Eliminating the Human Driver: Liability Schemes

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I. Introduction

Once just a piece of science fiction, reserved for comic books and movies, the self-driving autonomous car is approaching reality faster than the average person could even imagine.[1] Picture riding to work in your autonomous car while your digital assistant coordinates your work and home life as you sip coffee and make decisions with simple responses.[2] Not only is this futuristic technology currently in development stages, but, specifically, there are many vehicles on the road that already offer enhanced assistance features such as emergency break application, lane drift detection, and the ever popular parking assistance. As technology continues to advance at an exponential rate, self-driving car technology will continue to creep towards road-ready vehicles hitting the asphalt in the coming years. More than two million people are injured and over 30,000 people are killed every year in the United States due to automobile-related incidents.[3] With over six million automobile accidents occurring annually, it is estimated that widespread adoption of autonomous self-driving vehicles could drastically reduce these figures, potentially preventing ninety percent of car wrecks and saving thousands of lives each year.[4] However, this widely beneficial technology also has its downsides. Aside for the pressing ethical questions that arise, in terms of reactionary programming for these enhanced and intelligent vehicles, every advancement in the artificial intelligence participation within vehicle operations poses new and daunting legal

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1 Sarah J. Simkin, *Top 8 Legal Implications of Self-Driving Vehicle Technology: Practice Points*, Business Torts & Unfair Competition, Winter 2018, https://heinonline.org/HOL/Page?collection=aba&handle=hein.aba/butuc0025& id =43&men_tab=srchresults#.

2 Lee, Kevin, *A Day in the Life of a Lawyer in 2030*, Medium, November 2018, https://medium.com/predict/ a-day-in-the-life-of-a-lawyer-in-2030-8890aa3f223d

3 *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf.

4 *Id.*

questions.[5] Once autonomous self-driving cars are commercially available, the roads will be full of vehicles lacking human "drivers," or insurance policies to match, leading to the necessary evolution of our traditional liability system.[6] To fully understand and prepare for the evolution of autonomous vehicles, it is imperative to consider the current state of technology, future projections, potential approaches to liability, and how we should prepare for the inevitable.

II. Where We Are

1. *Statistics*

In 2017, 37,133 people were killed in automobile crashes,[7] and despite technological advancements in automobile safety, humans remain the biggest problem on the road. According to the National Highway Transportation and Safety Administration, the "critical reason" assigned to ninety-four percent of crashes can be attributed to human factors, mostly driver decision and recognition errors.[8] These staggering numbers have understandably led automobile tycoons and innovative programmers to relentlessly pursue the very real possibility of a fully autonomous self-driving vehicle.

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5 Sarah J. Simkin, *Top 8 Legal Implications of Self-Driving Vehicle Technology: Practice Points*, Business Torts & Unfair Competition, Winter 2018, https://heinonline.org/HOL/Page?collection=aba&handle=hein.aba/butuc0025&id=43&men_tab=srchresults#

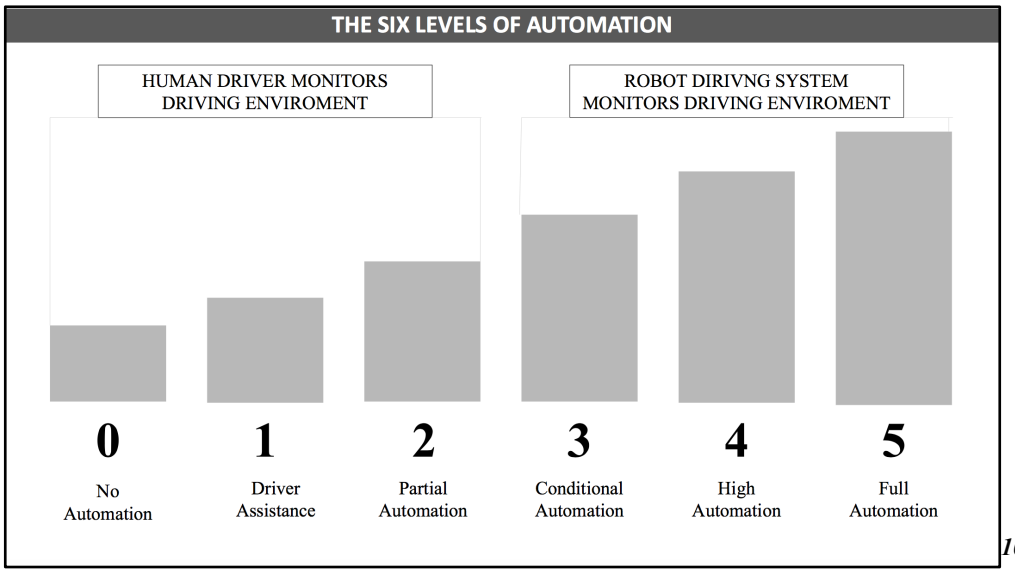
6 *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

