Facing Revolutionary Changes

Driverless Vehicles and the Effect on Insurance

By Julia A. Molander and Yevgenia A. Wiener

Robotic vehicles will require a new liability paradigm.

Remember *The Jetsons*? The Hanna-Barbera cartoon of the 1960s pictured a futuristic world beyond our imaginings. The family—Dad George, Mom Jane, Teenager Judy, Boy Elroy, and Dog Astro—lived in Googie-style Orbit City. George commuted to his job at Spacely Sprockets in a robot car that traveled through the air, deposited him at work, and parked itself. Wow. If only those cars were real.

Fast-forward 50 years: Driverless cars are no longer a dream. The first major autonomous feature in an automobile was introduced in the 1970s, in the form of cruise control. Since then, many more computerized functions have been added to cars, making them safer than ever before. Anti-lock brakes, electronic stability control (ESC), automated braking, side sensors that detect proximity to neighboring vehicles, and rearview cameras are among many of the new functions that have added to the safety of cars.

The advent of fully autonomous vehicles will dramatically change the insurance industry. KPMG's research report on the effect of autonomous vehicles on the insurance industry estimates that autonomous vehicles could reduce crashes by 80 percent by 2040, dramatically reducing the frequency of insurance claims. *See* kpmg.com, "Marketplace of Change: Automobile Insurance in the Era of Autonomous Vehicles." *See also* "KPMG: Driverless Cars Could Shrink U.S. Personal Auto Insurance Sector by 60 percent," *Claims Journal*, October 23, 2015.

In addition to a reduction in claims, the lack of drivers will mean that premiums from personal auto policies will drastically fall because those policies will no longer be needed or required. Product liability coverage and cyber-policies may increase in the commercial sector. If manufacturers lease their cars instead of selling them, fleet policy sales may increase. All in all, though, the rise in the use of robotic cars likely will result in corresponding shrinking revenues in the insurance sector.

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What Are Autonomous Vehicles?

Surprisingly, or perhaps not, it was a computer-industry company rather than a car manufacturer that gave us our first glimpse of a commercially viable, fully autonomous vehicle or "AV." Google began by altering Toyota Priuses and Lexus SUVs to incorporate driverless features. *See* Will Oremus, "The Big Problem With Self-Driving Cars," *Slate*, September 8, 2015. Recently Google introduced its own custom-built, bubble-shaped, fully driverless vehicle. *See* Will Oremus, "Google's Fully Driverless Cars Are Ready for the Road. Well, Some Roads," *Slate*, May 15, 2015; Gabe Nelson, "Google in Talks with OEMs, Suppliers to Build Self-driving Cars," *Automotive News*, January 14, 2015.

Google's driverless technology includes various sensors such as lasers, radars, and cameras to detect objects in all directions and computers designed specifically for self-driving. *See* Google Self-Driving Car Project, https://www.google.com/selfdrivingcar/how/. *See also* Ryan Whitwam, "How Google's Self-driving Cars Detect and Avoid Obstacles," *ExtremeTech*, September 8, 2014.

Other companies soon introduced their own vehicles. In October 2014, Tesla unveiled features that will allow its electric vehicles to self-park and avoid dangerous situations. Nichola Groom, "Tesla unveils all-wheel drive Model S, 'autopilot' features," *Reuters*, October 10, 2014. Tesla has announced that the Model S vehicles, already on the market, will have upgrades that include long-range radar, image-recognition so that the vehicle can detect pedestrians and stop signs, and a 360-degree ultrasonic sonar. *Id*. The car can park itself in a garage, turn on the air-conditioning in advance of a trip, and recognize obstacles on a road. *Id*. Tesla is reported to be near to introducing a fully automated vehicle. *See* Kirsten Korosec, "Elon Musk Says Tesla Vehicles Will Drive Themselves in Two Years," *Fortune*, December 21, 2015.

Volvo has announced that it already has a "production-ready" autonomous system, which it calls "IntelliSafe Autopilot." *See* Alexander Stoklosa, "Volvo Has a "Production-Viable" Autonomous Car, Will Put It on the Road by 2017," *Car and Driver*, February 19, 2015. Volvo's website states: "Today, we are close to creating cars capable of truly autonomous driving that will revolutionise [sic] the way you travel and change society for the better." *See* volvocars.com, "This Is Autopilot." To keep true to this promise, Volvo announced that it will be putting 100 fully autonomous vehicles in the hands of real customers as part of the "Drive Me" pilot program by 2017. *See* Stoklosa, *supra*. The trial will take place on 30 miles of roads in the company's home city of Goteborg (Gothenburg), Sweden, in collaboration with Swedish authorities. This will be the world's first, large-scale autonomous trial.

