What road lies ahead for driverless cars?

By Aaron M. Cargain, Esq., and Tad A. Devlin, Esq.
Kaufman Dolowich & Voluck

The transition from manually operated to autonomously (self-operating) driving vehicles appears all but certain, and it is expected to occur in the relatively near future. Industry experts believe vehicles will become fully self-driving — requiring no human intervention — within the next 15 to 25 years. The Insurance Institute for Highway Safety anticipates there will be 3.5 million self-driving cars on the road by 2025, and 4.5 million by 2030.[1]

Several major automobile manufacturers have implemented autonomous driving features such as front crash prevention technology, resulting in marked reductions in accidents when compared with similar vehicles without the technology. Other key players in the industry, including Google, seek to roll out self-operating vehicles within the next five years.

The transition has not been seamless, however, and several accidents caused by self-driving vehicles have been reported.

The inclusion of self-driving cars on public roads and highways has created the need for legislation and regulatory oversight. Currently, seven states and the District of Columbia have passed self-driving-vehicle legislation.

Despite the possibility that streets and highways will at least be shared by self-driving cars, if not dominated by them, insurers seem to be in no rush to augment their business models in the short term.

Nevertheless, the industry generally acknowledges the switch to self-driving vehicles will likely result in fewer accidents and claims, lower premiums, and, accordingly, a shift in its expected customer base.

Further, insurance executives believe Google, which has the bandwidth to amass, analyze and interpret data, will likely self-insure its fleet of autonomous vehicles and underwrite insurance policies for other self-driving vehicles and the technology installed in them.

Below is an overview of key issues concerning the implementation and advancement of self-driving technology, regulatory developments affecting the widespread adoption of autonomous vehicles, and the expected impact self-driving cars will have on the insurance industry.

adaptive cruise control systems in certain vehicles for the last 15 years. By 2018, Cadillac is expected to roll out Super Cruise, a GPS-oriented intelligent navigation technology that predicts freeway entries and exits and aids adaptive cruise control technology in assessing freeway conditions and making intelligent decisions.

Google is currently testing fully self-driving vehicles, which have logged more than 1.5 million miles since the company launched its Self-Driving Car Project. Its vehicles are currently being tested in Arizona, California, Texas and Washington. The test vehicles include both modified Lexus SUVs and new prototype vehicles that are designed to be fully self-driving. Notably, there are "test drivers" (licensed passengers) aboard all Google vehicles.[2]

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DEVELOPMENTS AND ISSUES

Several manufacturers have incorporated, and are continuing to develop, technology anticipated to reduce the number of accidents while allowing for the monetization of self-driving features and the ability to test them in real conditions.

For instance, Audi, Volkswagen, BMW, Toyota and Subaru have installed laser-based

According to Google, its vehicles implement both map and sensor information technology to determine vehicle location down to the car's lane of travel. The sensors assist in detecting objects and classify them based on size, shape and movement pattern.

Google indicates the vehicle's sensors can differentiate between a pedestrian and a bicyclist, and anticipate what the object will do next (e.g., whether the pedestrian will cross the street or the bicyclist will ride by). Based on the information gathered, Google's self-driving cars will then choose a safe speed and trajectory.

In late August, Uber began allowing its Pittsburgh customers to summon self-driving cars from their phones. Human drivers will supervise Uber's current self-driving vehicle fleet for the time being, but the supervision may be short-lived.

Uber Chief Executive Travis Kalanick said in a blog post that the company is "accelerating

Aaron M. Cargain (L) and **Tad A. Devlin** (R) are attorneys in the San Francisco office of **Kaufman Dolowich & Voluck** where their practices focus on insurance coverage and professional liability.

its plan to replace its 1 million human drivers with robots as quickly as possible." Uber has also acquired Otto, a driverless big-rig truck startup.

Self-driving vehicle systems, however, are not without flaws. A man was killed in Florida in May while operating his Tesla Model S sedan in autopilot mode. Neither the driver nor the vehicle engaged the brakes before the vehicle hit a trailer at about 65 mph.

In August, Tesla removed a Chinese term for "self-driving" from its website after a driver in Beijing who crashed in "autopilot" mode complained that Tesla overplayed the function's capability and misled buyers. The vehicle crashed after it failed to avoid another vehicle parked on the left side but partially in the roadway.