7 *2017 Fatal Motor Vehicle Crashes: Overview*, National Highway Safety Administration (NHTSA), October 2018, https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812603

8 *Critical Reasons for Crashes Investigated in the National Motor Vehicle Crash Causation Survey*, National Highway Transportation Safety Administration (NHTSA), March 2018, https://crashstats.nhtsa.dot.gov/Api/Public/ ViewPublication/812506

2. *Levels of Automation*

Understanding the current state of autonomous vehicles requires comprehending the various levels of automation. The Society of Automotive Engineers (SAE) has identified six levels of automation and set "a specific set of requirements that a vehicle must meet before it can be considered to operate at that level."[9]



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A Level 0 vehicle has no automated assistance technology and relies on a human to determine and dictate all driving actions. Level 0 cars may have cruise control options as well as crash warning technology; however, these vehicles have no intervening capabilities.[11] Vehicles at Level 1 classification have at least one advanced driver-assistance feature. The driver assistance technology incorporated in Level 1 vehicles is basic such as adaptive cruise

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9 Hyatt and Paukert, *Self-driving cars: A level-by-level explainer of autonomous vehicles,* Road Show, March 2018, https://www.cnet.com/roadshow/news/self-driving-car-guide-autonomous-explanation/

10 *Self-driving cars: A level-by-level explainer of autonomous vehicles,* Road Show, March 2018, https://www. cnet.com/roadshow/news/self-driving-car-guide-autonomous-explanation/

11 A 2005 Honda, 1967 Porsche 911, and 2018 Kia Rio are all Level 0 vehicles. Hyatt and Paukert, *Self-driving cars: A level-by-level explainer of autonomous vehicles,* Road Show, March 2018, https://www.cnet.com /roadshow /news/self-driving-car-guide-autonomous-explanation/; *Path to Autonomy: Self-Driving Car Levels 0 to 5: Just what does "Level 5 Autonomous car" mean?*, Car and Driver, October 2017, https://www.caranddriver. com/feature s/path-to-autonomy-self-driving-car-levels-0-to-5-explained-feature

control or lane-keeping technology.[12] Vehicles under the Level 1 classification are capable of maintaining their own speed, but mobility is still supervised by a human operator. Level 0 and 1 vehicles have been commercially available for quite some time and will continue to be present on the roads for many years to come.

A Level 2 vehicle has two or more advanced driver assistance systems, meaning the vehicle can, at times, control the acceleration, steering, or braking. Active lane-keep assist, adaptive cruise control, and automatic emergency braking are just a few examples of advanced driver assistance systems.[13] Level 2 vehicles, like Level 1, still require active monitoring of the vehicle's progress and the human driver still has the ability to intervene with the driving systems. Level 2 vehicles are not as common on the roads but are becoming more commercially available and present on the roads with each passing day. The best-known Level 2 autonomous car is the Tesla Model S.[14]

Vehicles at a Level 3 classification are drastically more advanced than that of Level 2. "A Level 3 vehicle is capable of taking full control and operating during select parts of a journey when certain operating conditions are met."[15] Requiring sophisticated software, hardware backups, and advanced sensor packages to keep occupants safe, a Level 3 vehicle is capable of managing itself on a freeway journey. Drivers of Level 3 vehicles, though, are still responsible for remaining vigilant during portions of self-driving, in the event of a failure.

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[12] The Kia Stinger GT with adaptive cruise control and lane-keeping tech makes it a Level 1 car. Hyatt and Paukert, *Self-driving cars: A level-by-level explainer of autonomous vehicles,* Road Show, March 2018, https://www. cnet.com/roadshow/news/self-driving-car-guide-autonomous-explanation/

[13] The Cadillac's CT6's Super Cruise system qualifies it for Level 2 classification. Additionally, Mercedes-Benz Distronic Plus, Nissan ProPilot Assist, and Tesla Autopilot are all Level 2 worthy advanced driver assistance systems. *Id.*

[14] John M. Vincent, *Cars That Are Almost Self-Drving,* U.S. News & World Report, October 23, 2018, https:// cars.usnews.com/cars-trucks/cars-that-are-almost-self-driving