Toyota recently unveiled plans to have vehicles by 2020 with "automated driving" systems that would not eliminate the need for the driver. *See* Yoko Kobuta, "Toyota Aims to Make Self-Driving Cars by 2020," *Wall Street Journal*, October 6, 2015. Uber is reportedly working on its own driverless car technology in a lab staffed with 50 scientists and engineers. *See* Josh Constine, "Uber Gives $5.5M to Make Amends for Stealing Carnegie Mellon's Self-Driving Car Scientists," *TechCrunch*, September 9, 2015. Google was the largest investor in Uber's latest round of financing, reportedly investing $258 million in the ridesharing company. *See* Alex Wilhelm, "Google Ventures Puts $258M Into Uber, Its Largest Deal Ever," *TechCrunch*, August 22, 2013.

In September 2015, BMW suggested that it had interest in owning fleets of autonomous vehicles for customers interested in having premium vehicles available instantaneously. *See* Edward Taylor and Irene Preisinger, "BMW Eyes New Business Opportunities with Autonomous Cars," *Reuters*, September 15, 2015.

Apple has not made any official announcements but media reports indicate that there is evidence that Apple is developing an electric vehicle that could eventually be driverless, code name "Titan." *See* Adrienne LaFrance, "Why Would Apple Make an Electric Car, Not a Driverless One?," *Atlantic*, September 22, 2015.

Recently, Lyft and GM announced that they would collaborate on driverless vehicles in the on-demand ridesharing space. *See* "Lyft, GM Teaming Up to Create Fleet of Driverless Cars," npr.org (updated January 11, 2016).

Both the current Secretary of Transportation, Anthony Foxx, and his head of the National Highway Traffic Safety Administration (NHTSA), Mark Rosekind, are very enthusiastic about autonomous vehicles. In 2013, NHTSA issued a "Preliminary Statement of Policy Concerning Automated Vehicles" aimed at "providing guidance to states permitting testing of emerging vehicle technology." (Available through http://www.nhtsa.gov/.)

NHTSA defines "automated vehicles" as "those in which at least some aspects of a safety-critical control function…occur without direct driver input." To assist regulators, NHTSA has devised definitions of levels of automation in motor vehicles, summarized as follows:

- Level 0: The human driver is in complete control of all functions of the car.
- Level 1: One function is automated.
- Level 2: More than one function is automated at the same time, but the driver must remain constantly attentive.
- Level 3: The driving functions are sufficiently automated so that the driver can safely engage in other activities.
- Level 4: The car can drive itself without a human driver.

More recently, the U.S. Department of Transportation (DOT) announced, during the 2016 North American International Auto Show, that it could spend as much as $4 billion over 10 years on driverless cars. *See* Mike Spector and Mike Ramsey, "U.S. Proposes Spending $4 Billion to Encourage Driverless Cars," *Wall Street Journal*, January 14, 2016.

Mr. Foxx announced that the DOT will issue guidelines in the next six months on the functions that autonomous vehicles must be able to perform to be considered

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safe. *See* Bill Vlasic, "U.S. Proposes Spending $4 Billion on Self-Driving Cars," *New York Times*, January 14, 2016.

Who Will Use Driverless Cars?

Who will use driverless cars? The short answer is "everyone." The Boston Consulting Group predicts that autonomous vehicles will represent 25 percent of the worldwide market by 2035. *See* BGCPerspectives.com, "Revolution in the Driver's Seat: The Road to Autonomous Vehicles," April 2015.

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In England they are forecasting a much quicker takeover of AVs, by 2020. That seems a bit optimistic, but the adoption of AV technology in most new vehicles in Western markets may pave the way for increasingly automated vehicles in a very short time.

Autonomous vehicles are a boon for the elderly and the disabled. No longer will adult children be required to have "the discussion with grandpa" about taking the keys away. If a vehicle is autonomous, seniors driving one won't have to worry about diminished eyesight or reflexes. Such a car will back itself out of the driveway without incident, take the passenger to the grocery store, come when summoned from the parking area (which can be much smaller), and take the passenger back home without incident. The disabled, particularly the blind, look forward to the availability of AVs to take them to appointments or even to parties without the hassle of public transportation.

