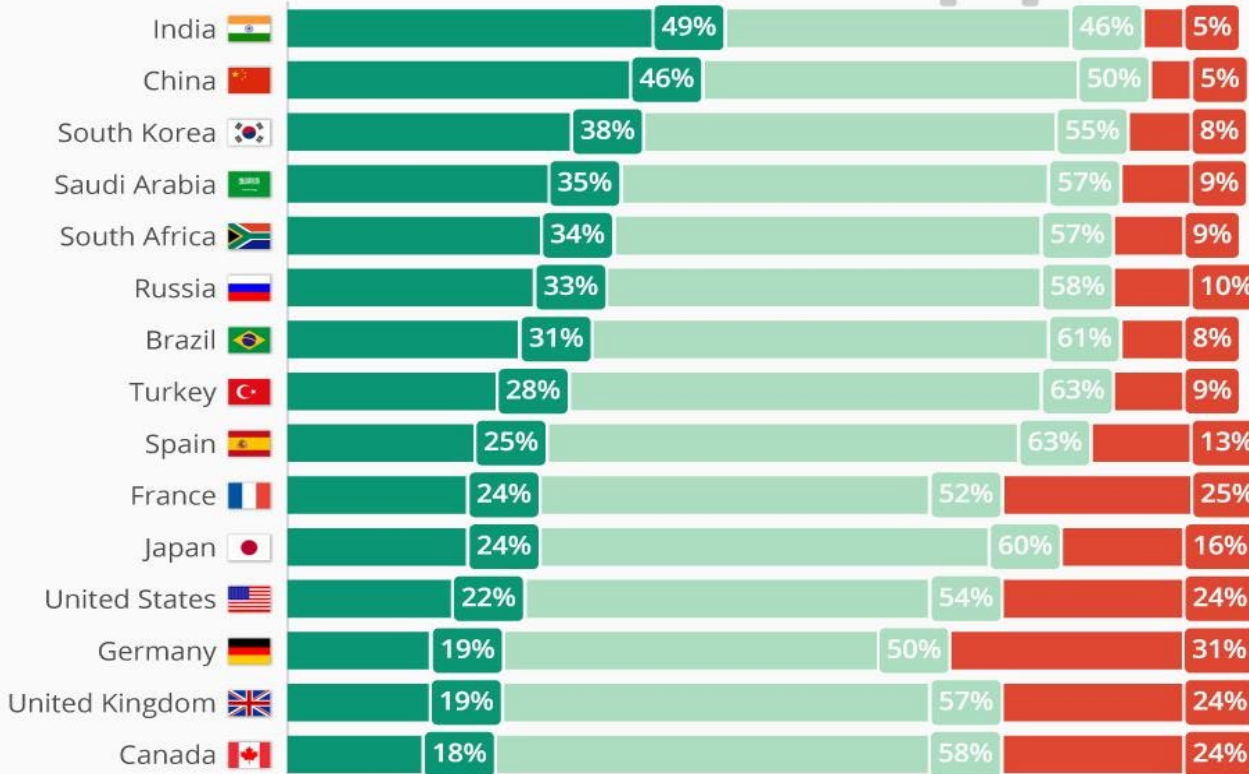
People differ significantly in their acceptance and trust

3

Acceptance and trust differ significantly across different automated vehicles

# Global Opinion Divided on Self-Driving Cars

- I'm in favor of self-driving cars and can't wait to use them
- I'm unsure about self-driving cars but find the idea interesting
- I'm against self-driving cars and would never use them



n = 21,500 adults. May not add up to 100% due to rounding.  
 @StatistaCharts Source: Ipsos

Forbes **statista**





# What the public really thinks about AVs?

## Which public?

1

Nations differ significantly in their acceptance and trust

2

**People differ significantly in their acceptance and trust**

3

Acceptance and trust differ significantly across automated vehicles

# Demographics, Attitudes, Behaviors Influence Acceptance and Trust

Source: TTI (2015-2019)