[15] Hyatt and Paukert, *Self-driving cars: A level-by-level explainer of autonomous vehicles,* Road Show, March 2018, https://www.cnet.com/roadshow/news/self-driving-car-guide-autonomous-explanation/

There is a prerequisite driver monitoring system for Level 3 vehicles, which makes certain that the driver is sufficiently alert to take over in the dictated conditions. In 2012, Google successfully achieved Level 3 autonomy with a test vehicle; however, tests showed that human drivers were "too trusting and slow to retake control from the system in the event of trouble."[16] Based on the test results, Google decided against taking the technology to the street. The Audi Traffic Jam Pilot system qualifies as Level 3 worthy technology,[17] but is not commercially available yet either. As of now, there are no Level 3 vehicles on the market,[18] but there are many autonomous cars with a potential Level 3 classification currently in testing.[19]

A Level 4 vehicle is where bona-fide autonomous driving systems begin to actually kick in. Vehicles worthy of a Level 4 classification are "capable of completing an entire journey without driver intervention, even operation without a driver at all, but the vehicle does have some" drawbacks.[20] While extremely powerful AI technology provides almost full autonomy, a Level 4 vehicle is still likely to retain some driver controls such as a steering wheel and pedals for situations where it may be necessary for the human driver to take control of the vehicle. There are no Level 4 production vehicles available to consumers. Google's now-defunct Firefly pod-car prototype is the best example of an attempt at an operational Level 4

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16 Hyatt and Paukert, *Self-driving cars: A level-by-level explainer of autonomous vehicles,* Road Show, March 2018, https://www.cnet.com/roadshow/news/self-driving-car-guide-autonomous-explanation/

17 *Id.*

18 Audi is attempting to release the first Level 3-capable vehicle with the new A8 sedan due to its Audi AI Traffic Jam Pilot system. *Id.*

19 Waymo is one such company, testing Level 3 vehicles for the road. John M. Vincent, *Cars That Are Almost Self-Driving,* U.S. News & World Report, October 23, 2018, https:// cars.usnews.com/cars-trucks/cars-that-are-almost-self-driving

20 Hyatt and Paukert, *Self-driving cars: A level-by-level explainer of autonomous vehicles,* Road Show, March 2018, https://www.cnet.com/roadshow/news/self-driving-car-guide-autonomous-explanation/

vehicle. The Firefly does not have pedals or a steering wheel and has a top speed restriction of twenty-five miles per hour.[21]

Level 5 vehicles will be fully automated without any need for human action. Level 5 vehicles will have no options for human control: no pedals, steering wheels, or joysticks. Capable of complete hands-off, driverless operations under any and all circumstances, Level 5 vehicles would theoretically allow passengers to sit back and watch movies or play video games during their travel.[22] Though Level 5 autonomous vehicles are "unconstrained geographically and theoretically able to travel at all speeds in safety," there are no Level 5 vehicles on the market.[23] Moreover, there are no examples of functioning Level 5 vehicles, but Waymo is currently working on developing its Level 5 technology using a fleet of 600 Chrysler Pacifica hybrids.[24]

3. Current Legislation

Thirty-three states introduced legislation regarding self-driving cars in 2017.[25] Recently, the National Highway and Transportation Safety Administration released the latest guidelines for automated vehicles.[26] A new era has arrived. Lawmakers and vehicle manufacturers will

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21 *Path to Autonomy: Self-Driving Car Levels 0 to 5: Just what does "Level 5 Autonomous car" mean?*, Car and Driver, October 2017, https://www.caranddriver.com/features/path-to-autonomy-self-driving-car-levels-0-to-5- explained-feature

22 *Id.*

23 This type of technology is possible thanks to advanced software and vehicle-to-vehicle and vehicle-to-environment communications. Hyatt and Paukert, *Self-driving cars: A level-by-level explainer of autonomous vehicles,* Road Show, March 2018, https://www.cnet.com/roadshow/news/self-driving-car-guide- autonomous-explanation/

24 *Path to Autonomy: Self-Driving Car Levels 0 to 5: Just what does "Level 5 Autonomous car" mean?*, Car and Driver, October 2017, https://www.caranddriver.com/features/path-to-autonomy-self-driving-car-levels-0-to-5- explained-feature

25 *Autonomous Vehicles. Self-Driving Vehicles Enacted Legislation,* National Conference of State Legislators, January 2018, http://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legisl ation .aspx

26 *Id.*

have to face to reality of this new unknown world of self-driving vehicles in order to keep the roads and all who travel on them safe.