Millennials are also very enthusiastic about AVs. They use Uber and Lyft routinely and do not feel the need to own a car. They did not have free driver education in schools; they reluctantly obtained drivers' licenses, if at all, after private lessons or parental tutoring in parking lots. The concept of not having to drive is welcome to them. With autonomous vehicles, they can put in headphones, read their e-mails, chat on phones, watch videos, and—voilà!—arrive at their destinations. The potential for driverless carpooling, through phone apps, is very appealing.

Environmentalists also, in all likelihood, will embrace AVs because the cars are all-electric or hybrids and therefore should reduce emissions. Carpooling also may help to limit pollution. The AVs can travel closer to each other than human-operated cars, effectively "drafting" each other on the highway. This has the beneficial side effect of reducing hydro-carbons.

We predict that so-called soccer moms will love AVs. The logistical nightmare of transporting kids to school, music lessons, and sports practices may be solved if a responsible adult can summon a vehicle, pack it with passengers, and send it on its way, perhaps even remotely. If a child is sick, a robotic car may be able to travel to school, pick up the child, and bring him or her to a doctor's office without taking mom or dad away from other work.

Control freaks, we believe, will not be fans. An NHTSA Level 4-autonomous vehicle leaves nothing for the person in charge to do. The joys of tailgating or dashing between cars at high rates of speed no longer will be possible; the car will not disobey speed limits and traffic warnings.

Will Self-Driving Cars Reduce Accidents?

Robotic vehicles certainly will save lives and reduce serious injury. Already, the incorporation of autonomous features in automobiles has helped cut the highway fatality rate in half since its highest point in the 1970s. Cruise control kept cars at a more consistent and predictable speed and therefore reduced accidents. More modern inventions, such as anti-lock braking and stability control have reduced the number of vehicles involved in spinouts. Airbags, of the non-exploding variety, automatically cushion humans from harm. With increased robotic functions, the reduction of property damage and personal injury in non-fatal accidents could even become more dramatic. One study by the Insurance Institute for Highway Safety proposed that automatic front collision-avoidance braking could reduce rear-end crashes by 40 percent or 700,000 a year if this feature were in all cars. *See* Insurance Institute for Highway Safety Highway Loss Data Institute, "Crashes Avoided," Status Report, Vol. 51, No. 1, January 28, 2016. The biggest challenge for safety will be at the intersection of humans and computers. Elon Musk of Tesla has been quoted as saying that in the future human drivers may be outlawed because they are too dangerous. *See* Peter Holly, "Elon Musk: Human-driven cars may be outlawed because they're 'too dangerous," *Washington Post*, March 18, 2015. If humans can override vehicles, they may save lives when a computer glitch causes a vehicle to go astray. More likely, though, the human response will be an overreaction that increases the potential risk. Older vehicles sharing the road with AVs could also create potentially dangerous situations. The unpredictability of driven cars may exceed the ability of a driverless car to anticipate them. And in some situations, the technology will be no better than the old-fashioned mechanics of an old car. If there is a pileup of cars due to fog or a blizzard, the AV will be no safer than other vehicles caught in the jam.

Another issue will be the possibility of systemic vehicle defects. The Takata airbag recall provides us with an example. Ten people have died and about 100 have been injured, allegedly as a result of airbags that exploded due to defective inflators. More than 25 million airbags have been recalled for replacement of the inflators. These airbags were placed in a host of different vehicles, made by a number of different car manufacturers. Early on, the deaths and injuries were attributed to the accidents themselves. Only later did it become known that the inflators may have caused the injuries. If there is a system-wide problem in AVs—such as sudden loss of power—this may increase the risk associated with the AVs compared to more traditional vehicles.

Sabotage and cyber-activity also pose possible threats unique to AVs. If code imbedded in the vehicles controls is maliciously manipulated, then we could face a "carmeggedon," during which all AVs from a particular manufacturer break down at once on a roadway such as the I-405 free-

way in Los Angeles. And because AVs are completely electronic, there is a risk that individual vehicles can be hacked, potentially jeopardizing the occupants of such a car.

Yet even taking all of these potential risks into account, the built-in safety features of autonomous vehicles seem to outweigh the potential risks.

Will Regulators Put the Brakes on AVs?

