Automated Vehicles & Driverless Cars

Emergent Themes

Automobile Culture

Market

Design & User Experience

the Ripple Effect

Infrastructure

Automobile Culture

Despite safety improvements, polls and plans show a cultural resistance to driverless transportation in the US.

Automobiles are part of the American identity.

“Plans and tests for autonomous buses or shuttles are already underway in Europe, the United States, China and Singapore… the well-established car culture in the United States, where driving is associated with recreation and identity, will make it difficult to convince the population to accept self-driving cars.”

2016, https://www.stratfor.com/analysis/slow-drive-toward-automated-vehicles

Older adults are least willing to own *or* ride in driverless vehicles.

“15 percent of those over 55 said they were willing to try a driverless vehicle, even though researchers say the technology could help them remain mobile later in life… Older adults in particular have the most to gain from automatic and advanced safety systems… but even just the idea, after you’ve been behind the wheel for 40 years, is a little daunting.”

2016, https://www.bostonglobe.com/business/2016/06/03/driverless-cars-have-investors-hearts-but-what-about-consumers/vJG7bW3kHeFIrEl4iLYjAJ/story.html

More test drive mileage is needed to demonstrate safety benefits of self-driving cars.

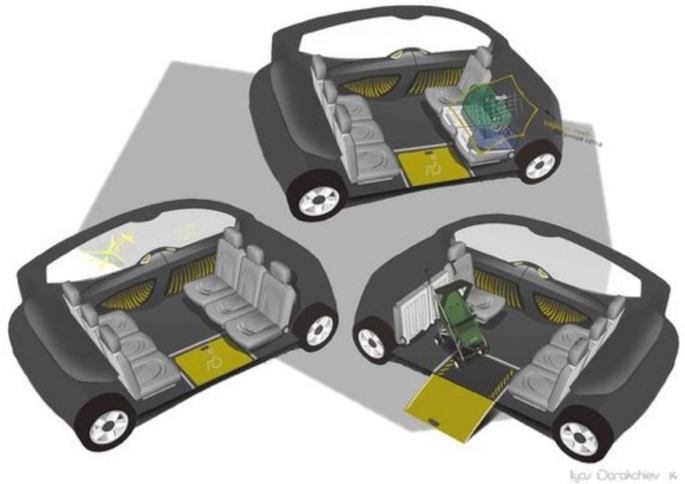
“To prove statistically that driverless vehicles would have a 20% lower fatality rate than human drivers would require 5 billion miles of test drives… It's unclear whether the public will demand such precise proof of safety before accepting driverless cars on the road… Before now, new vehicle technologies have just been allowed to go on the road because the driver is still ultimately in control… The public may not be comfortable following the same path for autonomous vehicles.”

2016, http://www.latimes.com/business/hiltzik/la-fi-hiltzik-driverless-cars-20160506-snap-story.html

Consumers acknowledge self-driving tech will be beneficial for physically impaired, but otherwise resist AVs.

“About 70% of the respondents believe autonomous vehicles will provide on-demand mobility for the elderly and handicapped…but acceptance will depend on public trust of the safety, reliability and capability of autonomous vehicles.”

2016 Forbes, http://www.forbes.com/sites/georgepeterson1/2016/06/05/consumer-interest-in-self-driving-cars-increasing/#6069e127ce67.



the Market

Enthusiasm for widespread use of AVs is abuzz within niche groups.

As investments pour in from developers and automakers worldwide, skepticism exists in the general public.

For ambulance services, cost is a barrier to AV adoption.

KS: “...I could see how it may be more efficient, but like drivers make $9 or $10 an hour. They get paid so little. Until the time when the cost of having a driverless ambulance or that technology comes down, it would still be cheaper to have a live person driver.”

2016. Interview with Paramedic and Physician’s Assistant Kevin Schwartzel

Survey finds that though trust in AVs is low, the potential to save money is an important factor for Americans.