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One of Google's Lexus self-driving vehicles was recently found to be at fault for an accident when it crashed into a bus. The vehicle attempted to make a turn from the center lane to avoid sandbags in the turning lane. The vehicle and its test driver incorrectly assumed that a bus approaching from behind would slow or stop to let the vehicle through. The Lexus collided with the bus at low speed, damaging its front fender, wheel and sensor.

There are also ethical considerations that appear to be, for the most part, unaddressed by the development of self-driving technology. For example, one question that arises is whether people are willing to purchase vehicles that might risk injuring the driver to protect a pedestrian.

In one study, researchers found people want self-driving cars to be programmed to minimize casualties while on the road. But when asked about what kind of vehicle they might actually purchase, they chose a car that would protect the driver first.[3]

While there have certainly been developments in the self-driving vehicle industry, it appears there is still work to be done and issues to be addressed before self-driving cars are widely implemented and accepted.

REGULATORY DEVELOPMENTS

Prior to 2011, no existing state or federal legislation prohibited self-driving vehicles. Sixteen states introduced autonomous-vehicle legislation in 2015, up from 12 states in 2014, nine states and the District of Columbia in 2013, and six states in 2012.

This year, the National Highway Traffic Safety Administration released a new policy updating its 2013 preliminary policy statement on autonomous vehicles. It also announced a 10-year, $3.9 billion investment in advancing autonomous vehicle technology, including large deployment pilots in communities around the country.

In 2011, Nevada was the first state to authorize the operation of autonomous vehicles. Since then, seven states and the District of Columbia have passed legislation related to autonomous vehicles. Nevada and California were at the forefront of approving self-driving-car legislation and are involved in the Google project.

A Nevada Senate bill, enacted June 17, 2011, authorizes the operation of autonomous vehicles and a driver's license endorsement for operators of autonomous vehicles. It defines what an autonomous vehicle is and directs state Department of Motor Vehicles to adopt rules for license endorsement and for operation, including insurance, safety standards and testing.

A Nevada Assembly bill, enacted contemporaneously with the Senate bill, prohibits the use of cellphones or other handheld wireless communication devices while driving in certain circumstances. It also makes it a crime to text or read data on a cellular phone while driving. The Assembly bill permits use of such devices for people in a legally operating autonomous vehicle. These people are deemed not to be operating a motor vehicle for the purposes of this law.[4]

Nevada's most current legislation requires autonomous vehicles tested on its highways to meet certain conditions relating to a human operator. The bill requires proof of insurance and prohibits autonomous vehicles from being registered in the state, or tested or operated on a highway within the state, unless they meet certain conditions.

The bill also provides that manufacturers of a vehicle that has been converted to be an autonomous vehicle by a third party are immune from liability for certain injuries.[5]

California's initial autonomous driving legislation, enacted Sept. 25, 2012, requires the state Highway Patrol to adopt safety standards and performance requirements to ensure the safe operation and testing of autonomous vehicles, as defined, on the public roads. The bill permits autonomous vehicles to be operated or tested on California public roads.[6]

California currently has four autonomous vehicle bills that have passed Assembly or Senate review. One Assembly bill authorizes a county transportation authority to conduct a pilot project for testing autonomous vehicles that are not equipped with a steering wheel, a brake pedal, an accelerator or an operator inside the vehicle, if the testing is conducted at specified locations and the vehicle operates at specified speeds.[7]

Numerous states have rejected self-driving-car legislation. So far this year, bills failed in Alabama, Georgia, Hawaii, Maryland, Minnesota, Tennessee, Virginia and Washington. In 2015 bills failed in Connecticut, Idaho, Mississippi, Missouri, Oregon and Texas. No new bills have been introduced in those states.

The number of states that have failed to pass autonomous vehicle legislation is almost double that of the states that have done so. As such, it appears the integration of self-driving vehicles at the interstate level may be far off.

EXPECTED IMPACT ON THE INSURANCE INDUSTRY

According to Google's Self-Driving Car Project, 94 percent of automobile accidents in the United States involve human error. A study by the Insurance Institute for Highway Safety conducted in 2015 found that improvements in design and safety technology have led to a lower fatality rate in accidents involving late-model cars. The likelihood of a driver dying in a crash of a late-model vehicle, defined in the study as a 2011 model, fell by more than a third over three years, and nine car models had zero fatalities per million registered vehicles.[8]

Another recent study and survey addressing the expected impact of self-driving vehicles on the insurance industry suggests that accident frequency could drop by 80 percent by 2040.[9]

The effects on the insurance industry of the switch to self-driving vehicles could include

a continual decline in the frequency of accidents, which will drive a drop in industry loss costs and subsequently premium.

