

THE WILD, WILD WEST: A CASE STUDY OF SELF-DRIVING¹ VEHICLE TESTING IN ARIZONA

Alexandra DeArman*

The tragic March 18, 2018 death of Elaine Herzberg, a pedestrian fatally hit by an Uber self-driving vehicle prototype, brought self-driving testing and technology to the forefront of national media. The laissez-faire attitude of Arizona's government in inviting such nascent technology into the state, without much forethought to the dangers it may bring, must be critically evaluated to set a safety-forward precedent for the rest of the country. A middle ground must be established through a legislatively-mandated taskforce equipped with the ability to regulate such industry, so that new self-driving vehicle technology can flourish, while the safety of the community can remain intact.

TABLE OF CONTENTS

INTRODUCTION	984
I. WHAT IS A SELF-DRIVING VEHICLE AND HOW IS IT DIFFERENT FROM OTHER AUTOMATION?.....	987
A. Potential Benefits of Self-Driving Vehicles	989
B. Potential Issues with Self-Driving Vehicles	991
C. The Future of Self-Driving Vehicles	993
II. HOW DID UBER END UP IN ARIZONA?.....	994
III. WHAT HAPPENED IN TEMPE, ARIZONA?.....	996

1. A conscious choice has been made to use “self-driving” (interchangeable with “automated,” “automation,” and “driverless” in everyday parlance and as may be used in any quoted material in this Note) to cover Level 4 automation and above (*see* Anderson, et al., *infra* note 28, at 3–4) in order to streamline the discussion with the labels commonly used by Uber in its promotional and informative materials and in many accessible news articles.

* J.D. Candidate, University of Arizona, James E. Rogers College of Law, 2020. I would like to thank my advisor, Jane Bambauer, my amazing colleagues and editors of *Arizona Law Review*, and my family and friends, especially Carol Moore, David Miller, and Elisheva Patterson, who were so supportive and willing to toss ideas around and provide feedback during the creation of this Note. I would also like to thank Mr. Gregory Rodriguez, whose podcast (*The Mobility Podcast*) and insight following Arizona Forward’s 2018 Tucson Autonomous Vehicle Town Hall inspired this Note.

A. Uber’s Findings & Reaction.....	997
B. NTSB’s Findings.....	999
C. Police Department Findings	1001
D. Implications for the Community	1002
E. Governor Ducey’s Reactions.....	1003
IV. WHERE TO GO FROM HERE?.....	1005
A. Responsibility of Uber	1005
B. Responsibility of the Governor’s Office	1008
C. Recommendations	1010

INTRODUCTION

On March 18, 2018, a self-driving Uber vehicle fatally struck 49-year-old Elaine Herzberg as she walked her bicycle midblock across Mill Avenue in Tempe, Arizona.² Although the 2017 Volvo XC90 was in auto-drive at the time of the accident,³ Rafaela Vasquez, an Uber employee, was present inside the vehicle as its “designated driver.”⁴ Vasquez’s responsibilities included monitoring important vehicle diagnostic messaging and intervening with manual operations in the event of a system failure.⁵ That night, however, Vasquez did not fulfill her official duties and was apparently watching *The Voice* moments before the accident.⁶ At the time of the fatal incident, Tempe had just become the newest hotbed of Uber’s self-driving vehicle testing after Governor Doug Ducey’s call for the industry to make Arizona its home.⁷ Despite Uber’s boastful claims of extensive safety protocols for public road testing,⁸ the damage was done. Herzberg became the first pedestrian to die due to a self-driving vehicle collision, and that self-driving vehicle happened to belong to Uber.⁹

2. NAT’L TRANSP. SAFETY BD., PRELIMINARY REPORT HIGHWAY HWY18MH010 1 (May 24, 2018), <https://www.nts.gov/investigations/AccidentReports/Reports/HWY18MH010-prelim.pdf>; Chris Coppola & BrieAnna J. Frank, *Report: Uber Driver Was Watching ‘The Voice’ Moments Before Fatal Tempe Crash*, AZCENTRAL (June 22, 2018, 10:36 AM), <https://www.azcentral.com/story/news/local/tempe-breaking/2018/06/21/uber-self-driving-car-crash-tempe-police-elaine-herzberg/724344002/>.

3. See NAT’L TRANSP. SAFETY BD., *supra* note 2, at 2 (“[The] systems included a collision avoidance function with automatic emergency braking, known as City Safety, as well as functions for detecting driver alertness and road sign information. All these Volvo functions are disabled when the test vehicle is operated in computer control but are operational when the vehicle is operated in manual control.”).

4. Coppola & Frank, *supra* note 2.

5. NAT’L TRANSP. SAFETY BD., *supra* note 2, at 2.

6. Coppola & Frank, *supra* note 2.

7. See Gabrielle Coppola, Ryan Beene & Dana Hull, *Arizona Became Self-Driving Proving Ground Before Uber’s Deadly Crash*, BLOOMBERG (Mar. 19, 2018, 6:09 PM), <https://www.bloomberg.com/news/articles/2018-03-20/arizona-became-self-driving-proving-ground-before-uber-s-deadly-crash> (last updated Mar. 20, 2019).

8. See, e.g., *id.*; David Shepardson, *Uber Sets Safety Review; Media Report Says Software Cited in Fatal Crash*, 37 No. 23 WESTLAW J. AUTO. 11 (May 16, 2018).

9. David Kiley, *First Death of a Pedestrian Struck by an Autonomous Vehicle May Set Tone for Lawyers and Liability*, FORBES (Mar. 19, 2018, 4:04 PM),

Uber's place in the lexicon of current culture is on par with brand royals like Google, Kleenex, Xerox, and Coke—once a reference to a specific rideshare phone application, it is now a generic verb for “technology-facilitated, on-demand transportation.”¹⁰ It does not matter if you actually use its largest competitor, Lyft,¹¹ or even the basic yellow taxi cab; calling a car via iPhone or Android now equates to the verb “Ubering.”¹² The company's ubiquity and meteoric rise has not only earned it the coveted place as the generic verb for ridesharing; it has also led to the development of “long-term technologies that advance Uber's mission”¹³ to ensure it stays a relevant leader in its field and brings “safe, reliable transportation to everyone, everywhere.”¹⁴

To that end, Uber is currently developing self-driving vehicle technology.¹⁵ The reasons for this technology development are likely twofold: first, to reduce human error and more efficiently serve Uber's more than 95 million monthly users;¹⁶ and second, to maximize profits by slashing costs related to Uber's network of 3.9 million drivers.¹⁷ Uber's drive to become a player in the self-driving vehicle market is understandable from a business perspective because it is projected to be worth over \$556 billion by the next decade.¹⁸ However, while self-driving vehicle development may favorably serve Uber's bottom line,¹⁹ such technologies are not

<https://www.forbes.com/sites/davidkiley5/2018/03/19/the-first-pedestrian-fatality-with-an-autonomous-vehicle-could-set-tone-for-lawyers-and-liability/#53124e633fd1>.

10. Evie Nagy, *Uber Is a Verb*, FAST CO. (Sept. 9, 2015), <https://www.fastcompany.com/3050660/uber-is-a-verb>.

11. Michal Lev-Ram, *How Lyft Could Defeat Uber*, FORTUNE (July 19, 2017), <http://fortune.com/2017/07/19/uber-vs-lyft-race/>.

12. Nagy, *supra* note 10.

13. *Uber and CMU Announce Strategic Partnership and Advanced Technologies Center*, UBER BLOG (Feb. 2, 2015), <https://www.uber.com/blog/uber-and-cmu-announce-strategic-partnership-and-advanced-technologies-center/>.