III. Where We Are Going

1. Future Projections

"Even the most optimistic robot car advocates believe it will be the mid-2020's before fully automated cars really take hold, and then at least 15 more years before human-operated cars are all but gone." [27] This fifteen-year gap period between introduction of self-driving cars on the road and the transition to mostly self-driving cars will be the sweet spot for liability disputes. While mostly human operated vehicles remain on the road, human error will continue to cause auto accidents. However, regardless of self-driving car's ability to avoid as much injury and damage as possible in accidents caused by human error, it may be tempting to blame the self-driving car. However, history has shown that society has an innate instinct to blame humans for misfortunate events. "From airline pilots to assembly plant workers, humans are consistently held responsible for incidents even when actual causes are complex and interrelated."[28] The tendency to blame humans is a real concern associated with the rise of self-driving vehicles, because situations will inevitably arise when the cause of accidents is a problem the human driver is unable to control or dictate.

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[27] *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

[28] *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

Manufacturers are likely to have a preference towards humans retaining responsibility for operation of self-driving vehicles by allowing drivers to bear "the brunt of the moral and legal penalties when the overall system fails."[29]

> Regulators, in addition to the engineers and managers of aviation systems, have created a schizophrenic dynamic in which automation is seen as safer and superior in most instances, unless something goes wrong, at which point humans are regarded as safer and superior. Unfortunately, creating this kind of role for humans, who must jump into an emergency situation at the last minute, is something humans do not do well.[30]

Research is undisputed that humans are poorly situated to re-engage in complex tasks, such as emergency situations on the road when their attention has been diverted for a period of time. On average it can take a human seventeen seconds to respond to a vehicle's request to retake control of the vehicle, which would allow a car traveling at sixty miles per hour to travel an additional quarter mile before the human driver regains sufficient control.[31] This is the exact precarious situation that Level 3 vehicles tend to throw their human drivers into in the event of an emergency. In theory, allowing the human driver to make the hard decisions using intuition and human reflexes seems practical. It would also give programmers and manufacturers a type of liability security blanket because the driver would be responsible for the last-minute decisions before accidents occur. However, trusting these autonomous vehicles to make the

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[29] M.C. Elish, *Moral Crumple Zones: Cautionary Tales in Human-Robot Interaction,* We Robot Working Paper 2016, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2757236; see also *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice. org/sites/default /files/Driven%20to%20 Safety%202017%20Online.pdf

[30] M.C. Elish, *Moral Crumple Zones: Cautionary Tales in Human-Robot Interaction,* We Robot Working Paper 2016, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2757236; see also *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default /files/Driven%20to %20Safety%202017%20Online.pdf

[31] These results followed a 2015 study conducted by the National Highway Traffic Safety Administration. *Human Factors Evaluation of Level 2 and Level 3 Automated Driving concepts,* National Highway Traffic Safety Administration (NHTSA), August 2015, http://www.nhtsa.gov/DOT/NHTSA/NVS/Crash%20Avoidance /Technical %20Publications/2015/812182_HumanFactorsEval-L2L3-AutomDrivingConcepts.pdf; see also, *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/ default/files/Driven%20to%20Safety%202017%20Online.pdf.

safest and best decisions in all regular driving conditions should carry over to emergency decisions. Pragmatically, these machines are better equipped and more intelligent that humans in almost every way and, assuming proper programming and manufacturing, should be relied on to handle emergency situations rather than human drivers.

As automakers have begun to realize the dangers of semi-autonomous cars requiring humans to unexpectedly retake control under certain conditions, many are abandoning their Level 3 vehicle research and development. It is a far greater technological challenge to design a vehicle that shifts control of the vehicle's operation to the human driver, and then upon human failure to engage, to react in every conceivable crisis event.[32] Moreover, creating a fully autonomous vehicle without any human control intervening before safe failing is more technologically realistic and achievable. This is evidenced by several companies quest to develop Level 4 vehicles and skipping over Level 3 automation altogether. Ford plans on this precise strategy by pursuing development of a Level 4 vehicle with no driver input or operation required.[33] Google also gave up on its quest for Level 3 automation that required humans to take control under certain circumstances because it found the test drivers would engage in "silly behavior" even while traveling at high speeds.[34] Google has since decided to turn towards the

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[32] Alford Morgan and G. Parkhurst, *Handover Issues in Autonomous Driving: A Literature Review,* University of the West England, Bristol, 2016, http://eprints.uwe.ac.uk/29167/1/Venturer_WP5.2Lit%20ReviewHandover.pdf; see also *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf.