## Demographic

- Age
- Gender
- Urban
- Mobility impairment

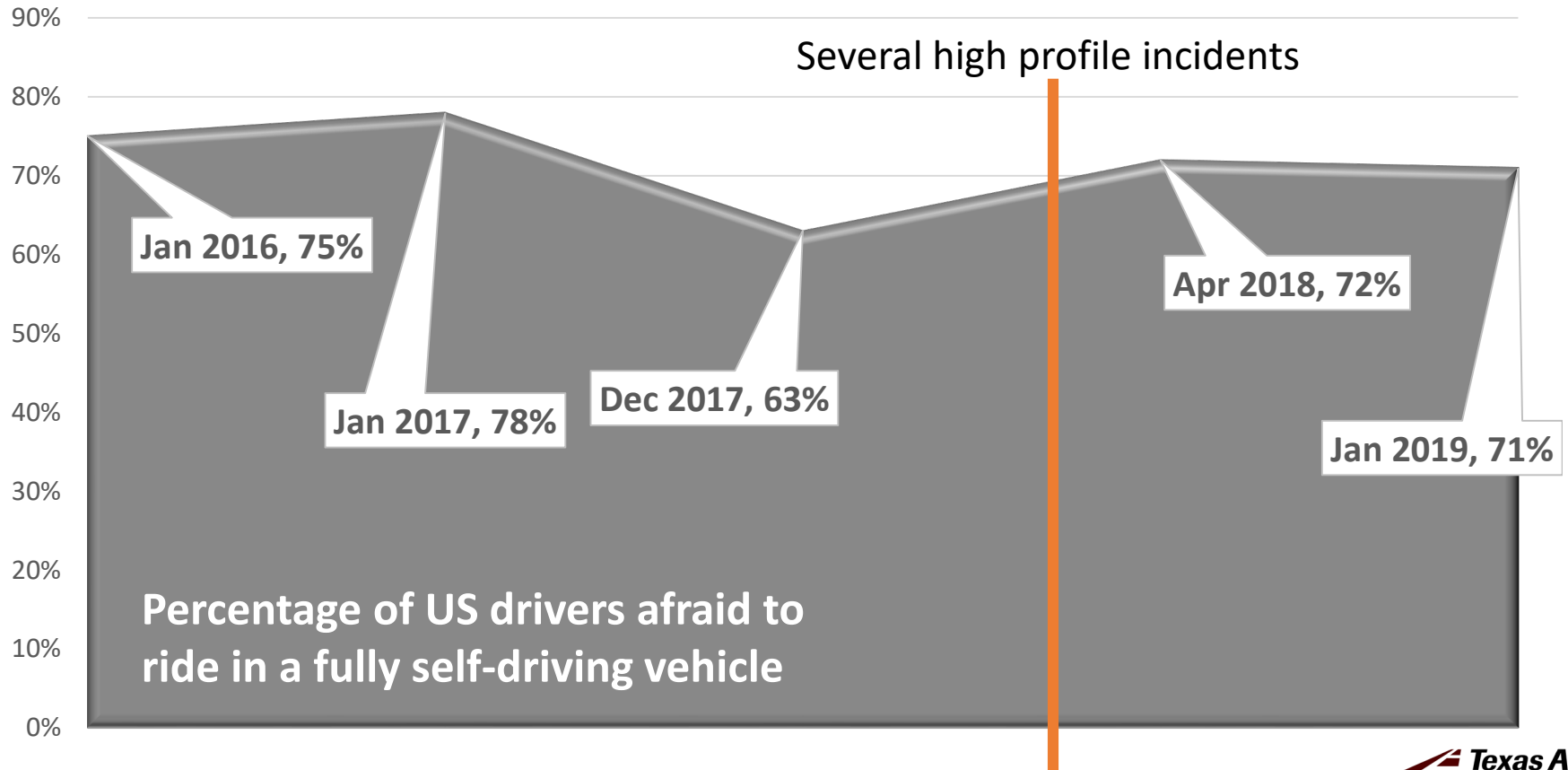
## Attitudes

- Attitudes about AVs
- Knowledge about AVs
- Lack of data privacy concerns

## Behaviors

- Technology adoption
- Use of ridehailing services
- Experience with advanced driver assistance systems (ADAS)
- Experience riding in self-driving vehicle