14. *Advanced Technologies Group*, UBER, <https://www.uber.com/info/atg/> (last visited Sept. 6, 2019).

15. *Id.*

16. E. Mazareanu, *Monthly Number of Uber's Active Users Worldwide from 2016 to 2019 (In Millions)*, STATISTA, <https://www.statista.com/statistics/833743/us-users-ride-sharing-services/> (last visited Aug. 9, 2019).

17. Mansoor Iqbal, *Uber Revenue and Usage Statistics (2018)*, BUS. OF APPS, <http://www.businessofapps.com/data/uber-statistics/> (last updated May 10, 2019); *see also* Rapier, *infra* note 19.

18. Kyle Wiggers, *Waymo Will Reportedly Launch a Commercial Driverless Car Service in Phoenix*, VENTURE BEAT (Nov. 13, 2018, 7:25 AM), <https://venturebeat.com/2018/11/13/waymo-could-launch-commercial-driverless-car-service-in-phoenix-as-early-as-december/> (finding that the “self-driving vehicle market is expected to be worth as much as \$556.67 billion by 2026, according to Allied Market Research, propelled by verticals such as food delivery and ride-hailing.”).

19. *See* Graham Rapier, *Uber Has Raised \$1 Billion for its Self-Driving Unit, Which is Now Valued at More Than \$7 Billion*, BUS. INSIDER (Apr. 19, 2019, 8:47 AM), <https://www.businessinsider.com/uber-atg-raises-1-billion-for-self-driving-from-softbank-toyota-valued-at-7-billion-valuation-2019-4> (explaining that in initial filings made by Uber

without risk to public safety if introduced onto public roads without clear, forward-looking safety protocols and safeguards in place.²⁰

This Note will attempt to unpack the legal issues surrounding Herzberg's untimely death by examining the roles and responsibilities of both Uber's self-driving vehicle program and Governor Ducey's recruitment of that industry to Arizona. Part I will explain what a self-driving vehicle is, clarify how self-driving vehicles differ from other automation technologies, and explore self-driving vehicles' potential benefits and potential issues. Part II will explain how Uber brought its self-driving cars to Arizona and the role Governor Ducey played in Uber's presence in the state. Part III will outline what happened in Tempe from both a technological and non-technological viewpoint. It will first detail Uber's findings on vehicle programming at the time of the fatal accident. It will then touch upon the National Transportation Safety Board's findings, the Tempe Police Department's findings, how Governor Ducey's office responded, and the ethical and safety considerations faced by the community. Part IV will evaluate Uber and Governor Ducey's respective responsibilities and recommend a taskforce, created by the legislature.²¹ This taskforce could prepare a comprehensive study on how such considerations play into the responsibilities and liabilities for companies like Uber, and government figures like Governor Ducey, as they advance such technology in Arizona and beyond.

This Note suggests that Arizona should create an advisory or regulatory entity to monitor self-driving vehicle companies. Such an entity would provide clarity of the responsibilities and liabilities the self-driving vehicle companies owe to the community, as well as notice of sanctions and mandates aimed at preventing future public safety incidents, such as Herzberg's death. Arizona's broad experience (both positive and negative) with self-driving vehicles on public roads gives the state a unique position to lead the country in safety measures and prevent future tragedies from occurring as self-driving vehicle technology advances across the country.

Many, if not most, decisions made by self-driving vehicles will be "benign and straightforward," such as deciding not to collide with other cars or obstacles.²²

in April 2019, "the company revealed that paying drivers was among its top expenses—removing them from the equation could help Uber reach profitability.").

20. See, e.g., Ashley Nunes, Bryan Reimer & Joseph F. Coughlin, *People Must Retain Control of Autonomous Vehicles*, 556 NATURE 169–71 (2018), <https://www.nature.com/articles/d41586-018-04158-5> (discussing the lack of legislation for autonomous vehicle development and its impact on liability and safety concerns for the community).

21. Legislation is necessary for Arizona to integrate its allowance of self-driving vehicle testing on its roads with the best practices suggested by the Department of Transportation and National Highway Traffic Safety Administration. See *infra* note 213. See generally NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., AUTOMATED DRIVING SYSTEMS 2.0: A VISION FOR SAFETY 19–21 (Sept. 2017), https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/13069a-ads2.0_090617_v9a_tag.pdf.

22. Mark Weston, *Liability and Risk in Programming Autonomous Vehicles*, CPO MAG. (Aug. 1, 2018), <https://www.cpomagazine.com/2018/08/01/liability-and-risk-in-programming-autonomous-vehicles/>.

But occasionally a self-driving vehicle may have to decide an action which may result in injury or fatality, and “it is in these scenarios that the ethical underpinning of the programming will be squarely in the legal (and moral) spotlight.”²³

The challenge will be to “ensure [it] make[s] moral sense. Programming a robot car to slavishly follow the law, for instance, might be foolish and dangerous. Better to proactively consider ethics now than defensively react after a public backlash in national news.”²⁴ Because the legal framework for self-driving vehicles in Arizona has yet to be developed, the opportunity exists to create laws and policies informed by safety.

If Arizona wants to attract innovative technology and business, per Governor Ducey’s campaign slogans and speeches,²⁵ then it also has to lead in innovative safety regulation. Arizona can accomplish this by constructively reflecting on its past experiences to establish a model for other states and companies interested in self-driving vehicle technology.

I. WHAT IS A SELF-DRIVING VEHICLE AND HOW IS IT DIFFERENT FROM OTHER AUTOMATION?

People constantly interact with and depend on automated, self-regulating machines throughout the day. For example, a Keurig Coffee Maker consistently delivering an appropriately warmed eight-ounce cup of coffee at the press of a button or an elevator rising from the basement-level parking garage to the 43rd story of a downtown office. The human experience of stepping into a “machine space”—an elevator, city bus, or Honda Accord—is usually predictable and commonplace.

The expected outcome with these everyday self-regulating machines is understood and limited. Interactions with such machines are directed by human input. With Keurigs and elevators, the user must press a button to control the machine’s actions and movements; with city buses and Honda Accords, the driver must press the brake or pedal and steer the wheel to dictate the vehicle’s speed, direction, and angle of motion. In each case, human agency plays the primary role in user interaction and safety considerations.

23. *Id.*

24. Patrick Lin, *The Ethics of Autonomous Cars*, ATLANTIC (Oct. 8, 2013), <https://www.theatlantic.com/technology/archive/2013/10/the-ethics-of-autonomous-cars/280360/>. It is worth acknowledging that the concept of ethics is outside the focus of this Note—it would be hard, if not impossible, for a regulatory agency or legislature to test and enforce “ethics” in this regard.

25. See DOUG DUCEY GOVERNOR, <https://dougducey.com/> (last visited Jan. 16, 2019) (the slogan is “Securing Arizona’s Future”); OFFICE OF THE GOVERNOR DOUG DUCEY, *Governor Ducey Delivers Second Inaugural Address*, AZ GOVERNOR (Jan. 7, 2019), <https://azgovernor.gov/governor/news/2019/01/governor-ducey-delivers-second-inaugural-address> (stating in his second inaugural address that “Arizona is open for business, government has gotten out of the way”); Steven G. Zylstra, *Here’s Why Arizona’s Technology Sector Is Booming*, AZ BIG MEDIA (Sept. 10, 2018), <https://azbigmedia.com/heres-why-arizonas-technology-sector-is-booming/>.