Accidents are expected to fall substantially as the ratio of self-driving to manually operated vehicles begins to change. It is expected that the fall in premium will be driven not only by the drop in loss costs but also by consumer demand.

Driving records and dashboard activity, which will be captured in a "black box," will add to the amount of data being generated. Data management, storage and security will all be factors for manufacturers and insurers to consider in their insurance calculus.

Insurance executives expect the insurance landscape will change as well. Specifically, Google is expected to play an important role

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The study predicts that within 25 years, the personal automobile insurance sector could shrink to less than 40 percent of its current size. Currently the personal automobile sector accounts for almost $125 billion in loss costs. By 2040, that number could drop to $50 billion.[10]

The mix of insurance will likely change as commercial and product liability lines expand. The amount of automobile insurance individuals purchase is expected to decrease as the use of self-driving vehicles increases. Commercial lines will likely make up a larger share of auto policies purchased, as the marketplace shifts to car-sharing and mobility on demand.

As the decision-making process switches from the driver to the vehicle, the potential liability of software developers and manufacturers could increase. Further, it is expected that losses covered by product liability policies will likely increase, in part because the technology installed in driverless vehicles will also need to be insured.

The insurance industry and manufacturers of autonomous vehicles will also have to address data privacy and management issues. Self-driving vehicles generate significant data, which will likely grow substantially as the universe of information becomes denser among vehicles, infrastructure and other sources.

in the insurance industry, as many believe it will control driving data and underwrite insurance policies. Some insurance executives believe Google will become an insurance carrier.[11]

Despite what appears to be overwhelming evidence that self-driving vehicles are a thing of the relatively near future, insurers have no intention of changing their business models in the short term.

In a survey, 65 percent of insurers indicated that their preparation for the forthcoming change consisted of external and internal conversations, 32 percent have taken no action, and 22 percent represented they have developed a strategic plan, set up a formal task force or developed an operational plan.

Notably, multiple responses to the survey were allowed, and 61 percent of the respondents are currently making no strategic investments in their businesses as it relates to autonomous vehicles, while 97 percent believe the effects of self-driving cars will not have an impact on their business within the next five years.

However, the majority of the executives polled — about 84 percent — expect self-driving cars to have a significant impact on their business when the time horizon is increased to a period of greater than 11 years.[12]

CONCLUSION

The development of self-driving vehicles may occur faster than we expect. Technology companies, and to a lesser extent automobile

manufacturers, are aggressively pursuing the implementation of autonomous vehicles, and they will likely reap the benefits of being at the forefront of this rapidly developing industry.

The technology developed to date, while impressive, is not without its flaws, and state and federal governments should implement policies to address technical and ethical dilemmas associated with the new technology.

Finally, while insurers do not expect significant changes in the industry landscape in the short term, it appears most acknowledge a dramatic shift in the type of policies that will be written, as well as who will be writing them. WJ

NOTES

[1]   Adrian Lund, Ins. Inst. for Highway Safety, Highway Loss Data Inst., Advancing vehicle safety at the Insurance Institute for Highway Safety in 2016 (and beyond) (2016).

[2]   Google Self-Driving Car Project, https://www.google.com/selfdrivingcar.

[3]   Amy Dockser Marcus, *With Driverless Cars, a Safety Dilemma Arises,* Wall St. J. (June 23, 2016), http://www.wsj.com/articles/with-driverless-cars-buyers-would-choose-own-safety-over-the-masses-1466704803.

[4]   Nat'l Conference of State Legislatures, Autonomous/Self-Driving Vehicles Legislation (July 1, 2016), http://www.ncsl.org/research/transportation/autonomous-vehicles-legislation.aspx

[5]   *Id.*

[6]   *Id.*

[7]   *Id.*

[8]   Ins. Info. Inst., Self-Driving Cars and Insurance (July 2016), http://www.iii.org/issue-update/self-driving-cars-and-insurance

[9]   Jerry Albright, Alex Bell, Joe Schneider & Chris Nyce, Automobile Insurance in the era of autonomous vehicles (KPMG 2015).

[10]   *Id.*

[11]   *Id.*

[12]   *Id.*