“80% of survey respondents said they would not buy an autonomous car if one were available today. Trust in the technology is the major hurdle… 90% of those surveyed said they would at least consider a self-driving car if owning one produced an 80% reduction in car insurance rates.”

http://www.jdpower.com/cars/articles/car-news/study-says-minority-drivers-want-autonomous-cars

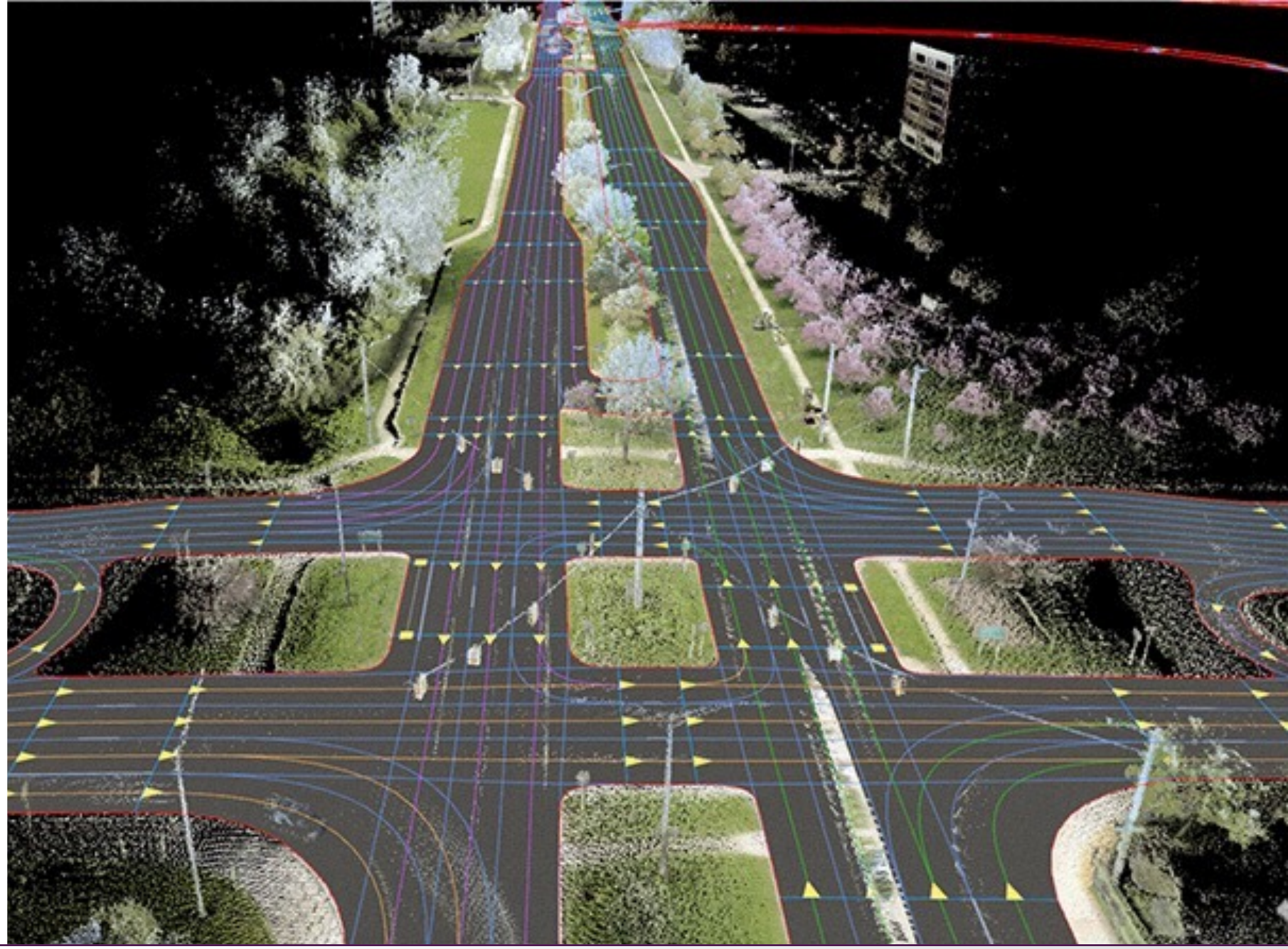
Automakers commit to a shared data format for smart vehicle data.