Self-driving vehicles are a wholly different beast—they “occupy a middle ground that has little or no comparator today among [machine] entities.”²⁶ As a general definition in the context of this Note,²⁷ self-driving vehicles are “vehicles that drive themselves without human supervision or input.”²⁸ And “without human input,” means that a human makes no instantaneous choice to take one action or another,²⁹ such as pressing a button to dictate which desired coffee cup size or floor number. Self-driving vehicles’ “movement choices are made by computer systems, not by humans.”³⁰

However, humans remain involved in creating the foundational programming of the vehicle’s abilities.³¹ Uber’s self-driving vehicle system mixes “pure” technology and human instruction.³² For Uber’s fleet, the pure technology system involves components like 64 laser beams on top of the vehicles that “constantly sweep the area to detect and measure the distance of objects around it.”³³ In turn, that data allows the vehicle to build three-dimensional internal maps.³⁴ Uber also uses “sensors to ‘localize’ the car. The car’s tires are equipped with encoders, which allow it to sense how many times it has turned over or what fraction it has turned, so the car can calculate how far it’s moved.”³⁵ Those inputs are processed by software that “plots a path, and sends instructions to the vehicle’s ‘actuators,’ which control acceleration, braking, and steering.”³⁶ The self-driving vehicles use this kind of data along with human-programmed “[h]ard-coded rules, obstacle avoidance algorithms, predictive modeling, and ‘smart’ object discrimination (ie [sic], knowing the difference between a bicycle and a motorcycle) [to] help the software follow traffic rules and navigate obstacles.”³⁷

While fully self-driving vehicles are not yet available to consumers, “prototype research vehicles,” such as Uber’s self-driving Volvo fleet, are currently

26. Harry Surden & Mary-Anne Williams, *Technological Opacity, Predictability, and Self-Driving Cars*, 38 CARDOZO L. REV. 121, 130 (2016).

27. See *supra* note 1.

28. Surden & Williams, *supra* note 26, at 121. This Note is solely addressing the preliminary testing by Uber and others in preparation for “Level 4” of the National Highway Traffic Safety Administration (“NHTSA”) vehicle automation levels, meaning “the car can drive itself without a human driver.” James M. Anderson et al., *Autonomous Vehicle Technology: A Guide for Policymakers*, RAND CORP. xiii (2016), https://www.rand.org/pubs/research_reports/RR443-2.html.

29. Surden & Williams, *supra* note 26, at 129.

30. *Id.* at 130.

31. Xavier Harding, *Pitt Stop: Inside Uber’s Driverless Car Experiment*, POPULAR SCI. (Sept. 13, 2016), <https://www.popsoci.com/uber-raffi-krikorian-driverless-car>.

32. See *id.*

33. *Id.*

34. *Id.*

35. *Id.*

36. UNION OF CONCERNED SCIENTISTS, *Self-Driving Cars Explained*, <https://www.ucsusa.org/clean-vehicles/how-self-driving-cars-work#.XEZqf89Kj-Y> (last updated Feb. 21, 2018).

37. *Id.*

on the road.³⁸ For example, Uber's self-driving cars resumed testing in Pittsburgh nine months after the fatal Tempe incident.³⁹ In contrast to the pure technology, it is likely that the human-involved programming is what causes many of the issues that arise with self-driving vehicles.⁴⁰ As Aviral Shrivastava, a computer science associate professor in Arizona State University's Ira A. Fulton School of Engineering, explained:

Google, Uber and others in the field are using humans to teach cars how to drive themselves . . . And that's the problem. They are learning from human drivers, all of whom are fallible, and the autonomous cars are in turn mirroring our unsafe driving behaviors . . . The autonomous car industry is trying to walk a line between a human-like driving experience and guaranteed safety. At the moment, the familiarity of human-like driving is the norm and puts safety at risk.⁴¹

This technology deserves—and even demands—the need for legislative policymaker awareness and proactive monitoring and oversight.

A. Potential Benefits of Self-Driving Vehicles

The potential for self-driving vehicle technology to beneficially reinvent personal transportation cannot be overstated—“it is clear that autonomous vehicles can improve the landscape of transportation safety and revolutionize how we travel”⁴²—by substantially improving safety, mobility, and congestion.⁴³

Today's reliance on human-driven vehicles carries substantial social costs, including such externalities as “accidents, congestion, noise, air pollution, and greenhouse gas (GHG) emissions.”⁴⁴ According to preliminary estimates for 2018 by the National Safety Council, motor vehicles accounted for 40,000 fatalities and “[m]otor vehicle deaths for January through June 2019 totaled 18,580 . . . [at an] estimated cost [to society] of . . . \$191.7 billion.”⁴⁵ In Arizona alone, there were

38. Surden & Williams, *supra* note 26, at 133.

39. Andrew J. Hawkins, *Uber's Self-Driving Cars Return to Public Roads for the First Time Since Fatal Crash*, VERGE (Dec. 20, 2018, 8:00 AM), <https://www.theverge.com/2018/12/20/18148946/uber-self-driving-car-return-public-road-pittsburgh-crash>.

40. *Human Influence Makes Autonomous Vehicle Programming Unsafe: Professor*, INS. J. (Mar. 29, 2018), <https://www.insurancejournal.com/news/national/2018/03/29/484726.htm>.

41. *Id.* (internal quotation marks and citations omitted).

42. Kevin Funkhouse, Note, *Paving the Road Ahead: Autonomous Vehicles, Products Liability, and the Need for a New Approach*, 2013 UTAH L. REV. 437, 438 (2013).

43. Anderson, et al., *supra* note 28, at 9.

44. *Id.* at 10.

45. NAT'L SAFETY COUNCIL, *Preliminary Estimates* (2019), <https://injuryfacts.nsc.org/motor-vehicle/overview/preliminary-estimates/> (last visited Oct. 14, 2019). The National Safety Council figures include “both traffic and nontraffic deaths that occur within a year of the accident,” which differs from the National Highway Traffic Safety Administration's method of counting “only traffic deaths that occur within 30 days of the accident.” NAT'L SAFETY COUNCIL, *Preliminary Estimates: Motor Vehicle Deaths Plateaued*

127,064 total crashes in 2017, 919 of which were fatal (killing a total of 1,000 individuals), resulting in \$10.765 billion in economic loss to the state.⁴⁶

In light of such staggering statistics, it is no surprise that many find the promise of an improved transportation landscape through research and development of self-driving vehicle technology so appealing. Many echo the feelings of Waymo's current chief safety officer, Deborah A.P. Hersman, who explained "[t]he price we are paying for mobility is 40,000 lives each year This is a stark reminder that our complacency is killing us. The only acceptable number is zero; we need to mobilize a full court press to improve roadway safety."⁴⁷ Governor Ducey also explained that his support of self-driving vehicle testing and operation is "about innovation, economic growth, and most importantly, public safety."⁴⁸

Another area of improvement promised by self-driving vehicles, for both specific users of the technology and society as a whole, is access to transportation for individuals unable to drive, such as those with visual impairment or certain physical or mental disabilities, the elderly, and children under the age of 16.⁴⁹ Potential access to self-driving vehicles for such individuals could lead to "personal independence, reduction in social isolation, and access to essential services."⁵⁰ It could also lead to reduced costs for the larger society by reducing the amount of money that existing public transit agencies expend each year for on-demand paratransit services.⁵¹

Self-driving vehicles could also improve time spent on the road by making commuting and traveling more efficient and reducing congestion.⁵² For example:

in 2017, But Still Up 6% From 2015 (Mar. 27, 2018), <https://www.nsc.org/in-the-newsroom/preliminary-estimates-motor-vehicle-deaths-plateaued-in-2017-but-still-up-6-from-2015>.

