

## Self-Driving Vehicles: Can Legal and Regulatory Change Keep Up With New Technology?

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Automotive travel in the United States will change dramatically in the next decades as technological advances shift more driver functions to computers, cameras, and sensors. Fully self-driving automation may be distant, but rapidly approaching is limited self-driving automation, which involves giving automation control of all safety-critical functions under certain traffic or environmental conditions, with the expectation that human drivers will resume control as needed. Emphasis has been placed on the technological changes and capabilities, and their attendant benefits, rather than on driver capabilities and necessary driver training. To secure the benefits of automation, driver training is essential. Anecdotal evidence suggests that drivers don't understand existing technologies, let alone emerging technology required for autonomous vehicle operation. State legislative activity regarding autonomous vehicles is just beginning, but accelerating. Now is the time to develop uniform standards and frameworks for manufacturers and drivers to ensure an effective and efficient transition to autonomous vehicles.

*Key Words:* self-driving vehicles, regulation, liability, licensing

### Introduction

Automotive travel is poised to change dramatically as new technology is bringing the prospect of self-driving or autonomous vehicles closer to reality. Anticipated benefits include improved safety, better traffic flow, less congestion, and more effective and efficient transportation options for the traveling public. However, the introduction of autonomous features is not without its challenges. The role and responsibilities of the driver will change as cars transition from full driver control to full vehicle control. Changes will need to be made to driver training and licensing, and also in the determination of legal liability for automobile accidents. How rapidly the changes will be made is not known. The National Highway Traffic Safety Administration (NHTSA) estimated ten to twenty years in a recent policy statement:


“America is at a historic turning point for automotive travel. Motor vehicles and drivers' relationships with them are likely to change significantly in the next ten to twenty years....The United States is on the threshold of a period of dramatic change in the capabilities of, and expectations for, the vehicles we drive” (NHTSA, 2013, p.1). Tesla's CEO Elon Musk (24 to 36 months) and Nissan's CEO Carlos Ghosn (by 2020) believe the technology will arrive much faster (Woodyard and Bomey, 2016).

### Types of Technological Change

The NHTSA defines five levels of vehicle automation, ranging from none (Level 0) to full self-driving automation (Level 4).<sup>1</sup> Current concerns with drivers' relationships with their vehicles and the impact on training, licensing, and liability results from a transition from Level 2 to Level 3. Experts believe that drivers will continue to be essential to overall safe operation of semi-autonomous vehicles. Although “cars with the right sensors are becoming really good at monitoring the outside world and have quicker response times than humans....People are much better at making decisions under uncertain circumstances” (Pritchard, 2015, p. 4). There must be an efficient and effective interface between technology and human that will allow control of the vehicle to be passed back to the human driver when the technology fails or when outside conditions do not allow the technology to operate as designed. Dan Gage, of the

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Alliance of Automobile Manufacturers stated, “as an industry...most of us suspect that there will always be someone in that driver’s seat” (Turner, 2013, p.2). State regulations in four states that allow the testing of autonomous vehicles require that “test drivers must be able to resume immediate control at any time in the event of an AV failure or emergency, which requires two things: There must be a driver’s seat with a steering wheel and pedals, and the driver must be in the driver’s seat and monitoring safe operation at all times” (Technology Law and Policy Clinic, 2015, p. 4).

Automakers are designing communications systems that can alert drivers whether or not autonomous technologies are engaged and when the human driver needs to reassume control of the vehicle if an autonomous feature becomes disengaged or ineffective. This requires drivers to be familiar with the technology, to be monitoring the systems, and to be capable of reassuming control as needed. The California Department of Motor Vehicles Code states that “the autonomous vehicle test driver knows the limitations of the vehicle’s autonomous technology and is capable of safely operating the vehicle in all conditions under which the vehicle is tested on public roads.”<sup>2</sup>

How can driver knowledge and ability be assessed? In California, “prospective test drivers have to pass a defensive driving course, have near-spotless records, have at least a decade without a drunk driving conviction....and also complete a special training program for autonomous vehicles” (Harris, 2015, p. 1). The training programs are conducted by the manufacturers of the autonomous vehicles being tested, and vary greatly in substance and duration.<sup>3</sup> In Florida and Michigan, however, test drivers need only a regular driver’s license.<sup>4</sup>

### **Relationship of Technology and Driver (Liability Concerns)**

In addition to the obvious need for driver training to ensure safe operation of semi-autonomous and autonomous vehicles as they begin to mix with traditional automobiles on our nation’s highways, driver training and driver participation becomes critical in the assessment of legal liability in the event of an automobile accident. Although experts disagree as to whether or not current law is sufficient to cover accidents involving autonomous vehicles,<sup>5</sup> there is agreement that products liability concerns will become more prevalent, along with driver negligence issues.