[33] Hope Reese, *Our autonomous future: How driverless cars will be the first robots we learn to trust,* Tech Republic, 2016, http://www.techrepublic.com/article/our-autonomous-future-how-driveless-cars-will-be-the-first-robots-we-learn-to-trust/; see also *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf.

[34] Paul Ingrassia, Alexandria Sage and David Shepardson, *Reuters Google Wants to Rewrite the Rules of the Road to Make Way for Driverless Cars*, Time, April 2016, http://time.com/money/4307730/google-driverless-cars-road-rules/; see also *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf.

goal of a truly driverless car.[35] General Motors is also pushing towards a commercially viable Level 5 vehicle by working on its Cruise autonomous test vehicles. [36]

With many companies halting their Level 3 research, perhaps indefinitely, it will be increasingly difficult to find fault on the human non-driver who owns, or simply rides inside, the vehicle. Level 4 and 5 vehicles will open up vast opportunities for litigation and the history of blaming humans will be tested as less human activity is utilized on the roads. To combat these issues, litigations schemes should be determined before these fully autonomous vehicles become commercially available.

2. What the Roads Will Looks Like

Once Level 4 and 5 vehicles inevitably take control of the roads, humans would have the ability to work during commutes, send vehicles to pick up children or friends, watch the movies, or simply sleep. We may reach the point where it is unnecessary to even own one's own vehicle because it would be simpler and more economical to use a service. However, the problem lies not with the introduction of autonomous vehicles onto the roads, but with the significant number of human operated vehicles that will remain on the road for many years. The composition of the roads will consist of a wide array of levels of autonomation. Level 0 and 1 vehicles will likely remain a constant feature as the affordability cannot be beat. Level 2 vehicles, while in existence, pale in comparison to Level 4 and 5 vehicles and still require substantial human control and decision-making. The mixture of fully human-operated vehicles, fully autonomous vehicles, and semi-autonomous vehicles will leave the roads in an unprecedented state.

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35 *Id.*

36 Hyatt and Paukert, *Self-driving cars: A level-by-level explainer of autonomous vehicles,* Road Show, March 2018, https://www.cnet.com/roadshow/news/self-driving-car-guide-autonomous-explanation/

With a variety of human input required vehicle-to-vehicle, human error will continue to be a major cause of automobile accidents. Though Level 4 and 5 vehicles require little to no human input and will theoretically be programmed to be the safest moving vehicle on the market, humans are still on the roads making mistakes. Due to human error, autonomous vehicles will be put in situations, much like a human driver, and will be forced to make hard decisions based on their programming, on how to best handle an accident. There will be no-win situations, and autonomous vehicles will have no option but to crash in the safest and most efficient way possible. The complication is that it may seem easier to blame the self-driving vehicle than the human driver who caused the accident.

Until the roads are completely composed of autonomous vehicles, humans will continue to cause situations that lead to automobile wrecks and collusions, resulting in property damage as well as injury. Elon Musk, the CEO of Tesla, has pointed out that right now, the "hardware and software are not yet at a point where a driver can abdicate responsibility… [The system] requires drivers to remain engaged and aware when Autosteer is enabled. Drivers must keep their hands on the steering wheel." [37] Since humans will not be able to relinquish complete control of their vehicles for some time, and even then, most automobiles on the roads will still require a human driver, liability schemes will be subject to much debate over the next few decades.

3. What the Courts Will Look Like

For half a century, vehicle automation in some form or another has existed. Beginning with simply cruise control in the 1950s and 1960s, courts determined the human driver was

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[37] Elon Musk on the future of self-driving cars. *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

responsible for the operation of the vehicle even though some of the vehicle's operation were executed by an automated device.[38] While the courts solved the cruise control question with seeming ease, the increasing complexity of autonomous vehicle technology will also increase the "possibility of significant product defects" that will be more difficult to pinpoint the cause of the defect, or the defect itself.[39] The question on everyone's mind is how to approach liability in automobile collusions involving a self-driving vehicle.

With less and less human intervention required during driving, a mixture of vehicle autonomy on the roads, and different programming schemes, liability questions will continue to mount. Though it will be some time before Level 5 vehicles are a reality or autonomous cars control a majority of the roads, preparing to answer the hard liability questions now could save time, money, and litigation in the future.

4. Challenges

There will a plethora of challenges to deal with on the journey to fully self-driving vehicles. Will there be different standards based on the level of automation of all the vehicles involved in the automobile accident? Now it seems the main question is how to handle wrecks with an Level 0 or 1 vehicles that requires overwhelming human control and a Level 4 or 5 vehicle that operates autonomously. This may be the initial question; however, once there are more Level 4 and 5 vehicles on the road and two autonomous vehicles crash, which vehicle, driver, programmer, or manufacturer should be liable? As automation technology develops, the questions get increasingly complicated.