46. ARIZ. DEP'T TRANSP., 2017 MOTOR VEHICLE CRASH FACTS FOR THE STATE OF ARIZONA (2018), <https://azdot.gov/sites/default/files/2018/10/2017-crash-facts.pdf>.

47. Andrea Leptinsky, *This April, Commit to Just Driving. Say 'No' to Distracted Driving.*, I DRIVE SAFELY (2019), <https://www.idrivesafely.com/defensive-driving/trending/april-commit-just-driving-say-no-distracted-driving> (last visited Oct. 14, 2019). Prior to working at Waymo, Deborah A.P. Hersman was the President and CEO of the National Safety Council. Eric Miller, *Deborah Hersman to Leave National Safety Council for Safety Post at Waymo*, TRANSPORT TOPICS (Nov. 27, 2018, 4:45 PM), <https://www.ttnews.com/articles/deborah-hersman-leave-national-safety-council-safety-post-waymo>.

48. Scott Neuman, *Arizona Governor Helped Make State 'Wild West' For Driverless Cars*, NPR (Mar. 20, 2018, 4:18 AM), <https://www.npr.org/sections/thetwo-way/2018/03/20/595115055/arizona-governor-helped-make-state-wild-west-for-driverless-cars> (internal quotations omitted).

49. See Anderson et al., *supra* note 28, at 16–17.

50. *Id.* at 17 (internal citation omitted).

51. *Id.* (finding that public transit agencies spend 14–18% of their budget on such services). Although outside the scope of this Note, one challenge to consider with this type of "benefit" is the potential issues that may arise in outsourcing critical public services (such as paratransit services) to a private company, such as Uber.

52. *Id.*

Automation allows real-time traffic information to help cars anticipate what's ahead, then slow down to avoid disruptions It also helps that there is no reaction time in an automated car. Self-driving cars become synchronized. They communicate with one another, signaling disturbances ahead, and adjust to the optimal speed to not create a backup.⁵³

However, these scenarios remain speculative due to problems with accurately predicting the extent of self-driving vehicles' ability to improve the flow of commuters' daily drives.⁵⁴ For example, manual drivers may "cut off driverless cars, screwing up their flow."⁵⁵ Also, if traffic is improved by self-driving vehicle technology, thereby lessening road congestion, more vehicles (whether automated or manual) are likely to begin using the road, so "basically it will become congested because it's supply and demand."⁵⁶ Yet the potential for a perhaps rush-hour-free commute in the future may outweigh any negative speculation for self-driving vehicle developers and the community.⁵⁷

B. Potential Issues with Self-Driving Vehicles

Despite the many benefits touted by supporters of self-driving vehicles, their potential issues must be kept in perspective. One of the overarching challenges involves the actual roll-out of self-driving vehicles on the road.⁵⁸ As companies like Uber continue to test and fine-tune their self-driving vehicle technologies, human-

53. Yuki Noguchi, *Self-Driving Cars Could Ease Our Commutes, But That'll Take a While*, NPR (Feb. 10, 2017, 4:45 AM), <https://www.npr.org/sections/alltechconsidered/2017/02/10/514091049/self-driving-cars-could-ease-our-commutes-but-thatll-take-a-while>; see also HNTB, *Connected and Automated Vehicles*, <https://www.hntb.com/Newsroom/Media-Kits/Intelligent-Transportation-Systems> (last visited Aug. 11, 2019) (giving a brief discussion, as well as informative links to outside sources, regarding the necessary interconnectivity and reworking of transportation network infrastructure needed to make self-driving vehicles workable and successful in today's cities).

54. Anderson et al., *supra* note 28, at 17.

55. Noguchi, *supra* note 53.

56. *Id.* (quoting Hesham Rakha, "an engineering professor at Virginia Tech who studies traffic's flow—or lack thereof.").

57. See, e.g., Phil Bernstein, *Goodbye, Rush Hour. Hello, Autonomous Cars and a Future Without Any Traffic*, REDSHIFT (Jan. 15, 2015), <https://www.autodesk.com/redshift/goodbye-rush-hour-hello-autonomous-cars/>. Bernstein explains:

The changeover to [a self-driving vehicle] system will probably resemble the switch from cash tolls to E-ZPass. You can still pay a toll in cash today, but you end up sitting in a long line of cars. However, if you use the automated system, you just keep driving right through the gates. The change didn't happen right away—it took a while for everyone to get with the program, literally. And that same gradual approach—and social shift—will probably happen with driving automation, too. First one autonomous lane, then two, and as people see how more efficiently those people are traveling, they will want to join the autonomous party.

Id.

58. Brian A. Browne, *Self-Driving Cars: On the Road to a New Regulatory Era*, 8 CASE W. RESERVE J.L. TECH. & INTERNET 1, 4–5 (2017).

driven vehicles, along with walking and bicycling, continue to be the dominant modes of transportation.⁵⁹ Without a clear game plan for rolling out self-driving vehicles, “it is likely that accidents will result from the confusion between computer-driven and human-driven vehicles.”⁶⁰ It may also be difficult for pedestrians and fellow human drivers alike to predict how self-driving vehicles will react.⁶¹

As self-driving vehicle technology becomes commercially available, especially in the realm of “semi-autonomous vehicles,” or vehicles that “require the driver to remain alert and ready to intervene in the car’s regular operation,”⁶² it is foreseeable that drivers will begin to make use of their newly-found freedom to text, read, etc., instead of remaining vigilant to prevent accidents and react if necessary.⁶³ If drivers or riders of semi-autonomous vehicles fail to be active or “place too much trust in their cars,” or both, they may place themselves in situations where the quick decisions necessary to prevent a collision become impossible to make⁶⁴—like what occurred in the fatal Tempe collision.⁶⁵

In addition to the potential danger of self-driving vehicles, other issues will come into play in determining when such vehicles enter the consumer market, including “liability for crashes, insurance markets, traffic laws, infrastructure needs, privacy, cybersecurity, and ethical concerns.”⁶⁶ One potential issue, which is especially relevant in today’s world of data breaches, is deliberate attempts by third-party adversaries to abuse or exploit self-driving vehicle systems.⁶⁷

For example, there is the possibility of self-driving vehicles being used in a crime, such as drug or sex trafficking, by erasing the need for a complicit driver.⁶⁸ Since self-driving vehicles “rely at least in part on some kind of connectivity with other vehicles, infrastructure, or the internet,” there are also many potential opportunities for destructive behavior to affect self-driving vehicles.⁶⁹ At the extreme, terrorists could use cybersecurity vulnerabilities to remotely “utilize numerous vehicles to attack critical infrastructure [which] could cause mass casualties or sow panic.”⁷⁰

59. *Id.* at 5.

60. *Id.*

61. *Id.*

62. *Id.*

63. *Id.*

64. *Id.*

65. *See infra* Part III.

66. Melissa Bauman, *Why Waiting for Perfect Autonomous Vehicles May Cost Lives*, RAND CORP. (Nov. 7, 2017), <https://www.rand.org/blog/articles/2017/11/why-waiting-for-perfect-autonomous-vehicles-may-cost-lives.html>.

67. Laura Fraade-Blanar et al., *Measuring Automated Vehicle Safety*, RAND CORP. 52–53 (2018), https://www.rand.org/pubs/research_reports/RR2662.html.

68. This issue was raised by a law enforcement officer at the Arizona Forward Autonomous Vehicle Town Hall. Ariz. Forward Town Hall at Tucson Elec. Power, in Tucson, Ariz. (Dec. 4, 2018).