# Fear of self-driving cars influences acceptance

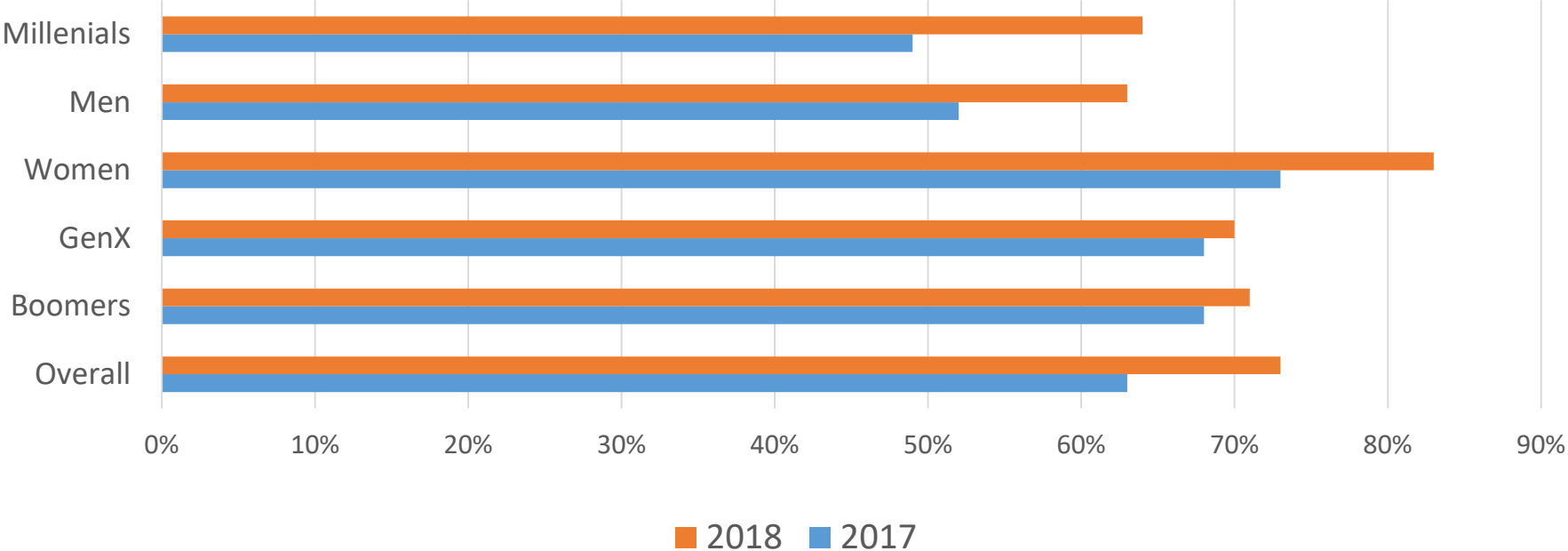


Source: AAA surveys, 2016, 2017, 2018, 2019. N~1000



# Trust slips among millennials more than others

Percentage of US Drivers afraid to ride in a fully self-driving vehicle

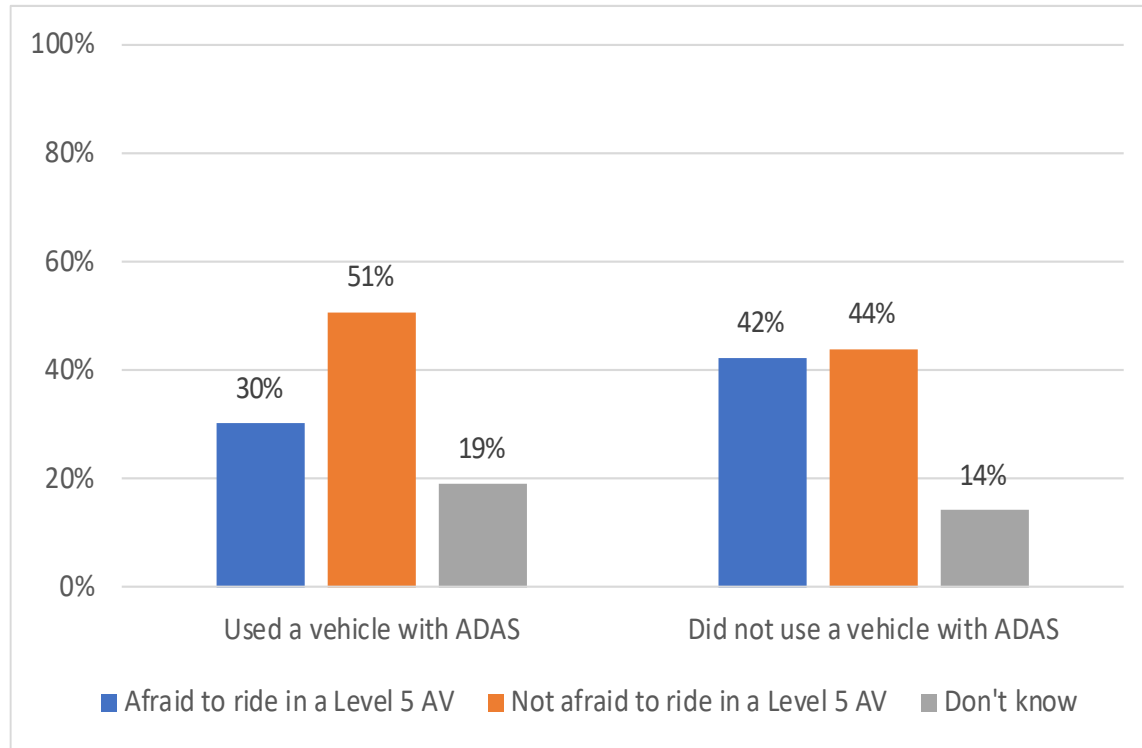


Source: AAA surveys, 2017, 2018. N=1000 (about)

