Myths

By Thomas E. Curtis, CAPP

Parking garages will be obsolete by 2025 (2020 if you believe Uber CEO Travis Kalanick). Of course, the paperless office was hinted at in 1964 and predicted by 1975. Decades later, the use of office paper is only starting to level off, and we are still tens of years away from that visionary dream. So, will the driverless car eliminate the need for parking garages? Probably not and definitely not anytime soon.

In May 2013, the National Highway Traffic Safety Administration (NHTSA) released a policy on automated vehicle development that enumerated a classification system:

- No-Automation (Level 0): The driver is in complete control of the primary vehicle controls at all times.
- Function-Specific Automation (Level 1): Automation involves one or more specific control functions, such as electronic stability control or lane-keeping assist.
- Combined Function Automation (Level 2): At least two primary control functions work in unison, such as adaptive cruise control in combination with lane assist.
- Limited Self-Driving Automation (Level 3): The driver can cede full control of all safety-critical functions in certain traffic conditions. The driver is expected to be available for control with the system, providing sufficient time for transition.

Will autonomous vehicles really lead to the demise of the parking garage?

Busted

- Full Self-Driving Automation (Level 4): The vehicle performs all safety-critical functions for an entire trip. The driver provides navigation input but is not expected to be available for control at any time.

SAE International enumerates an alternative classification system that has five levels ranging from driver control to self-driving.

We have seen in the past decades, and will continue to see during the next several years, autonomous features added to standard vehicles. We are now seeing Level 2 features offered in higher-end vehicles: lane-departure warnings combined with adaptive cruise-control that speeds up or slows down cars to maintain their spacing in traffic. These are the features that move us toward the driverless car and are available from most automakers today. Some auto manufacturers claim Level 3 features will be available in the next five to seven years. Examples of these vehicles are being tested by auto manufacturers and technology firms on public streets today.

Self-Driving Prophecies

Kalanick and Elon Musk, co-founder of Tesla Motors, believe self-driving vehicles (Level 4) will be here in five or six years. Musk does, however, concede regulatory impediments will slow the transition to market saturation.

What else will slow the transition to the driverless car?

Technology

Currently, less-than-ideal weather conditions are a concern because technology doesn't allow the vehicle to navigate in snow or heavy rain. Then there is the recent software hack of the Jeep Cherokee. And, of course, there are ubiquitous computer glitches. The old "blue screen of death" might not be just a figure of speech anymore. However, most in the automotive industry believe these technology hurdles will be crossed in the near future.

There are those who have their doubts. Richard Ni and Jason Leung, in their paper "Safety and Liability of Autonomous Vehicle Technologies," state that Professor John Leonard of MIT has noted that the leap between Level 2 and Level 3 technology is quite extreme and that Google's test environments have not accounted for extreme but realistic conditions such as snow, glare from the sun, and difficult left-turn situations. He noted that little progress has been made and expressed doubts that Level 3 technology will be available as quickly as car manufacturers claim.

Cost

Cost of the technology will be a factor well into the future. According to industry experts, technology costs will increase to about $3,000 per vehicle in 2035, down from $7,000 to $10,000 in 2025. Top-of-the-line, 64-laser rotating Lidar systems retail for about $45,000, though prices will drop as people start buying. The Audi A7 that drove semi-autonomously from Silicon Valley to Las Vegas in early 2015 carried two LIDARs, two short-range Radars, four mid-range Radars, two long-range Radars, four top-view cameras, one 3-D camera, and four ultrasonic sensors.

Audi's current active safety package, which includes adaptive cruise control, emergency braking and blind-spot detection, is priced at $2,550. And it's not just the technology that is expensive but the manufacturing as well. As noted by the Victoria Transport Policy Institute, "Because system failures could be fatal to both vehicle occupants and other road users, all critical components will need to meet high manufacturing, installation, repair, testing, and maintenance standards, similar to aircraft components, and so will probably be relatively expensive."

Infrastructure

Infrastructure will be a major concern. Automakers say that a driverless vehicle needs to be connected to an external system that feeds it information about surrounding vehicles, traffic conditions, road work, and the like. Autonomous features such as lane-keeping assist technology needs to "see" the lane markings. It may not activate or work at 100 percent effectiveness when the markings are not sufficiently visible. Because the road cannot communicate with the vehicle and the vehicles can't yet communicate with each other, the current autonomous system depends on being able to see objects and the lines on the road. This makes it good for superhighways but not so much on smaller roads.