69. Fraade-Blanar et al., *supra* note 67, at 53.

70. *Id.*

There are also concerns about less extreme behavior that would normally present no real danger to everyday drivers of conventional vehicles.⁷¹ For example, although regular drivers are usually not affected by graffiti, such as the addition of “collaborate and listen” to a stop sign,⁷² a recent study “showed [self-driving vehicles] could be fooled or confused by defaced road signs.”⁷³

In general, as self-driving vehicle technology advances and more self-driving cars enter the roadways, “they must be robust to the chaos that they will encounter—not just from the environment and the mistakes of other road users, but also from deliberate attempts, malevolent or otherwise, to interact in undesirable ways.”⁷⁴ Companies like Uber, as well as state regulatory bodies, must keep these potential risks in view when rolling out public-road testing programs—“[w]ithout appropriate governance structures and polices, rapid deployment of [self-driving vehicles] could actually worsen our transportation problems.”⁷⁵

C. *The Future of Self-Driving Vehicles*

Determining where to appropriately reconcile the benefits with the issues of self-driving vehicles is critical for the future of self-driving vehicles and public acceptance.⁷⁶ However, it is likely impossible to define an exact safety standard threshold that is satisfactory to everyone.⁷⁷ To reach the life-saving standards necessary to justify self-driving vehicles on the road, such vehicles must be given a place on the road to improve and learn because “[t]he machine learning algorithms that govern their performance rely largely on experiencing various road conditions and situations to improve. The more miles that autonomous vehicles travel—on different roads, in different environments, and under various weather conditions—the more quickly their safety improves.”⁷⁸

Self-driving vehicles will undoubtedly face no-win scenarios while on the road, just as many conventional drivers do.⁷⁹ However, people are more inclined to understand and empathize with the no-win, split second choices made by conventional drivers, “such as swerving into incoming traffic rather than the other way into a field.”⁸⁰ Self-driving vehicle software must not only be able to make such a decision, but must also be able to overcome the possible issue of programming

71. *Id.* at 54.

72. *See, e.g.,* Cara (@CaraMaya), FLICKR (Apr. 15, 2007), <https://www.flickr.com/photos/caramaya/459831631>.

73. Fraade-Blanar et al., *supra* note 67, at 54.

74. *Id.*

75. Austin Brown et al., *Federal, State, and Local Governance of Automated Vehicles*, UC DAVIS (Dec. 2018), https://policyinstitute.ucdavis.edu/wp-content/uploads/AV-Governance_IssuePaper_1218.pdf.

76. *See, e.g.,* Gillian Yeomans, *Autonomous Vehicles Handing Over Control: Risks and Opportunities in Insurance*, LLOYD’S 6 (Mar. 2014), <https://www.lloyds.com/news-and-risk-insight/risk-reports/library/technology/autonomous-vehicles>.

77. *See* Weston, *supra* note 22.

78. Bauman, *supra* note 66.

79. Lin, *supra* note 24.

80. *Id.*

bias because “not all of the world subscribes to the same moral philosophy. Different cultures and societies would choose a different option” in certain scenarios.⁸¹ Nevertheless, according to a survey undertaken by MIT’s Moral Machine Experiment, there are a few globally agreed upon preferences when it comes to programming self-driving vehicles.⁸² In general, the survey found that most prefer sparing the lives of humans over animals, sparing the lives of many people over a few, and preserving the lives of the young over the old.⁸³

Proponents, programmers, designers, and developers of self-driving vehicles must be proactive and hyper-focused in furthering self-driving vehicle technology in Arizona and beyond because they do not have the “luxury [of forgiveness in the face of a serious public safety incident], since they *do* have the time to get it right and therefore bear more responsibility for bad outcomes.”⁸⁴ If it is Arizona’s goal to continue to allow self-driving vehicles on its roads, Governor Ducey and the State’s legislature and regulatory bodies must take charge of this opportunity to create an appropriate and proactive regulatory framework with such ethical considerations in mind.

II. HOW DID UBER END UP IN ARIZONA?

Governor Ducey’s pro-business agenda has allowed Arizona, and especially the Phoenix area, to flourish as a hub of innovation and technology.⁸⁵ His campaign slogans involved business-centric themes such as “Securing Arizona’s Future” with a focus on the state being “open for business.”⁸⁶ Governor Ducey’s focus on economic development, and enticement of technology companies to Arizona to fulfill that economic focus, is apparent in the wording of his executive orders and his public statements.⁸⁷

On August 25, 2015, Arizona Governor Ducey signed a permissive Executive Order declaring that it was within “Arizona’s interest to support the development of [self-driving] vehicle technologies, by allowing testing and operation of self-driving vehicles on certain public roads, in order to continue to

81. Weston, *supra* note 22.

82. Peter Dizikes, *How Should Autonomous Vehicles Be Programmed?*, MIT NEWS (Oct. 24, 2018), <http://news.mit.edu/2018/how-autonomous-vehicles-programmed-1024>.

83. *Id.*

84. Lin, *supra* note 24.

85. *See Arizona Leaders Form InvisionAZ to Accelerate Technology Growth*, AZ BIG MEDIA (Mar. 16, 2018), <https://azbigmedia.com/arizona-leaders-form-invisionaz-accelerate-technology-growth/>; OFFICE OF THE GOVERNOR DOUG DUCEY, *Infosys to Open Technology and Innovation Hub in Arizona, Hire 1000 Workers*, AZ GOVERNOR (Sept. 20, 2018), <https://azgovernor.gov/governor/news/2018/09/infosys-open-technology-and-innovation-hub-arizona-hire-1000-workers>.

86. *See* DOUG DUCEY GOVERNOR, <https://dougducey.com/> (last visited Jan. 16, 2019); Steven G. Zylstra, *Here’s Why Arizona’s Technology Sector is Booming*, AZ BIG MEDIA (Sept. 10, 2018), <https://azbigmedia.com/heres-why-arizonas-technology-sector-is-booming/>.

87. *Infra* notes 88–92; *see* OFFICE OF THE GOVERNOR DOUG DUCEY, *supra* note 25.

advance the technology.”⁸⁸ He ushered in a seemingly unencumbered opportunity for Uber to test its new technologies in Arizona:

Arizona welcomes Uber self-driving cars with open arms and wide-open roads. While California puts the brakes on innovation and change with more bureaucracy and more regulation, Arizona is paving the way for new technology and new businesses. In 2015, I signed an executive order supporting the testing and operation of self-driving cars in Arizona with an emphasis on innovation, economic growth, and most importantly, public safety. This is about economic development, but it’s also about changing the way we live and work. Arizona is proud to be open for business. California may not want you, but we do.⁸⁹

The August 2015 Executive Order set out requirements that: (1) the self-driving vehicle must be operated only by an employee, contractor, or otherwise authorized entity developing self-driving technology; (2) self-driving vehicles must be monitored by an operator with the ability to direct the vehicle’s movement if required; (3) the self-driving vehicle operator must be licensed to operate a vehicle in the United States; and (4) the self-driving vehicle owner must submit proof of financial responsibility in an amount and on a form established by the Director of the Arizona Department of Transportation.⁹⁰ However, the question as to consumer and community protection in interacting with self-driving vehicles, as well as to liability in the event of an accident, remained unaddressed.⁹¹

A follow-up Executive Order in March 2018 further developed rules and regulations involving self-driving vehicles.⁹² However, procedures for addressing liability for public safety incidents and consumer and community protection in interacting with self-driving vehicles remained elusive, which prompted some to describe “Arizona as ‘the wild west of robot car testing.’”⁹³ As one safety advocacy non-profit group, Consumer Watchdog, explained: “there is no regulation in place,

88. Ariz. Exec. Order No. 2015-09 (Aug. 25, 2015), <https://azgovernor.gov/file/2660/download?token=nLkPLRi1> [hereinafter Governor Ducey’s Order].