In the event of an automobile accident, who is liable, the manufacturer or the driver?

- In purely autonomous mode, probably the manufacturer based on manufacturing defect or design defect

- If autonomous mode is disabled, probably the driver due to negligence
- When switching in and out of autonomous mode, probably the driver, except manufacturer’s liability may be extended even in cases of driver error due to manufacturer’s failure to warn, or warning defect (Swanson, 2014; Gurney, 2013)

In regards to failure to warn or warning defect, manufacturers have a duty to provide instructions on the safe use of their product and to warn consumers of hidden dangers. This is consistent with manufacturer-provided training for test drivers noted above in California. Recall that manufacturer training programs vary greatly in scope and duration. Developing training programs for the general driving population will be a more expensive and expansive undertaking.

### **Current Legislative Activity**

Despite increasing state legislative activity,<sup>6</sup> and recommendations for additional training and licensing requirements,<sup>7</sup> few states have enacted specific new regulations for autonomous vehicle driver’s licenses (although some have charged their state’s department of motor vehicles to propose new, so far unspecified, rules). Florida and Michigan specifically allow drivers to operate autonomous vehicles with only a regular driver’s license (Technology Law and Policy Clinic, 2015), while legislation in Hawaii was introduced, but not passed, in 2015 that would also permit any person with a valid Hawaii driver’s license to operate an autonomous vehicle.<sup>8</sup>

### **Uniform Regulations Needed**

Technology is improving automotive transportation and safety, but human drivers will remain an essential part of the process for years to come. David Mindell, an MIT professor of the history of engineering and manufacturing, said “Today’s autonomous cars still require a great deal of human judgment and skill to operate safely, and that’s unlikely to change for some time” (Harris, 2015, p. 3). Yet many drivers are confused by existing technology, let alone cutting edge emerging technology.<sup>9,10</sup>

Driver education, training, and licensing requirements must be improved in order to facilitate the introduction of autonomous vehicles and to enhance their ability to improve the safety, reliability, and effectiveness of automotive transportation. Because technologies vary by automotive brands, the manufacturers must be involved in the development of comprehensive and effective training programs. Uniformity is necessary, however, in regards to the setting of minimum safety and training standards.<sup>11</sup>

State licensing agencies must be able to evaluate manufacturer-sponsored training programs and be able to assess a prospective licensee's successful completion of such training prior to the issuance of a driver's license allowing the operation of an autonomous vehicle. Driver's license endorsements may have to be automaker specific if the technologies and operational features and training are significantly different from one manufacturer to the next. In the longer term, standardization of driver-vehicle interfaces and driver education and training programs will be necessary to facilitate wide-spread acceptance of autonomous vehicles on American roadways.

The Federal Government has a responsibility to protect its citizens via appropriate product and transportation safety regulation and oversight. Wide variations in manufacturer driver training programs and in state legislature's approaches to the introduction of autonomous vehicles suggests that Federal Government involvement is necessary for proper regulation in an environment of rapid technological innovation.

### Conclusion

Driving in the United States is an inherently national phenomenon, not limited by state borders. It is inefficient, and perhaps ultimately ineffective, to rely on multiple state legislatures to make rules governing the operation of, and licensing and training requirements for, autonomous vehicles. The NHTSA recommends that states adopt driver license endorsements for autonomous vehicles and require drivers to certify that they have received and understand auto manufacturers' instructions. The NHTSA also suggests that instructions could be reviewed and approved by each state, but this is not included in their list of recommendations. These recommendations are neither stringent enough nor broad enough to adequately deal with the safety and liability issues inherent in wider adoption of autonomous vehicles on our nation's highways.

The Federal Government needs to quickly step up its efforts to impose structure on the process and promote the uniformity required for efficient and effective incorporation of autonomous vehicles that invariable will be driven across state lines. Federal regulations should require all states to initiate driver license endorsements for autonomous vehicles similar to those required currently for special types of vehicles, such as trucks and buses. Federal regulations should include the recommendations of the NHTSA and require drivers wanting to receive the endorsement to certify they understand the features of their autonomous vehicle and that they have received and understand manufacturers' instructions. The regulations should go further and provide a mechanism

for Federal approval of manufacturer instructional materials, making them uniform across all states. Driver license endorsements should also be vehicle specific as long as manufacturers incorporate technologies and safety features unique to their brands. Otherwise, a driver trained on an autonomous Volkswagen could receive a driver license endorsement and then drive an autonomous Audi for which he or she has received no training and is unfamiliar with the required operational activities.