The U.S. Department of Transportation (DOT) has encouraged the development of roadway sensors. It also funds research for the Connected Vehicle Program. However, Anthony Foxx, U.S. secretary of transportation, in his introduction to "Beyond Traffic 2045," notes, "The federal government alone cannot achieve resolution of all of the issues and concerns the future will bring." A few states—notably California, Nevada, Iowa, Michigan, and Florida—do appear to be focused and invested in driverless vehicle technology and infrastructure. This may cause development of incompatible infrastructure between states.

Regulation

Regulation will be problematic. NHTSA has shown little interest in promulgating regulations. To this point, regulations have primarily been handled at the state level. Bryant Walker Smith, professor at the University Of South Carolina School of Law, states, "Typically, federal mandates for new technology arrive only after it dominates the market." Examples of this include seat belts, air bags and backup cameras. What happens when the task is delegated to the states? Inconsistent state regulations pose the risk of 50 states with 50 different regulations. The Audi test car was allowed to test in California and Nevada, but the states have different regulations and license plates. The test car was stopped for a license plate change when it crossed state lines.

Liability

If we believe regulation will be problematic where does that leave liability? How do we insure a vehicle not con-

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trolled by a person? Who is responsible in an accident? Is it the owner, the driver, the service provider (Uber, Lyft), the infrastructure provider (DOT), the manufacturer?

The RAND Corporation in its report "Autonomous Vehicle Technology," enumerated several options. The recommendation is that "aggressive intervention with respect to regulation or liability is premature."

Other Vehicles

Then there is the problem of the more than 250 million cars and trucks already on the road in the U.S. These cars aren't going away anytime soon. The average vehicle age is estimated to be 11.7 years by 2019. This is generally because of higher quality. The Oak Ridge National Laboratory recently projected car and truck survivability rate at more than 50 percent after 13 years. Even if we assume that the driverless car is available and working by 2020, there will still be more than 100 million cars on the road that are driver-operated in 2035. Musk notes that even if driverless cars were available tomorrow, it would take 20 years to replace the entire fleet of vehicles on the road.

People

Last but certainly not least is the consumer: people. Consider that a lot of us own cars because we like cars. We like driving cars. Cars are very personal things. I don't see us giving up cars for a Kalanick vision of an on-call Uber fleet anytime soon.

Even if we keep personal vehicles, many have concerns about Big Brother. The electronic data recorders (EDRs) in vehicles today record a tremendous amount of information about us already. How safe is that information in a self-driving connected vehicle? Jim Farley, Ford Motor Company's top sales executive, told a panel at the 2014 Consumer Electronics Show, "We know everyone who breaks the law. We know when you're doing it. We have GPS in your car, so we know what you're doing."

What It All Means

How does all this affect parking and the parking garage? Well, it appears doubtful that parking lots and garages will become obsolete within the next few decades, but they will change. They are already changing with cashierless and gateless implementations. And there are an increasing number of robotic garages.

One thing parking professionals should note is that there is a difference between autonomous cars and driverless cars. In July 2015, Business Insider Intelligence predicted that "Fully autonomous cars are further divided into user-operated and driverless vehicles. Because of regulatory and insurance questions, user-operated fully autonomous cars will come to market within the next five years, while driverless cars will remain a long ways off."

Steven Shladover, transportation researcher at the University of California, Berkeley, insists that Level 5 vehicles—robocars that require no human input—"are not on the horizon." Autonomous cars with drivers still require parking, and people generally like to park close to their destinations. In the near future, we will continue to see the incremental changes being made in our industry. Even IHS automotive, which aggressively predicts self-driving cars by 2025, forecasts that only a very small percentage will be driverless. And even those may be severely restricted to driverless zones.

Sometime in the distant future, there may be fewer cars. There may be fewer parking spaces. Currently it is easy to envision a distant future where there will be small robotic garages strategically placed outside of the city center and in suburban hubs—places where drivers send and summon their cars or driverless vehicles go to charge their batteries. But for the next few decades, it's very likely that the only vehicles able to take us from home to work while we focus attention on our electronic gadgets will still be taxis and limos.

There is no doubt that change is coming, but it will most likely be evolution, not revolution. Although the change may be slow, now is the time for stakeholders to come together. Consideration should be given to both design and operation of the garage of the future. There are many changes coming that the young professionals in parking and other stakeholders should consider now.

So, how does the parking industry adapt? What will the parking garage of 2060 really look like? Will it be a completely automated, robotic garage with charging ports? Will it be more efficient? Will current garages be converted to the SCADPad, a 16 × 8 foot dwelling designed for a single occupant fitted with a bed, kitchenette, and bathroom? All are considerations for another article.

As a side note, this article was created and transmitted electronically. No paper was used.

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