89. OFFICE OF THE GOVERNOR DOUG DUCEY, *Governor Ducey Tells Uber ‘CA May Not Want You, But AZ Does,’* AZ GOVERNOR (Dec. 22, 2016), <https://azgovernor.gov/governor/news/2016/12/governor-ducey-tells-uber-ca-may-not-want-you-az-does>. The California Department of Motor Vehicles canceled the registrations of all Uber self-driving vehicles in December 2016 after one of the vehicles ran a red light, forcing Uber to shutter its testing on California roads and to seek deployment of its testing somewhere else. Mary Papenfuss, *California Pulls the Plug on Uber’s Self-Driving Car Experiment*, HUFFPOST (Dec. 22, 2016, 1:00 PM), https://www.huffpost.com/entry/california-stops-uber-self-driving-cars_n_585bda66e4b0d9a594573319.

90. Governor Ducey’s Order, *supra* note 88.

91. *See id.*

92. Ariz. Exec. Order 2018-04 (Mar. 1, 2018), <https://azgovernor.gov/file/12514/download?token=-HhY7Q01>.

93. Neuman, *supra* note 48.

in the state. That's why Uber and Waymo test there. When there's no sheriff in town, people get killed."⁹⁴

III. WHAT HAPPENED IN TEMPE, ARIZONA?

On March 18, 2018, at around 9:58 p.m., a self-driving Uber vehicle going 38 mph in self-driving mode fatally struck 49-year-old Elaine Herzberg and her bicycle as she was walking her bicycle midblock on Mill Avenue in Tempe, Arizona.⁹⁵ Although the vehicle, a 2017 Volvo XC90, was "factory equipped with several advanced driver assistance functions by Volvo Cars, the original manufacturer,"⁹⁶ Uber had disabled the emergency braking and collision avoidance capabilities "to reduce the potential for erratic vehicle behavior."⁹⁷ And although the self-driving vehicle was in auto-drive at the time of the accident,⁹⁸ Rafaela Vasquez, an Uber employee, was the "designated driver" of the vehicle, tasked with taking "manual control of the SUV if anything went wrong"⁹⁹ in the event of a system failure. As Uber told the National Transportation Safety Board:

the developmental self-driving system relies on an attentive operator to intervene if the system fails to perform appropriately during testing. In addition, the operator is responsible for monitoring diagnostic messages that appear on an interface in the center stack of the vehicle dash and tagging events of interest for subsequent review.¹⁰⁰

However, Vasquez was apparently watching *The Voice* moments before the crash occurred and not fulfilling her required "designated driver" responsibilities, despite Uber's boasts about extensive safety protocols in place for the testing of its self-driving vehicles on public roads.¹⁰¹ At the time of the fatal incident, Tempe had recently become the newest location of Uber's self-driving vehicle testing due to Governor Ducey's recruiting pitches of the emerging industry and the state's laissez-faire attitude toward regulation of the technology.¹⁰²

94. *Id.* (internal quotations omitted).

95. Ray Stern, *Ducey's Drive-By: How Arizona Governor Helped Cause Uber's Fatal Self-Driving Car Crash*, PHX. NEW TIMES (Apr. 12, 2018, 7:00 AM), <https://www.phoenixnewtimes.com/news/arizona-governor-doug-ducey-shares-blame-fatal-uber-crash-10319379>.

96. *See* NAT'L TRANSP. SAFETY BD., *supra* note 2, at 2.

97. Devin Coldeway, *Uber in Fatal Crash Detected Pedestrian But Had Emergency Braking Disabled*, TECHCRUNCH (May 24, 2018, 11:18 AM), <https://techcrunch.com/2018/05/24/uber-in-fatal-crash-detected-pedestrian-but-had-emergency-braking-disabled/>. The reason for disabling such safety features is not clear, but it arguably "reflects extremely poorly on Uber . . . [as it was not] just a safety issue . . . [it was] a failure of judgement by Uber, and one that cost a person's life." *Id.*

98. *Id.*

99. Stern, *supra* note 95.

100. *See* NAT'L TRANSP. SAFETY BD., *supra* note 2, at 2.

101. *See, e.g.*, Coppola & Frank, *supra* note 2; NAT'L TRANSP. SAFETY BD., *supra* note 2, at 3; Shepardson, *supra* note 8.

102. *See* Coppola, Beene & Hull, *supra* note 7.

The divergent findings and reactions of Uber, the National Transportation Safety Board (“NTSB”), the Tempe Police Department, the Arizona community, and Governor Ducey’s office speak to the lack of comprehensive and cohesive opinions on the impact and implications of Herzberg’s death.¹⁰³ The development of a legal and regulatory framework is sorely needed in Arizona for three reasons: (1) to prevent future tragedies and to direct self-driving vehicle companies as to their responsibilities; (2) to guide governmental bodies and agencies in their investigations in the event of a public safety incident and in their continued monitoring and regulating of self-driving vehicles on the roads; and (3) to aid the community in accepting self-driving vehicles and navigating their shared and mixed-use public road spaces.

A. *Uber’s Findings & Reaction*

According to Uber’s investigation into the fatal collision, the likely cause of the accident was “a problem with the software that decides how the car should react to objects it detects.”¹⁰⁴ The software used in Uber’s self-driving cars is programmed to allow the vehicle to ignore false positives, or “objects in its path that wouldn’t actually be a problem for the vehicle, such as a plastic bag floating over a road.”¹⁰⁵ In the case of Herzberg’s death, Uber’s preliminary conclusion (released prior to the NTSB’s comprehensive report¹⁰⁶) was that the software was tuned to react less to such false positives and that “the tuning went too far.”¹⁰⁷

Although the car’s sensors detected Herzberg and her bicycle, the software determined it did not need to react right away.¹⁰⁸ Uber found that the “perception” software, i.e., the part of the self-driving vehicle that “combines data from the car’s cameras, lidar and radars to recognize and ‘label’ objects around it,” was in working condition and recognized Herzberg as an object in the vehicle’s path.¹⁰⁹ However, the “problem was what the broader system chose to do with that information.”¹¹⁰

Uber’s motivation for programming a false-positive allowance stems from its desire to develop a self-driving car that delivers a smooth and safe ride to its customers.¹¹¹ By Uber’s standards, a vehicle that constantly flags false positives, such as unnecessarily maneuvering to avoid roadside rubbish, delivers not only a jerky ride but an unsafe one as well.¹¹² Thus, “people who have recently ridden in [competing self-driving vehicle made by companies like] Waymo and General

103. See *infra* Sections III.A.–E.

104. Amir Efrati, *Uber Finds Deadly Accident Likely Caused by Software Set to Ignore Object on Road*, INFO. (May 7, 2018, 9:48 AM), <https://www.theinformation.com/articles/uber-finds-deadly-accident-likely-caused-by-software-set-to-ignore-objects-on-road>.