As autonomous vehicles become more prevalent, it is expected that they will become more uniform as manufacturers learn from each other and from the marketplace what features work best and which design elements enhance safety, reliability, and consumer demand the most. Until that time, however, the combination of various models of autonomous vehicles mixing in with traditional vehicles on roadways all across America requires a strong Federal regulatory regime.

### Notes

1. (NHTSA, 2013, pp. 4-5). No Automation (Level 0): The driver is in complete and sole control of the primary functions, such as electronic stability control or pre-charged brakes. Combined vehicle controls – brake, steering, throttle, and motive power – at all times. Function-specific Automaton (Level 1): One or more specific automated control. Function Automation (Level 2): Automation of at least two primary control functions designed to work in unison to relieve the driver of control of those functions, e.g., adaptive cruise control in combination with lane centering. Limited Self-Driving Automation (Level 3): Automation to cede full control of all safety-critical functions under certain traffic or environmental conditions...and to monitor for changes in those conditions requiring transition back to driver control. The driver is expected to be available for occasional control but with sufficiently comfortable transition time. Full Self-Driving Automation (Level 4): The vehicle is designed to perform all safety-critical driving functions and monitor roadway conditions for an entire trip. The driver will provide destination or navigation input, but is not expected to be available for control at any time during the trip.
2. California DMV Code, Section 227.18.
3. According to Harris (2015), the extra time for autonomous vehicle training ranges from low of about two hours for Volkswagen/Audi to a high of about five weeks at Google.
4. Fla. Stat. Section 316.85(1); Mich. Comp. Laws Section 257.665(2)(c).
5. For example, (Gurney, 2013, p. 248) states that "current products liability law does not adequately assess liability in this futuristic situation," while (Technology Law and Policy Clinic, 2015, p. 20) concludes that "products liability law is sufficiently advanced to assign liability for damages resulting from the failure of

an autonomous vehicle” and “current tort law is also sufficiently advanced to assign liability for damages resulting from AV-driver negligence.”

6. The National Conference of State Legislatures reports that 16 states introduced legislation related to autonomous vehicles in 2015, 12 state in 2014, 9 states and Washington D.C. in 2013, and 6 states in 2012 (National Conference of State Legislatures, 2015).
7. The NHTSA recommends (1) driver’s license endorsements (or separate driver’s licenses) that authorize the operation of autonomous vehicles, (2) driver’s must complete manufacturer’s training program (and that the training program should be approved by the state agency that issues driver’s licenses), and (3) drivers must be in the driver’s seat at all times ready to resume control (NHTSA, 2013). Similarly, the Technology Law and Policy Clinic recommends that drivers must obtain a state endorsement on their driver’s licenses in order to demonstrate they can safely and lawfully operate an autonomous vehicle on public highways. To obtain the endorsement, drivers must (1) certify with the DMV that they have received and understand manufacturer provided instructions, (2) certify with the DMV that they acknowledge the legal requirements for monitoring an autonomous vehicle while it operates in autonomous mode, and (3) certify they will intervene and physically reassume control of an autonomous vehicle in the event that public safety or the efficient use of the roadways so requires (Technology Law and Policy Clinic, 2015).
8. HI SB 632, 2015.
9. A recent study conducted by the University of Iowa Transportation and Vehicle Safety Research Division evaluated drivers’ understanding of several current safety technologies, including back-up cameras, blind spot monitors, forward collision warning, anti-lock braking systems, rear cross traffic alert, adaptive cruise control, automatic emergency braking systems, lane departure warning, and traction control. A majority of over 2,000 participants expressed uncertainty about all of the technologies. Dan McGehee, director of the Research Division, noted “The level of confusion about features that have been standard in American cars for quite a while was really surprising. The little details about how some of these systems work are really important when we’re talking about safety. We need to do a better job of making sure consumers are comfortable with them” (Day, 2015, p. 2).
10. Tom Pecoraro, retired police officer and owner of “I Drive Smart” schools in California, Maryland and Virginia notes that “State-required curriculums taught in driving schools are typically about 15 years behind the latest technology,” and “Most people don’t even know how to get to their spare tire, let alone understand the technology” (Lowy, 2015, p. 4).
11. Patrick Lin, director of the ethics and emerging sciences group at California Polytechnic State University, stated “allowing manufacturers to have variable training times may be useful in determining the proper amount of training ordinary drivers should have. But if government or a consortium of carmakers were to establish minimum standards of safety and training,

that may give us more confidence than letting each manufacturer decide what’s best” (Harris, 2015, p. 4).

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