“The main task of proponents of automated vehicles is to map roads. Companies like Here — a mapmaker owned by the German automakers BMW, Daimler and the Audi unit of Volkswagen— are trying to do that.” …

“In an initiative kicked off by HERE, carmakers have been demonstrating a commitment to agree on a standardized format for how this data can be transmitted to the cloud – to ensure that the data generated would be compatible regardless of vehicle manufacturer.”

2016, http://www.nytimes.com/interactive/2016/06/06/automobiles/autonomous-cars-problems.html

https://company.here.com/automotive/



American automakers now investing in AV technology.

“Ford announced that it is tripling the size of its autonomous vehicle testing fleet – declaring that we should no longer consider it a car company, but instead a mobility company...A survey by the Boston Consulting Group last year of 1,500 people in 10 countries found that 14% would be willing to pay a premium exceeding $5,000 for a self-driving car. In Paris, Copenhagen, and Vancouver driverless subways haven’t caused much concern. [Toyota] is investing $1 billion in artificial intelligence research for autonomous vehicles, but is betting that individually owned cars will continue to dominate the market.”

2016, http://fortune.com/2016/02/15/driverless-cars-google-lyft/.

Apple invests in Didi Chuxing to gain insight into user behavior with ride-sharing and taxi services.

“As rumors continue to swirl about Apple's eventual expansion into making automobiles, it will be crucial for the company to understand what the biggest car market on Earth thinks about how to get around… The blossoming partnership could insulate the U.S. tech giant from a global slowdown in iPhone sales. Through the deal, Apple is expected to gain access to highly valuable data on the 11 million trips a day made through Didi…”

2016, https://www.washingtonpost.com/news/the-switch/wp/2016/05/16/how-apples-investment-in-the-uber-of-china-could-give-it-an-edge-in-the-transportation-wars/

Chinese automakers push to make the country a leader in driverless vehicle manufacture.

“For China, the push for self-driving vehicles is also part of a broader state initiative urging manufacturers to upgrade their technology as lower-cost countries emerge and compete for labor-intensive factory jobs.”

“A 2015 World Economic Forum study… found that 75 percent of Chinese respondents are inclined to ride in an autonomous taxi, compared to 52 percent of Americans.”

https://www.wired.com/2016/06/chinas-plan-first-country-self-driving-cars/
2016 http://www.bloomberg.com/news/articles/2016-04-18/china-s-changan-auto-completes-1-200-mile-autonomous-drive-test.

Design & User Experience

In a race to make AVs operational, the user experience and supporting infrastructure will lag behind.

How will the in-vehicle experience influence consumer opinion about AVs? What can a private non-driving experience offer that a taxi or train ride cannot?