105. *Id.*

106. See generally *infra* Section III.B.

107. Efrati, *supra* note 104.

108. *Id.*

109. *Id.*

110. *Id.*

111. *Id.*

112. *Id.*

Motors' Cruise . . . say the ride can be jerky, with sudden pumping of the brakes even though there's no threat in sight."¹¹³

However, while Uber's desire to create an enjoyable riding environment for its customers is understandable, its failure to implement industry standards, namely having a second rider in its beta self-driving vehicles while on the road, is not as clear.¹¹⁴ Most other self-driving vehicle technology beta-test programs require not only the "safety driver" (i.e., Vasquez in the Tempe incident), but also an employee in the passenger seat to take notes about any issues that may arise and to assumedly take the role of an extra safety-net for any unforeseen issue that may arise;¹¹⁵ however, Uber had removed that post from some of its Arizona testing.¹¹⁶ Although "[i]t's unclear how useful a second person would be, from a safety perspective,"¹¹⁷ the optics of removing that person from the vehicle for testing on an actual road is not favorable in light of Herzberg's death. It also does not help that Uber initially declined to comment on whether any employees had been disciplined for what happened in Tempe.¹¹⁸ When Uber's testing ended in Arizona in May 2018, Vasquez was apparently "let go from the company along with all other [self-driving vehicle] drivers in Arizona."¹¹⁹

According to two sources privy to the internal reaction at Uber, the mood of the nearly 300 employees involved in Tempe's self-driving program was somber following Herzberg's death.¹²⁰ Some even "shed tears in their office."¹²¹ However, despite most employees being kept out of the loop, Uber doubled down on its safety argument.¹²² According to those same sources, Eric Meyhofer, the head of Tempe's self-driving vehicle unit, told the employees that "developing self-driving cars would ultimately end car-related deaths, so they should continue their work and soldier on with testing their software in simulation and later on private tracks."¹²³ And as Uber's public statement read: "We're committed to self-driving technology, and we look forward to returning to public roads in the near future. In the meantime, we remain focused on our top-to-bottom safety review, having brought on former NTSB Chair Christopher Hart to advise us on our overall safety culture."¹²⁴ That

113. *Id.*

114. *Id.*

115. Aarian Marshall, *My Herky-Jerky Ride in General Motors' Ultra-Cautious Self Driving Car*, WIRED (Nov. 29, 2017, 8:00 PM), <https://www.wired.com/story/ride-general-motors-self-driving-car/?verso=true/>.

116. *Id.*

117. *Id.*

118. *Id.*

119. Coppola & Frank, *supra* note 2.

120. See Morgan Bircher, *Uber 'Winding Down' Testing of Autonomous Vehicles in Arizona*, ABC15 ARIZ. (May 23, 2018, 7:14 PM), <https://www.abc15.com/news/region-southeast-valley/tempe/uber-to-stop-testing-autonomous-vehicles-in-arizona>.

121. Efrati, *supra* note 104.

122. *Id.*

123. *Id.*

124. Bircher, *supra* note 120. Hart's move to Uber is only one instance of top federal safety officials moving to the private sector, indicating a risk of "brain drain" in which companies such as Uber and Waymo "swallow up some of the government's most

top-to-bottom safety review would look at “everything from the safety of our system to our training processes for vehicle operators.”¹²⁵ The safety review report was made available in November 2018 by Uber.¹²⁶

B. NTSB’s Findings

The NTSB is “an independent federal agency charged with determining the probable cause of transportation accidents, promoting transportation safety, and assisting victims of transportation accidents and their families.”¹²⁷ In particular, the NTSB investigates select accidents that “can advance knowledge of broad or new safety issues.”¹²⁸

On March 19, 2018—the day following Herzberg’s death—a four-person team began collecting information on the Uber fatal collision.¹²⁹ Its fact finding included: meeting with Uber, the National Highway Traffic Safety Administration, and the Tempe Police Department; examining the Volvo XC90 involved in the crash and the accident site; viewing a video recording of the crash filmed from inside the Volvo; gathering information about the technology of Uber’s vehicle; collecting all electronic data stored by the Volvo or transmitted to Uber; and collecting information about Herzberg and Vasquez.¹³⁰ As is protocol, the NTSB investigative team did not release any information on its findings or on the probable cause of the accident while on-site.¹³¹ It released a preliminary report on May 24, 2018, which although it declines to state probable cause, helps establish the precise sequence of events.¹³²

According to the preliminary report, the self-driving vehicle system first registered Herzberg about six seconds before impact while traveling at 43 mph.¹³³ As the Volvo and Herzberg’s paths converged, the self-driving vehicle system’s software first classified Herzberg as an “unknown object, as a vehicle, and then as a

sophisticated experts on the emerging technology,” thereby creating more obstacles in creating legislatively imposed regulations for safety across the country. Tanya Snyder, *Driverless Car Industry Luring Federal Safety Brass*, POLITICO (May 5, 2019, 6:55 AM), <https://www.politico.com/story/2019/05/05/driverless-cars-regulation-1385844>.

125. David Shepardson, *Uber Sets Safety Review; Media Report Says Software Cited in Fatal Crash*, REUTERS (May 7, 2018, 10:18 AM), <https://www.reuters.com/article/us-uber-selfdriving/uber-hires-former-ntsb-chair-to-advise-on-safety-culture-after-fatal-crash-idUSKBN1181Z4>.

126. See *infra* Section IV.A.

127. Press Release, Nat’l Transp. Safety Bd., NTSB Update: Uber Crash Investigation (Mar. 21, 2018), <https://www.nts.gov/news/press-releases/Pages/NR20180320.aspx>.

128. Press Release, Nat’l Transp. Safety Bd., Car with Automated Vehicle Control Crashes Into Pedestrian (Mar. 18, 2018), <https://www.nts.gov/investigations/Pages/HWY18FH010.aspx>.

129. Press Release, *supra* note 127.

130. *Id.*

131. *Id.*

132. *Id.*

133. NAT’L TRANSP. SAFETY BD., *supra* note 2, at 2.

bicycle with varying expectations of future travel path.”¹³⁴ Exactly 1.3 seconds before the collision, the self-driving vehicle system determined that a mitigating emergency braking maneuver (referring to “a deceleration greater than 6.5 meters per second squared”¹³⁵) was necessary.¹³⁶ However, such a maneuver is not possible while the vehicle is in computer mode, “to reduce the potential for erratic vehicle behavior,” and instead relies on the designated manual operator to intervene and take control, despite the system not being designed to alert the operator.¹³⁷

The NTSB found that the self-driving vehicle system data showed Vasquez intervened less than a second before the vehicle collided with Herzberg by engaging the steering wheel.¹³⁸ Upon impact with Herzberg the vehicle was going 39 mph, with Vasquez beginning to break less than a second after the impact.¹³⁹ An inward-facing camera showed Vasquez glanced down toward the center of the vehicle several times prior to the crash.¹⁴⁰ The NTSB report states that Vasquez told investigators that she had been monitoring the self-driving vehicle’s system interface¹⁴¹ and that “although her personal and business phones were in the vehicle, neither was in use until after the crash, when she called 911.”¹⁴²

The preliminary report states “[a]ll aspects of the crash remain under investigation as the NTSB determines the probable cause, with the intent of issuing safety recommendations to prevent similar crashes.”¹⁴³ As of October 2019, the NTSB had not issued a final report.¹⁴⁴

134. *Id.*

135. *Id.* at 2 n.2.

136. *Id.* at 2.

137. *Id.*

138. *Id.* at 3.

139. *Id.*

140. *Id.*

141. *Id.* However, the widely shared video released by Uber and the Tempe Police Department of the vehicle’s internal and external cameras show that:

Vasquez’s eyes focused downward and to the right . . . [Moments before the collision,] her mouth turned in a sideways grin as she gazed below the dashboard, as if she was reading something amusing. She looked up for a brief moment, gazing left at bridge lights over the Town Lake, then looked back down at her lap.