Some state motor vehicle departments, including California, have addressed licensing for fully autonomous vehicles. Under a legislative mandate, California adopted regulations for testing driverless vehicles that became effective in September 2015. These regulations identify the requirements that manufacturers must meet to test autonomous vehicles on the roadways. Eleven manufacturers currently hold permits to test AVs.

Regulations that are pending in California address the use of AVs by the public after testing. The current edition of the proposed regulations defines "autonomous vehicle" to include the following:

> any vehicle equipped with technology that has the capability of operating or driving the vehicle without the active physical control or monitoring of a natural person, whether or not the technology is engaged, excluding vehicles equipped with one or more systems that enhance safety or provide driver assistance but are not capable of driving or operating the vehicle without the active physical control or monitoring of a natural person.

California Code of Regulations, Title 13, Article 3.7 §227.02(d). The "operator" of the AV is the "person who possesses the proper class of license for the type of vehicle being operated, has direct control over the operation of an autonomous vehicle, and has engaged the autonomous technology while sitting in the driver seat of the vehicle." California Code of Regulations, Title 13, Article 3.7 §227.02(p).

The California regulations will grant permits to AV manufacturers to deploy their vehicles on the California public roads as long as they weigh less than 10,000 pounds (not trucks) and require an operator in the vehicle. The vehicles will have to be insured or self-insured by the manufacturers against bodily injury and property damage and meet various other requirements. California Code of Regulations, Title 13, Article 3.7 §227.54-.56. The AVs will have to undergo third-party testing for safety. California Code of Regulations, Title 13, Article 3.7 §227.58. Safety defects must be reported to the Department of Motor Vehicles (DMV) using the same guidelines as the federal regulations. California Code of Regulations, Title 13, Article 3.7 §227.66. If an AV collects information that it is not necessary to collect for the safe operation of the vehicle, (*e.g.*, mileage or destinations), the manufacturer must have the written approval of the operator. California Code of Regulations, Title 13, Article 3.7 §227.76. The operator of the AV must have a driver's license and a special certificate of training in the AV operation, and the operator "must be capable of taking over immediate control of the vehicle in the event of an autonomous technology failure or other emergency." California Code of Regulations, Title 13, Article 3.7 §227.84(c).

The main concern of the California DMV is safety. Until the regulators are convinced that the AVs are safe enough to operate independently, they will require features that enable operators to take control of a malfunctioning AV. These concerns are not imaginary. There have been reports of wayward AVs that inexplicably veer onto exit ramps independently, without the drivers directing the AVs to do so. Extreme weather conditions, such as snow, also pose problems for AVs. The sensors of self-driving vehicles may not be able to "see" in blizzards or driving rain. A number of "bugs" in the computer programming have been discovered. The California DMV wants to make sure that an operator can take over in the event of an emergency.

However, the "handoff" between the computer and the human can be fraught with danger. Drivers may be distracted by a book, a phone, an e-mail message, or a video at just the exact moment that the human's full attention is needed. The split second required for reorientation may be too long. The California regulations are vague about the circumstances in which an operator must take over the handling of a vehicle. If an operator jumps in too quickly or not fast enough to prevent an accident, litigation about responsibility will inevitably occur. This is why there has been strong resistance from the AV manufacturers against the California regulation requiring brakes and a steering wheel in AVs. The manufacturers are convinced that the "handoff" requirement will cause more accidents than it prevents.

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What Liability Do Robotic Cars Face?

Robotic vehicles will require a new liability paradigm. Driver negligence will be largely absent except when the human is forced to take over control. In the rare situations requiring driver intervention, we can anticipate accusations of riders not reacting quickly enough or accurately enough when the car is involved in an accident. Individual owners may also face liability for failing to maintain and upgrade the computer components in their vehicles. If an operating system is no longer supported by the manufacturer, the owner may be at fault for using the vehicle at all.

With this switch from driver-centered to auto-centered liability, the most likely targets for liability in an AV-caused accident are manufacturers and component installers. Driverless vehicles are a mixture of highly sophisticated mechanical and computerized parts. The more complicated the parts, the more likely that Murphy's law will be invoked: "Anything that can go wrong, will." Vehicles that share the same design will have the same defect, and it could result in massive breakdowns. Product design defects in

AVs will engender a significant amount of litigation, unless legislation grants manufacturers some level of immunity.