## Afraid to Ride by Having Vehicle with Advanced Driver Assistance Systems (ADAS)

Source: TTI, 2019 Online Survey, Frisco, Texas Drive.ai pilot  
N=623

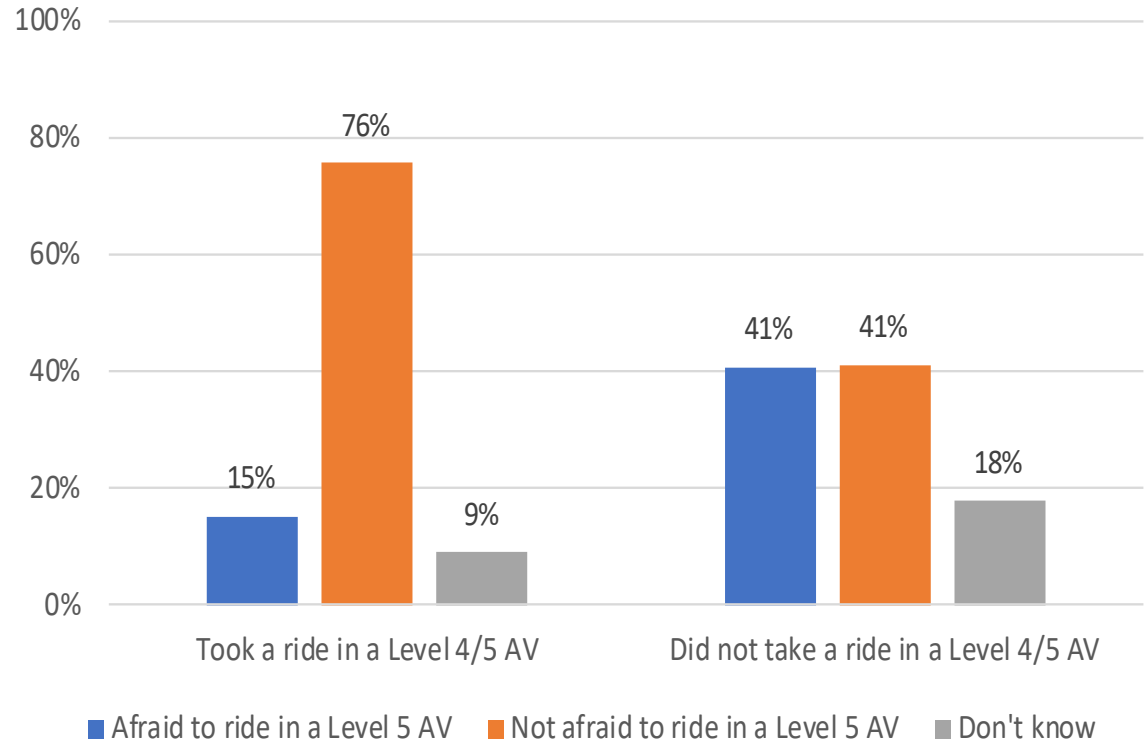
# Having ADAS decreases fear



## Afraid to Ride by Experience Riding in a Level 4/5 AV

Source: TTI, 2019 Online Survey, Frisco, Texas Drive.ai pilot  
N=623

# Interacting with AVs decreases fear more



# What the public really thinks about AVs?

## Which vehicles?

1

Nations differ significantly in their acceptance and trust