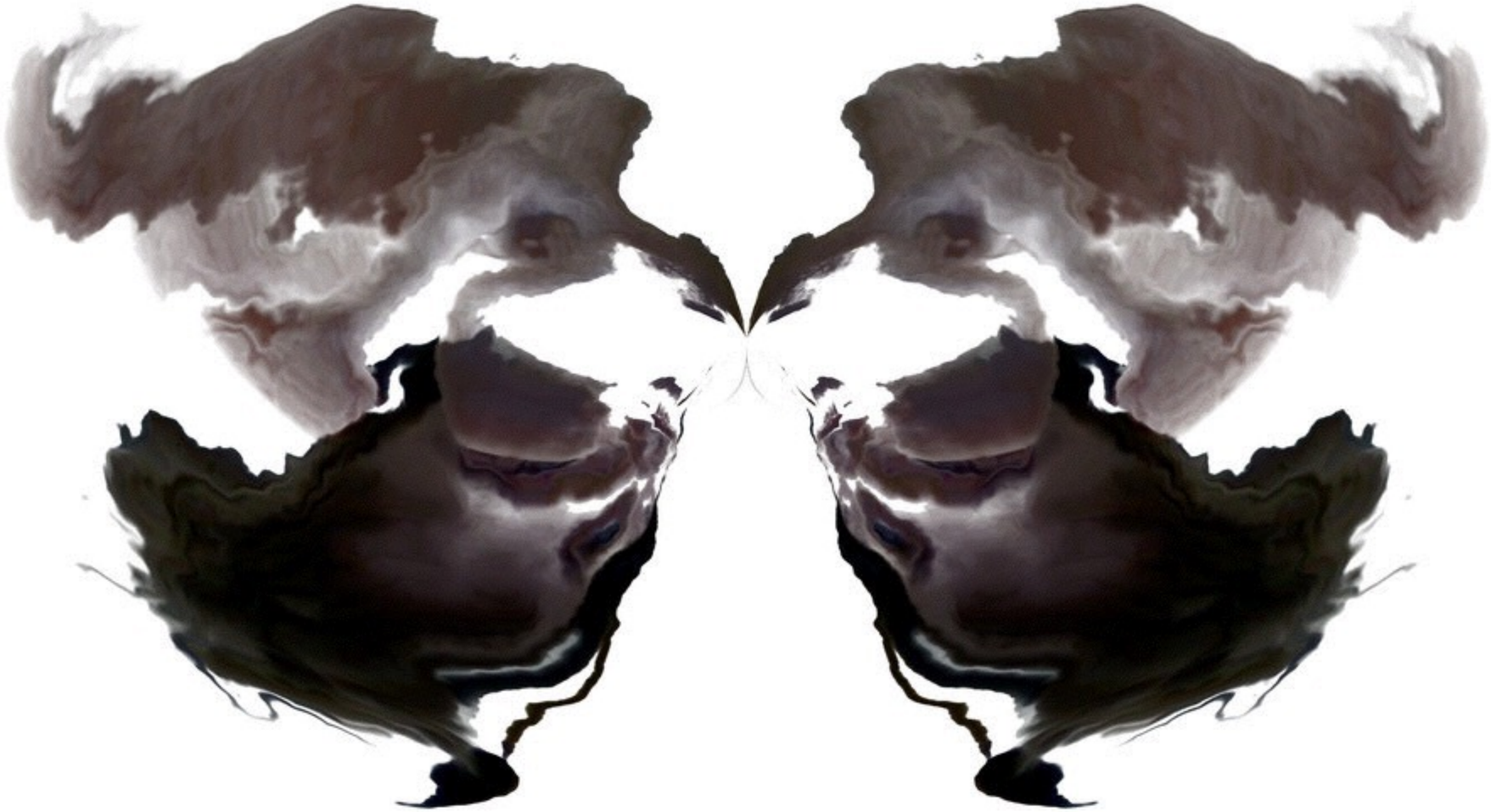
Time spent in the vehicle is a major consideration for consumers of all ages, especially Gen X and Y, who hope time spent in an AV will be more productive.

"…GenY/GenX respondents are even more definite when choosing reasons: relaxing (82%/88%), increasing productivity during their drive (68%/63%), reducing stress (55%/62%), self-parking (45%/51%). These working-age people want to use the autonomous car as a tool to make them more efficient. They believe the time spent in their vehicle can be put to better use."

2016, http://www.forbes.com/sites/georgepeterson1/2016/05/25/your-self-driving-car-is-waiting-sooner-than-you-think/#1886d54619d7

Ethics systems will be programmed in to AVs.

“Although some researchers have indicated that automated vehicles will need to be programmed with some sort of ethical system in order to make decisions on how to crash, few, if any, studies have been conducted on how particular ethical theories will actually make crash decisions and how these ethical paradigms will affect automated vehicle programming… The experiment demonstrates that understanding rational ethics is crucial for developing safe automated vehicles.”



2015. http://trrjournalonline.trb.org/doi/10.3141/2489-15

Smart vehicles: MIT includes AVs in a mobility platform being developed to manage data and improve user experience.

“At the MIT Media Lab, they are designing and prototyping the development of a sophisticated multi-modal mobility recommendation engine that ties together a variety of modes, from carpooling to bike sharing, and is influenced by real-time data such as weather patterns, traffic, and past user behavior.”

http://cities.media.mit.edu/research/mobility-networks

Humans do not behave vigilantly behind the wheel of AVs.