Some manufacturers have proposed retaining ownership of their self-driving cars. Persons interested in using the vehicles would lease them directly from the manufacturers. In fact, the California DMV requires that all AVs be leased from the manufacturer as part of its pending regulations. California Code of Regulations, Title 13, Article 3.7 §227.68(c). Manufacturers would be responsible for upkeep and upgrades to the vehicles. If manufacturers continue to own fleets of their vehicles, any ownership liability will remain with them.

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The extreme technology of autonomous cars will make them targets for cybercrime, malicious code, and individual hacking. The manufacturers and perhaps individual owners will be responsible for electronic failures of the AVs, depending upon the circumstances.

Will We Need Insurance for Driverless Cars?

Totally driverless cars will fundamentally change the personal auto insurance industry. Some of this sounds very positive for the insurance industry. Fewer accidents mean lower rates of claims and smaller amounts paid on those claims. This will result in greater savings to insurers that have priced policies based on the history of losses. However, these reductions in accidents will ultimately result in lower premium rates as the market and regulators put pressure on insurers to cut rates to reflect the dollars saved from claims. These changes will lead to consolidation and cost cutting throughout the personal auto industry.

The public policy of every state now is to require that drivers have insurance. The requirement making certain minimum personal auto coverage apply to each driver was established in the 1950s as part of the development of the national interstate highway system. The basic premise of the coverage is to insure the vehicle operator for the "ownership, maintenance or use" of the automobile. If cars do not have drivers, though, then personal auto insurance does not make sense because there will not be a driver to insure.

Joint ventures between data-driven companies and traditional auto manufacturers, such as Lyft and GM, hint at multipassenger AVs that rideshare to various destinations. The carpool vehicle would pick up passengers along the way, after being "hailed" through an app. At some point in the not-distant future, personal autos may be relics of the past. Without personal autos to insure, the need for personal auto insurance vanishes.

A number of the auto manufacturers are considering owning the vehicles and renting out their use. If the vehicle is neither operated nor owned by the rider, the passengers do not have an insurable interest in it. This too will affect the personal auto insurers.

Personal auto is the largest segment of the insurance market. According to the Insurance Information Institute, as of 2013 (the latest year for which this information is available), 195 million cars in the United States are insured at an average annual premium of $841.23, based on January 2016 information from the National Association of Insurance Commissioners. *See* Insurance Information Institute, http://www.iii.org/fact-statistic/auto-insurance. This comes to roughly $165 billion in premium each year spent on insurance for individual vehicles. A precipitous decline in this market could have far-reaching consequences for the insurance industry.

That decline will not happen immediately, if regulators step in. State departments of motor vehicles and insurance commissioners support maintaining personal insurance for the "operators" of autonomous vehicles. California's recently proposed regulations for the deployment of AVs require that "operators" of autonomous cars must maintain a current California driver's license, which requires that the driver have minimum insurance coverage. California Code of Regulations Title 13, Article 3.7 §227.12(a); California Vehicle Code §16020.

Additionally, the market for product liability insurance may grow. The new California regulations require that automobile manufacturers, as a condition for obtaining a permit to deploy the AVs, have sufficient insurance or self-insurance to cover all property damage and bodily injury arising from collisions or accidents caused by the AVs. A "manufacturer" includes any person who modifies any vehicle by installing autonomous technology. California Code of Regulations Title 13, Article 3.7 §227.02(o). Beyond the California regulations, it makes good sense for autonomous vehicle and component manufacturers to carry product liability insurance to cover their risks from autonomous vehicles.

Cyber-insurance may also be a growth market. The potential liability of manufacturers for privacy breaches and possible malicious software attacks may spur the purchase of cyber-policies with coverage for these exposures.

Conclusion

As a result of autonomous vehicles, we are facing revolutionary changes in the liability and insurance schemes that govern vehicle accidents. The old system had simplicity in its favor. Drivers had to carry minimum coverage to be licensed. Driver negligence was the usual cause of accidents. When defective design of a vehicle was involved, many plaintiffs chose to forego a product liability claim because of the expense of proving liability.

If drivers no longer operate vehicles, the injured parties are left with product liability as the most likely path to recovery. Lawsuits may result less frequently but they may become more expensive. Insurance may not be available for recovery of damages. As regulators grapple with licensing and permitting of vehicles, they will have to consider the appropriate ways to compensate people for their injuries. In the meantime, the insurance industry will have to plan for significant changes. FD