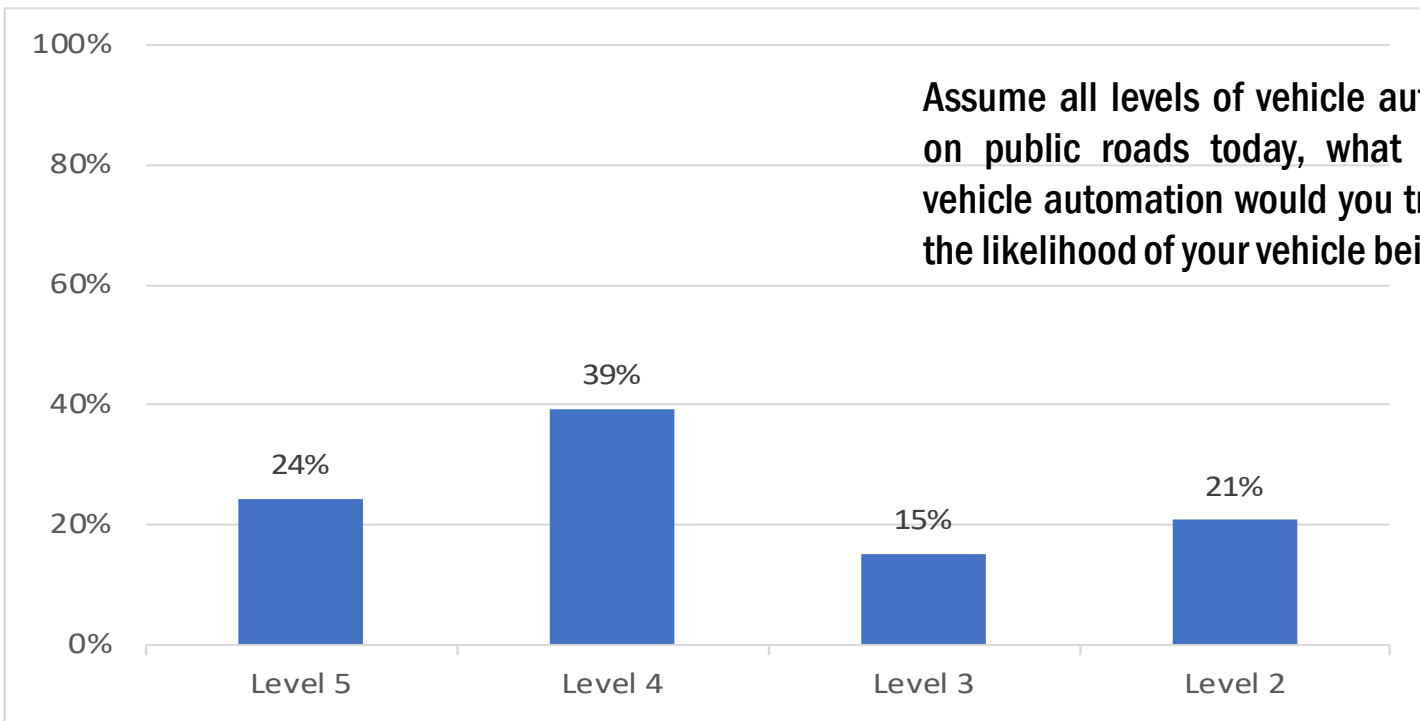
2

People differ significantly in their acceptance and trust

3

**Acceptance and trust differ significantly across automated vehicles**

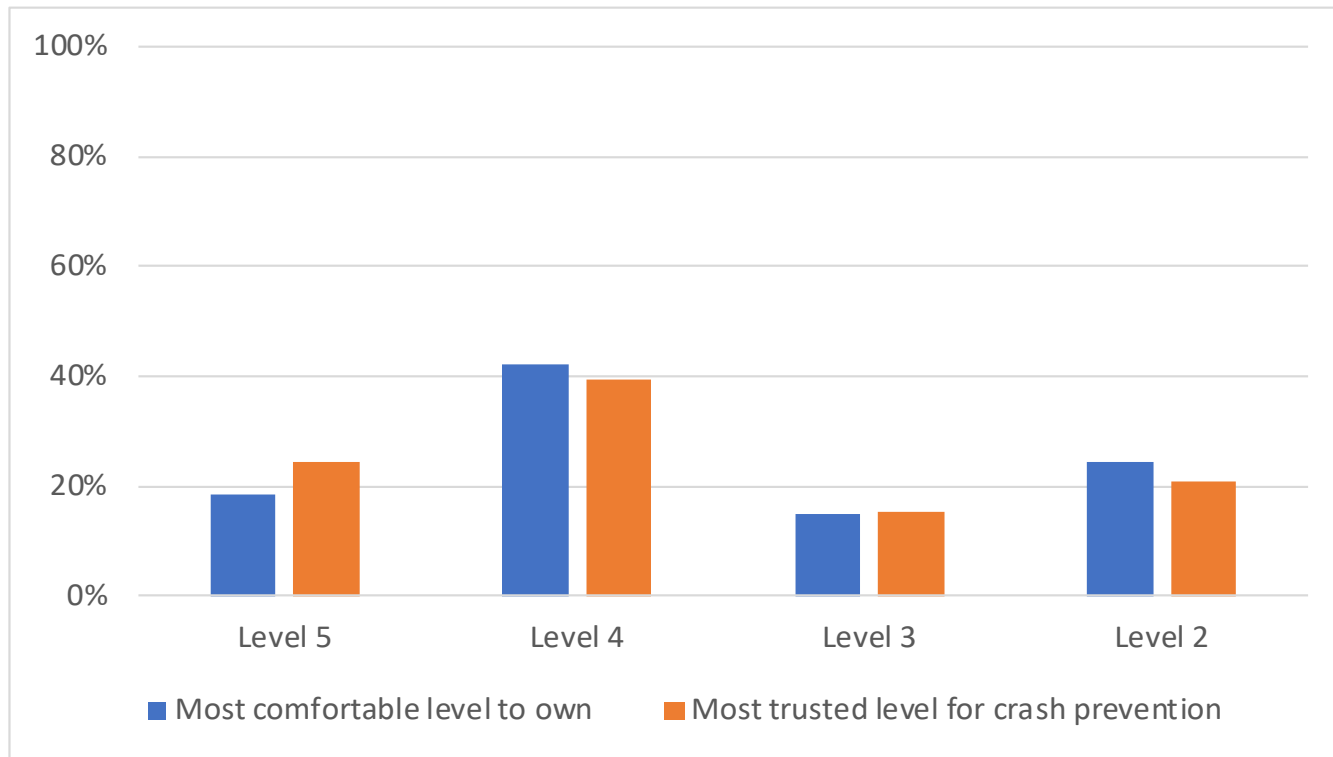
# People are aware of the potential safety benefits of higher levels of automation



Source: TTI, 2019 Online Survey,  
Frisco, Texas Drive.ai pilot, N=840



# Level 4 vehicle both preferred to own in a few years and most trusted to reduce the likelihood



# Losing ability to take over control leads to lower comfort in owning Level 5 vehicle

Automated driving has the potential to be **safer than human drivers** and add convenience. However, technology is **not fool-proof** so I would like to at least be **able to request control**.

Software glitches do happen, as in the case of **recent plane crashes**.

What if the automation chooses to react in a way that I don't think is safe?

I think there are some instances where **things cannot be predicted** and a quick response by a human may be needed.