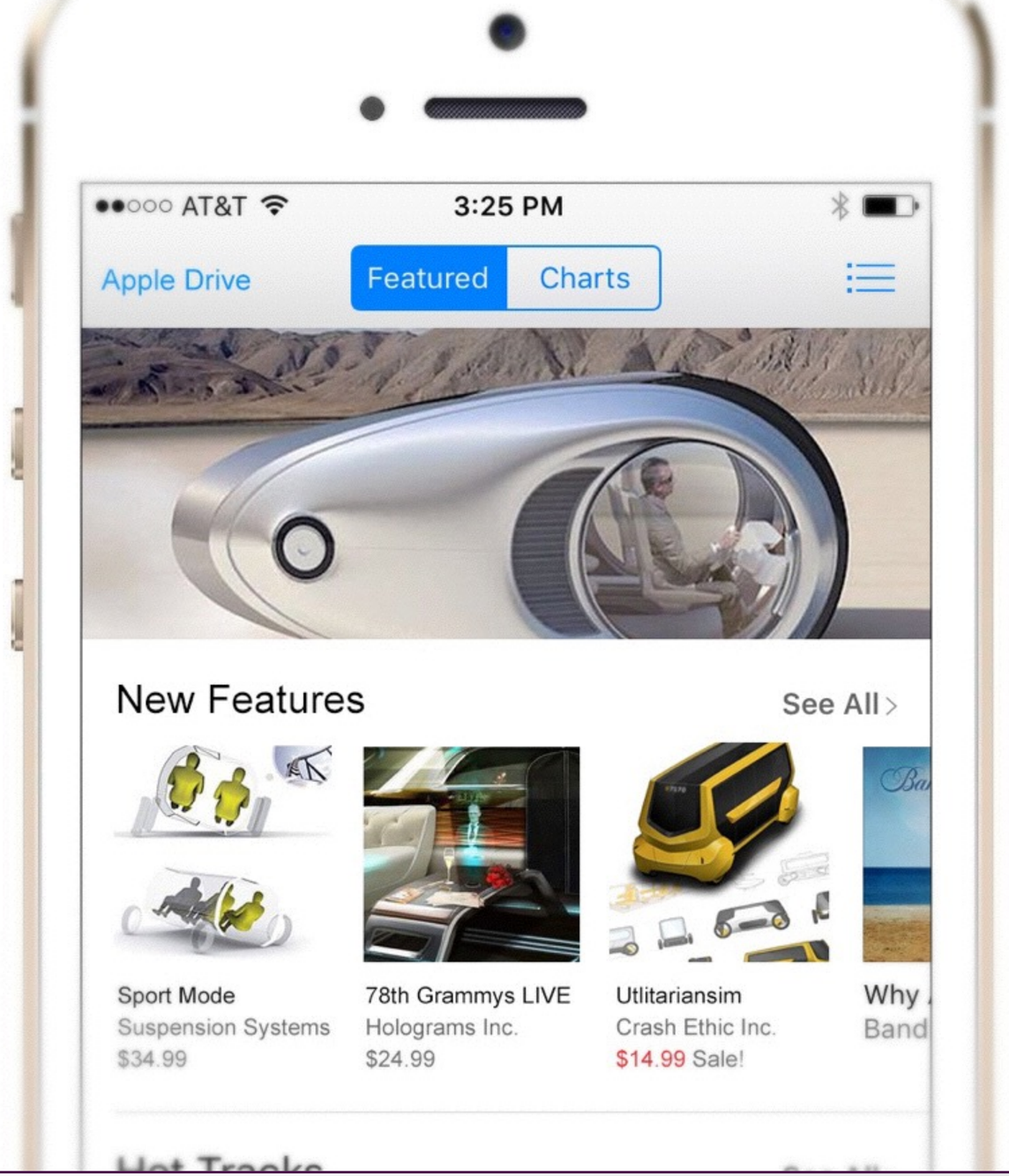
“Engineers using onboard video cameras to remotely monitor the results were alarmed by what they observed — a range of distracted-driving behavior that included falling asleep. The experiment convinced the engineers that it might not be possible to have a human driver quickly snap back to “situational awareness,” the reflexive response required for a person to handle a split-second crisis.”