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[38] Elish and Hwang, *Praise the Machine! Punish the Human!* Date & Society Research Institute, May 18, 2015. https://www.datasociety.net/pubs/ia/Elish-Hwang_AccountabilityAutomatedAviation.pdf

[39] For example, the exact defect responsible for the Toyota's sudden acceleration problem a few years back is still unsolved. *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

In addition to the liability questions, still more questions need answering in the realm of autonomous vehicles. What coding and programming will be the standard for inevitable accidents caused by human error from other cars on the roads? Who will be responsible for determining that coding standard? Will the type of coding implementation lead to further litigation? Will there have to be legislation to set a standard? If a vehicle operates at the standard under given conditions and still crashes, is there liability on the manufacturer or programmers? Though many issues exist, the initial problem is assigning liability.

IV. Potential Liability Schemes

When fully automated vehicles become commercially available, what will happen to the current regimes of liability? When there is no human actor, who or what is responsible for an accident? Who will be responsible if an autonomous car hits a pedestrian? Even more complicated, if a driverless car is programmed to save the driver's life at all costs, and in doing so, leaves a trail of deceased and injured humans in its wake, who should be liable for the vehicle's programming scheme and AI decision-making? Answers to these troubling questions center around not only "technological capabilities but also cultural perceptions, norms and laws."

> From the earliest passenger airplanes to robotic surgical systems a century later, litigation has severed as the most consistent and powerful force in strengthening safety standards, revealing previously concealed defects and deterring manufacturers from cutting corners on safety for the goal of greater profits. The

> civil justice system is better placed than any other regulatory mechanism to ensure innovations develop in the safest manner possible.[40]

Suggestions of manufacturer immunity and no-fault insurance schemes may underestimate the court's ability to adapt to new technology.[41] On the other hand, strict liability may place liability on the wrong actor due to potential inability to locate the source of the problem. Overall, no liability system will fit perfectly into our imperfect world, but we must discover and implement the most viable option sooner rather than later.

1. Strict Liability

"Under a strict liability regime, the claimant need only prove the tort occurred and that the defendant is responsible. Holding vehicle makers accountable for crashes will be the only way to guarantee that humans and governments do not end up footing the bill for collisions over which they have no control."[42] Supporters believe a strict liability system would give victims of driverless vehicle accidents access to justice while simultaneously ensuring that manufacturers have an incentive to develop and construct safe vehicles.[43]

While strict liability is imposed on manufacturers for the shipment of defective products, operators assume responsibility for the consequences of their decision to utilize automated systems.[44] Essentially, the liability rests on the driver when the vehicle performs exactly as designed under a strict liability system. The issue is that in some circumstances, the driverless vehicle may perform exactly as it was designed but that performance could be

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[40] *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

[41] *Id.*

[42] *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

[43] *Id.*

[44] Elish and Hwang, *Praise the Machine! Punish the Human!* Date & Society Research Institute, May 18, 2015. https://www.datasociety.net/pubs/ia/Elish-Hwang_AccountabilityAutomatedAviation.pdf

contrary to the user's expectations by acting unpredictably or adversely towards the driver.[45] In turn, drivers could be held accountable for purchasing autonomous vehicles that perform to their standard, but react in an unpredictable fashion, leaving the driver stunned and responsible for accidents that were caused by other factors besides human error.

2. Designers and Engineers

Some propose "that the debate around liability and autonomous systems be reframed more precisely to reflect the agentive role of designers and engineers and the new and unique kinds of human action attendant to autonomous systems."[46] The ongoing race to produce driverless vehicles presents society with an opportunity to "reconfigure regimes of liability that reflect the realities of informational asymmetry between designers and consumers."[47]

Proponents maintain that human accountability remains important, but that both manufacturer and software designers should be accountable. It would be incongruous the consider the computation agent within driverless cars as an individual agent for liability purpose; instead, the computation agent should be considered an extension of the human agents, the designers and engineers, who developed the technology.[48] Manufactures appear, in fact, best positioned to control the risks of the systems they sell for two reasons:

> First, manufacturer possess extensive data about the performance of their systems under different conditions and have substantially greater expertise than consumers in assessing the level of risk presenting by their products. Second, manufacturers are able to influence the design of these systems at the lowest cost since they are the source of the goods and determine the design of the product before it enters the flow of commerce.[49]