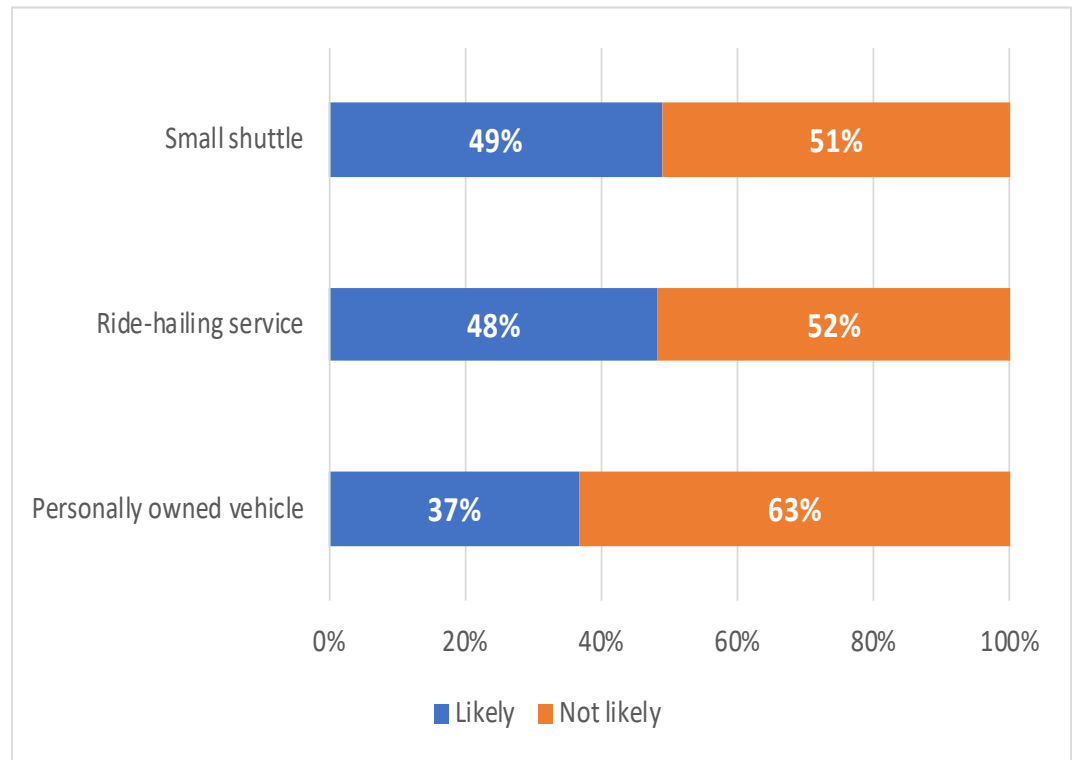
Biggest **benefit to me** travel experience.  
Greatest **benefit to society** - safety



# Level 5 vehicles as on-demand shuttle or ridehailing are preferred

Imagine that Level 5 self-driving vehicles were available for you to purchase and/or use today. How likely would you be to:

- Purchase
- Use as a ride-hailing service like Lyft or Uber,
- Use as small, low speed shuttle



# Key take-aways

## When assessing what the public thinks about AVs, ask:

- Which people?
- Which vehicles?

## What do people *really* think:

- Intent to use is high among subgroups of people
- Trust is big issue, technology is so new, assumptions based on media
- People don't want to own yet
- Personal benefit: improved travel experience; Societal benefit: safety

## Few respondents have interacted with AVs

- Leads to overestimating or underestimating value
- Pilots aid acceptance and help for public education

# Thank you.

## Research Team

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## Recent Published Research on Topic

Consumer Acceptance, Trust, and Future Use of Self-Driving Vehicles.  
August 2019. <http://tti.tamu.edu/documents/TTI-2019-3.pdf>.

Chipping Away at Uncertainty: Intent to Use Self-Driving Vehicles and the Role of Ride-Hailing. *Transportation Planning & Technology*. August 2019.

Measures of Baseline Intent to Use Automated Vehicles: A Case Study of Texas Cities. *Transportation Research Part F: Traffic Psychology and Behaviour*, 62, 2019.

Self-Driving Vehicles: Determinants of Adoption and Conditions of Usage  
*Transportation Research Record: Journal of the Transportation Research Board*,  
No. 2565. Washington, DC: Transportation Research Board, 2016.