2016, http://www.nytimes.com/2016/07/05/business/tesla-and-google-take-different-roads-to-self-driving-car.html

Consumers need to be involved in shaping the ethics and decision-making systems in self-driving cars.

"…transparency will be crucial as this technology develops: Consumers have a right to know how their cars will be programmed. What's less clear is how this will be achieved… The challenge as we move ahead is to ensure that consumers are made aware of this relationship in accessible and meaningful ways and are given appropriate avenues to be co-creators of the solutions—before self-driving cars are brought to market."

2016, Slate. http://www.slate.com/articles/technology/future_tense/2016/06/self_driving_cars_crash_optimization_algorithms_offer_an_ethical_quandary.html.



AVs are not designed to operate in less-than-perfect road conditions.

“In tests in urban and rural settings, automated vehicles have struggled with bad weather and difficult terrain. They need better mapping, more reliable sensors and improved software to better respond to changing road conditions and to anticipate and adjust to the unpredictable behavior of pedestrians, other vehicles and even the environment. Costs will need to come down as well before the technology can be widely adopted…”

2016, https://www.stratfor.com/analysis/slow-drive-toward-automated-vehicles

Ripple Effect

How will AVs threaten existing industries and professions?

In which industries would it be advantageous to adapt to AVs? Where might partnerships form?

Affluent Beverly Hills votes to replace public transportation with self-driving cars.

“Beverly Hills City Council has unanimously approved plans for a driverless-car programme that could replace the affluent Los Angeles neighbourhood's public transport system… Users would access the on-demand, point-to-point transportation within the city by requesting a ride using their smartphones. The plan also calls for partnerships with manufacturers such as Google and Tesla, which are both developing autonomous vehicles (AVs).”

2016, http://www.dezeen.com/2016/04/19/beverly-hills-replace-public-transport-driverless-cars-los-angeles/

Self-driving big rigs may be profitable before personal cars, but threaten truck drivers.

“It could make trucking more efficient, allowing, for example, a human driver to rest in the sleeper cabin while the truck takes the wheel… There is concern that if commercial trucking is completely automated, it would be economically devastating for small towns in America that thrive from supporting the long-haul trucking industry…”

2016, http://www.nytimes.com/2016/05/17/technology/want-to-buy-a-self-driving-car-trucks-may-come-first.html

Many port workers will lose their jobs if AVs are introduced into Southern California's Los Angeles and Long Beach port systems.

[At a] Beverly Hills conference, where technologists, hedge fund managers and other experts have talked at length about the potential perils of a world where technology continues to make human workers obsolete. Though self-driving cars and ports that need fewer trucks have benefits, they also represent huge numbers of job losses."

2016, http://www.govtech.com/fs/Transportation-Disruption-Hyperloop-and-Self-Driving-Cars-Discussed-in-Los-Angeles.html

Working vehicles and taxis will be autonomous long before personal vehicles.

"…Technological developments will probably outpace changes in public opinion and culture that are necessary to remove human drivers from the road… Countries with less entrenched driving cultures will… be more likely to smoothly transition to and reap many of the benefits of the technology… Niche sectors will be the first adopters."

"'In a confined area where you have control and no pedestrians, driverless is relatively easy… autonomy will come to mines first, where we are not restricted by legislation…'"

2016, https://www.stratfor.com/analysis/slow-drive-toward-automated-vehicles

2016, https://www.theguardian.com/technology/2016/may/26/volvo-driverless-mining-trucks-descent-machines

AVs can—and will—be hacked.

“BMW patched the 2.2 million cars that connect to its ConnectedDrive platform after hackers were able to unlock cars using their smartphones in a simple “man in the middle” attack. Hackers sent information from a server pretending to be BMW and essentially fooled the car into unlocking.”