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[45] Elish and Hwang, *Praise the Machine! Punish the Human!* Date & Society Research Institute, May 18, 2015. https://www.datasociety.net/pubs/ia/Elish-Hwang_AccountabilityAutomatedAviation.pdf

[46] *Id.*

[47] *Id.*

[48] Elish and Hwang, *Praise the Machine! Punish the Human!* Date & Society Research Institute, May 18, 2015. https://www.datasociety.net/pubs/ia/Elish-Hwang_AccountabilityAutomatedAviation.pdf

[49] *Id.*

As technology advances, it is suggested that a common liability regime will permit a more streamlined assessment of risks to manufactures and will also lower compliance costs.[50]

Opponents feel this scheme would place too much responsibility upon manufacturers and engineers and would stifle innovation. The problem is timing. When should manufacturers and engineers be responsible? In system malfunctions leading to accidents or in all accidents, regardless of system performance? There is still uncertainty regarding how this type of liability scheme would be implemented consistently across the board.

3. Corporate Immunity:

The following corporate immunity liability schemes include a no-fault system, industry self-regulation, and manufacturer immunity; each share a common level of immunity for manufacturers on the premise that these liability schemes will encourage innovation, and others will stifle innovation and progress.[51] However, the industry has shown that immunity is unnecessary to foster innovation, as several major manufacturers have pledged to accept full liability for their autonomous or semi-autonomous vehicles.[52]

a. No-fault insurance system

Accidents occurring under a pure no-fault system allow for automatic payment through an insurance company to pay any economic damages, regardless of fault, up to the policy limit; however, the party completely surrenders the right to sue a negligent driver for non-economic

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50 *Id.*

51 *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

52 Google, Volvo, and Mercedes Benz have all proactively pledged to accept full liability. Omri Ben-Shahar, *Should Carmakers Be Liable When a Self-Driving Car Crashes?* Forbes, September 2016, http://www.forbes.com/sites/omribenshahar/2016/09/22/should-carmakers-be-liable-when-a-self-drivingcarcrashes/#c48b6a81f409; see also *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

damages.[53] "No-fault insurance is intended to reduce auto insurance premiums by reducing the number of automobile accident cases in the courts, by restricting recovery for pain and suffering damages, and by providing limited payment for losses."[54]

The premise behind a no-fault insurance system rests on the idea that there will be a massive shift in liability from personal insurance to product liability as self-driving vehicles become commercially available.[55] Since, lawsuits will no longer involve the driver, there will be no insurance company to recover from; therefore, recovery will only come from suits against manufacturers due to product defects.[56] Proponents of a no-fault insurance system rely on the belief that this shift will result in verdicts against manufacturers so large that no-fault insurance would be necessary to protect corporations;[57] however, there is a lack of evidence showing that product defect litigation will dramatically increase in a way that would make a non-fault insurance system necessary.[58]

Opponents of the no-fault insurance system argue that it is not only unnecessary to protect corporations, but is also "costly, ineffective, and unjust."[59] At one point there were twenty-seven states that had enacted no-fault insurance; however,[60] not a single state currently

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53 Economic damages include medical bills, loss wages and the like. Non-economic damages include pain and suffering, loss of companionship, and the like. *No Fault Insurance Explained*, Allen Financial Insurance Group & The Equestrian Group, https://www.eqgroup.com /no-fault_explained/

54 *Id.*

55 *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

56 *Id.*

57 Denise Johnson, *Crash Avoidance Technology: Embrace With Caution,* Claims Journal, October 2012, http://www.claimsjournal.com/news/national/2012/10/29/216361.htm; see also *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

58 *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

59 *Id.*

60 *Id.*

operates a pure no-fault insurance system anymore.[61] History has shown that there is no actual reduction in litigation costs under this system.[62] Additionally, insurance rates are higher in no-fault states than in traditional liability state by an average of twenty-five percent.[63] States that had a no-fault system and later repealed the laws saw a ten to thirty percent drop in premiums.[64] Ultimately, no-fault insurance systems have historically been costly and ineffective.

b. Industry Self-regulation

To keep the government from over regulating and consequently halting innovation, car manufacturers are likely to push for industry self-regulation, suggesting they understand the technology best. Some even go so far as to suggest being permitted to self-certify, in which car manufacturers would actually set their own standards and then certify that they met those standards; thus, by doing so, manufacturers would be granted immunity.[65]

With multiple examples of car manufacturers abusing this type of self-certification and regulation scheme[66], opponents have a very real fear that manufactures will cover up defects as they have done in the past.[67]