2016, http://www.techworld.com/personal-tech/great-driverless-car-race-where-will-uk-place-3598209/

Tire manufacturer Goodyear looks ahead to a potential need for specialty AV tires.

“Goodyear claims that the multi-orientation tyres could contribute to passenger safety, by allowing the vehicle to move in all directions and avoid obstacles faster. Built-in sensors could also enable the tyre to detect and negotiate around patches of black ice. "By steadily reducing the driver interaction and intervention in self-driving vehicles, tyres will play an even more important role as the primary link to the road.”

2016, http://www.dezeen.com/2016/03/09/eagle-360-tyre-goodyear-driverless-vehicles-concept-car/

Partnership between tech developers and automakers.

“Google said it would expand its testing of autonomous vehicles by installing its technology in a fleet of minivans made by Fiat Chrysler. The deal is the most prominent example yet of a Silicon Valley company collaborating with a traditional automaker on self-driving vehicles...The deal is a major departure for Google, which previously had chosen to work mostly on its own… The experiences both companies gain will be fundamental to delivering automotive technology solutions that ultimately have far-reaching commercial benefits.”

Google to get Fiat Chrysler minivans for self driving tests, 2016.

The motor insurance industry will be destabilized if accidents decrease sharply.

"…industry figures recently warned that motor insurers could suffer, as a steep decline in accidents sends premiums tumbling."

2016, https://www.theguardian.com/business/2016/may/06/lyft-driverless-cars-uber-taxis-us-roads-chevrolet-bolt,

Infrastructure & Governance

How will AVs affect our roadways and transportation systems?

What will we need to build to accommodate them?

AV tech development will expand quickest in the place of least resistance.

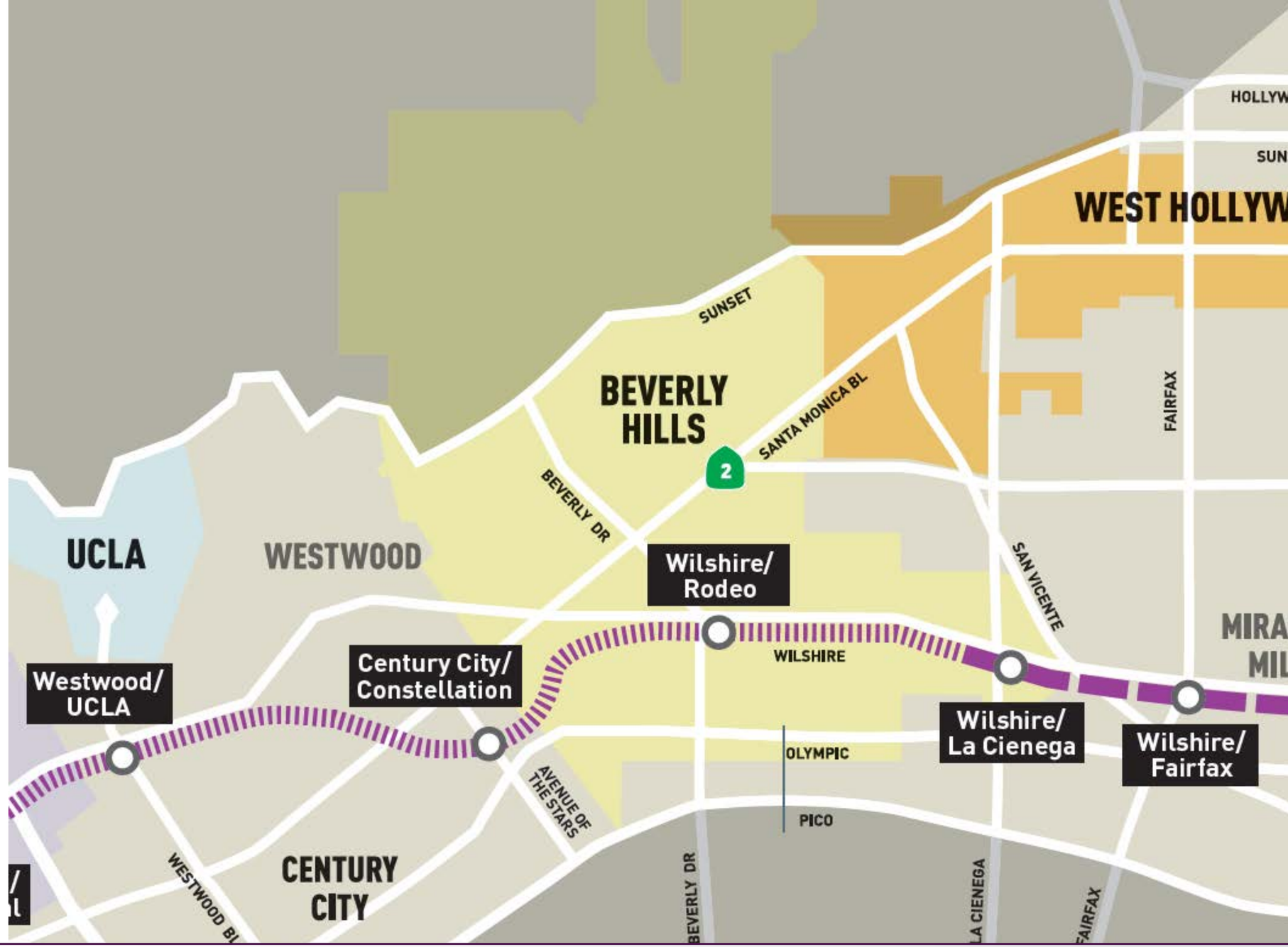
“A large-scale experiment of that sort is far more likely in China than the US or EU because the country ‘doesn’t necessarily have to have the debate to reach a conclusion’… [China] desperately needs autonomous cars to suit an expanding middle class with an appetite for autos… Wu Hu, about 200 miles west of Shanghai, aims to become the first city in the world to ban human drivers and go fully autonomous.”

2016, https://www.wired.com/2016/06/chinas-plan-first-country-self-driving-cars/

Hyperlocal automated vehicle taxi service would aims to connect locals to existing public transportation.

“Beverly Hills is only about 5.7 square miles, so our geography would seem to be well-suited to the individualized, convenient and efficient local public transportation envisioned in MASS. The city should take the lead in developing a hyperlocal transportation system that not only eventually will enable the Purple Line to realize its potential as a truly multidirectional transit system, but that also will serve the other transit needs of our residents locally.”

John Mirsch, 2015. http://labusinessjournal.com/news/2015/jun/01/taking-wheel-transit/\



Platooning reduces travel times by eliminating human reaction time.

“Grouping vehicles into platoons is a method of increasing the capacity of roads. An automated highway system is a proposed technology for doing this… Platoons decrease the distances between cars or trucks using electronic, and possibly mechanical, coupling. This capability would allow many cars or trucks to accelerate or brake simultaneously. This system also allows for a closer headway between vehicles by eliminating reacting distance needed for human reaction.”

2016. https://en.wikipedia.org/w/index.php?title=Platoon_(automobile)&oldid=713053477

Local AV systems will be shaped by regional needs and culture.

“European culture is generally more receptive to public transportation and will transition to automation in this area more smoothly. Compared with the rest of the world, however, Europe does not face the same risk from congestion and infrastructure problems…Urban congestion and pollution are already issues for China.... Beijing, unwilling to risk fomenting unnecessary unrest at this delicate time, will seek technological solutions, including automation, to help mitigate congestion and pollution…”

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2016, https://www.stratfor.com/analysis/slow-drive-toward-automated-vehicles

Traffic congestion caused by urban drivers looking for parking spaces may be alleviated by autonomous vehicle taxis.

“There’s plenty of research showing that a surprisingly large number of people are driving, trying to find a place to leave their car. A group called Transportation Alternatives studied the flow of cars around… Park Slope, and found that 64 percent of the local cars were searching for a place to park. It’s not just the inner core of cities either. Many cars in suburban downtowns and shopping-mall parking lots do the same thing.”

2015. http://www.theatlantic.com/technology/archive/2015/08/driverless-cars-robot-cabs-parking-traffic/400526/