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61 *No Fault Insurance Explained*, Allen Financial Insurance Group & The Equestrian Group, https://www.eqgroup.com /no-fault_explained/

62 The time and effort that insurers once spent defending litigation claims is not spent defending lawsuits brought by their own insured for failure to pay no-fault benefits. *No Fault Insurance Explained*, Allen Financial Insurance Group & The Equestrian Group, https://www.eqgroup.com /no-fault_explained/

63 *Id.*

64 James Anderson, Paul Heaton, Stephen Carroll, *The U.S. Experience with No-Fault Automobile Insurance,* RAND Corporation, 2010, http://www.rand.org/content/dam/rand/pubs/monographs/2010/RAND_MG860.pdf; see also *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

65 Alexander Stoklosa, *California Attempts to Wade Into the Uncharted Waters of Autonomous-Car Regulation,* Car and Driver, March 2014, http://blog.caranddriver.com/california-attempts-to-wade-into-the-uncharted-waters-of- autonomous-car-regulation/, see also *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

66 Some examples are as follows. Toyota's sudden acceleration problem a few years ago resulting in at least eighty-nine deaths. Takata's lethal airbag cover-up killing as many as fourteen people and remain installed in millions of vehicles. AP, *"Toyota "Unintended Acceleration" Has Killed 89,* CBS News, May 2010, http://www.cbsnews.com/news/toyota-unintended-accelerations-has-killed-89/; Hiroko Tabuchi, *Airbag, and Takata's Road*

c. Manufacturer Immunity

Some even take it a step further and call for full-fledged manufacturer immunity, arguing it would reduce production costs for manufacturers and encourage progress and innovation.[68] The typical model of such an immunity system is the Vaccine Court created by The National Vaccine Injury Act of 1986, which was "intended to provide a more expedient, more flexible, and less adversarial alternative to traditional tort litigation."[69] Because self-driving vehicles use machine learning to operate, determining all possible adverse events and programming responses, makes establishing an appropriate standard incredibly difficult.[70] There is a real concern by many that regardless of user errors or continued maintenance, that manufacturers will be held liable.[71] Adam Thierer, "an advocate of manufacturer immunity at the Mercatus Center at George Mason University, puts it, 'Just leave it to the tort system.'"[72]

Proponents are concerned with innovation, but unlike the vaccine industry when the Vaccine Court was created, the self-driving car industry is not plagued by a shortage of innovation. "Without the civil justice system's incentives towards safety, less safe products

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to a Deadly Crisis, New York Times, August 2016, http://www.nytimes.com/2016/01/27/business/takata-airbag-recall-crisis -html?_r=1; see also *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

67 Such as, General Motors' ten-year cover up of their defective ignition switch defect, which caused up tp 124 deaths. Kristen Korosec, *Ten times more deaths linked to faulty switch than GM first reported,* August 2015, http://fortune.com/2015/08/24/feinberg-gm-faulty-ignition-switch/; see also *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

68 Ryan Calo, *Open Robotics,* Maryland Law Review, 2011, http://papers.ssrn.com/sol3/papers.cfm?abstract_id-1706293. see also *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

69 Lauren Haertiein, *An Alternative Liability System for Autonomous Aircraft*, The Air & Space Lawyer, November 2018, https://heinonline.org/HOL/Page?handle=hein.journals/airspaclaw31&id=25&collection=journals&index=

70 *Id.*

71 *Id.*

72 *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf

enter the market, and individuals absorb the costs in the form of medical bills, lost income and increased insurance premiums."[73] In the end the immunity system is really just a policy that threatens Americans' constitutional rights and forces individuals to pay for corporate negligence.[74]

V. Conclusion:

Ready or not, here they come. It appears that some combination of liability schemes with detailed specifications for when one should be applied versus another would be the most just system; however, it would be tedious and difficult to implement consistently. Waiting until autonomous vehicle technology advances and hits the market will be too late to deal with the complex issues that are associated with self-driving vehicles and who should be liable. While there is no perfect option, there is definitely a good many to choose from. Only time will tell which option is functionally superior.

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[73] *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf; see also F. Patrick Hubbard, *'Sophisticated Robots': Balancing Liability, Regulation, and Innovation,* Florida Law Review, March 2014, https ://papers.ssrn.com/sol3/papers.cfm?abstract_id=2408557, at 83.

[74] *Driven to Safety: Robot Cars and the Future of Liability*, American Association for Justice, February 2017, https://www.justice.org/sites/default/files/Driven%20to%20Safety%202017%20Online.pdf