Stern, *supra* note 95. In addition, Uber told reporters that “drivers aren’t trained to look at the diagnostics while the car is in motion.” Ray Stern, *NTSB Report Suggests Uber’s Backup Driver More at Fault than Car in Fatal Crash*, PHX. NEW TIMES (May 24, 2018, 2:42 PM), <https://www.phoenixnewtimes.com/news/ntsb-report-uber-backup-driver-fatal-self-driving-crash-tempe-10453507>.

142. NAT’L TRANSP. SAFETY BD., *supra* note 2, at 3.

143. *Id.* at 4.

144. *See generally* NAT’L TRANSP. SAFETY BD., *supra* note 2, at 2. However, the NTSB scheduled a board meeting for November 19, 2019, open to the public, to determine the probable cause of Herzberg’s death. *See* NTSB News Release, *Automated Test Vehicle Subject of Board Meeting*, NTSB (Oct. 17, 2019), <https://www.nts.gov/news/press-releases/Pages/ma20191017.aspx>. As of the time of publication of this Note, the outcome of the board meeting is unknown.

C. Police Department Findings

The Tempe Police Department's findings shed unique light on the incident because the police were collecting information from the perspective of public safety rather than through a technological or economic lens.¹⁴⁵ Although toxicological specimens were not collected from the vehicle operator, Vasquez was given a field sobriety test and "responding officers from the Tempe Police Department stated that the vehicle operator showed no signs of impairment at the time of crash . . . toxicology test results for the pedestrian were positive for methamphetamine and marijuana."¹⁴⁶

A few days following the fatal crash, police obtained a search warrant for Vasquez's personal and business cell phone and served warrants on Hulu, Netflix, and Google to investigate whether Vasquez had been streaming video while driving.¹⁴⁷ In fact, Hulu's records proved Vasquez was watching *The Voice* and her streaming ended one minute before the collision.¹⁴⁸ The crash report made by Tempe police states that although Vasquez told officers that she had her hands "hovering" above the steering wheel, the on-board video shows that her hands were not visible.¹⁴⁹ The report "concludes that, while Herzberg was not in a crosswalk when hit, Vasquez was 'inattentive,' failed to take control of the vehicle to avoid the crash and that her 'disregard for assigned job function to intervene in a hazardous situation' all contributed to the crash."¹⁵⁰ The Tempe Police Department referred the case to the Maricopa County Attorney's Office for possible charges, including manslaughter.¹⁵¹ The case was later turned over to the Yavapai County Attorney's Office to make a charging decision due to a possible conflict of interest arising from the Maricopa County Attorney's Office past partnership with Uber.¹⁵² In a March 4, 2019 letter from Yavapai County Attorney Sheila Sullivan Polk to Maricopa County Attorney Bill Montgomery, Polk stated "there is no basis for criminal liability for the Uber corporation arising from this matter Because the determination eliminates the basis for the [Maricopa County Attorney's Office] conflict, we are returning the matter to [the Maricopa County Attorney's Office] for further review

145. See Ryan Randazzo, *Police Shut Mill Avenue to Investigate 2018 Uber Self-Driving Car Death. Why?*, AZCENTRAL (July 10, 2019, 3:45 PM), <https://www.azcentral.com/story/money/business/tech/2019/07/10/fatal-uber-crash-killed-elaine-herzberg-still-under-investigation/1693956001/> (discussing the different facets and reasons for the Tempe Police Department's investigation into the fatal crash, including a lighting study undertaken more than a year after Herzberg's death).

146. NAT'L TRANSP. SAFETY BD., *supra* note 2, at 4; Coppola & Frank, *supra* note 2.

147. Coppola & Frank, *supra* note 2.

148. *Id.*

149. *Id.*

150. *Id.*

151. *Id.*

152. *Id.*; Max Walker, *Yavapai County Attorney Clears Uber in Deadly Self-Driving Car Crash in Tempe*, ABC15 ARIZ. (Mar. 5, 2019, 7:38 PM), <https://www.abc15.com/news/region-southeast-valley/tempe/yavapai-county-attorney-clears-uber-in-deadly-self-driving-car-crash>.

for criminal charges” against Vasquez.¹⁵³ According to the June Tempe Police Department report, Vasquez could face vehicular manslaughter charges¹⁵⁴ because the “crash would not have occurred if Vasquez would have been monitoring the vehicle and roadway conditions and was not distracted.”¹⁵⁵ At the time of this Note, no charges against Vasquez have been filed and the Yavapai County Attorney’s Office “does not have a projected timeline for a decision in the case.”¹⁵⁶

D. Implications for the Community

Tempe’s community was arguably an unwitting participant in the entire Uber-Arizona partnership.¹⁵⁷ Governor Ducey made a unilateral decision to encourage economic growth by inviting Uber into Arizona and onto the Tempe roads without publicly gauging support or appropriately assessing the safety issues faced by the community.¹⁵⁸ In fact, much of Governor Ducey’s communication with Uber, as well as its initial testing on Arizona roads, was kept secret from Tempe’s residents.¹⁵⁹

One Brookings Institute study made available in the summer of 2018 found that public confidence in self-driving vehicle technology is tenuous at best.¹⁶⁰ “More than 60 percent said they were ‘not inclined’ to ride in self-driving cars, and almost 70 percent expressed ‘concerns’ about sharing the road with them.”¹⁶¹ AAA’s annual self-driving vehicle survey made available on March 14, 2019 (almost one year after the Tempe fatality) found similar results—71% of people in that study said they are fearful about riding in fully self-driving vehicles, an 8% increase from the 2018

153. Uriel J. Garcia, *No Criminal Charges for Uber in Tempe Death; Police Asked to Further Investigate Operator*, AZCENTRAL (Mar. 6, 2019, 10:52 AM), <https://www.azcentral.com/story/news/local/tempe/2019/03/05/no-criminal-charges-uber-fatal-tempe-crash-tempe-police-further-investigate-driver/3071369002/>.

154. David Shepardson & Heather Somerville, *Arizona Finds No Criminal Liability for Uber in Fatal 2018 Autonomous Car Crash*, CLAIMS J. (Mar. 6, 2019), <https://www.claimsjournal.com/news/west/2019/03/06/289567.htm>.

155. Kim Tobin, Clayton Klapper & Morgan Bircher, *Arizona Driver in Deadly Self-Driving Uber Crash Could Face Charges*, ABC15 ARIZ. (June 22, 2018, 6:16 PM), <https://www.abc15.com/news/region-southeast-valley/tempe/tempe-police-release-new-video-from-deadly-self-driving-uber-crash>.

156. *Id.*

157. *See* Stern, *supra* note 95.

158. *See* Mark Harris, *Exclusive: Arizona Governor and Uber Kept Self-Driving Program Secret, Emails Reveal*, GUARDIAN (Mar. 28, 2018, 2:36 PM), <https://www.theguardian.com/technology/2018/mar/28/uber-arizona-secret-self-driving-program-governor-doug-ducey>.

159. *Id.*

160. *See* Darrell M. West, *Brookings Survey Finds Only 21 Percent Willing to Ride in a Self-Driving Car*, BROOKINGS TECHTANK BLOG (July 23, 2018), <https://www.brookings.edu/blog/techtank/2018/07/23/brookings-survey-finds-only-21-percent-willing-to-ride-in-a-self-driving-car/> (explaining that the “survey asked how likely a person was to ride in a self-driving car. Forty-six percent are very unlikely, 15 percent are somewhat unlikely, nine percent are somewhat likely, 12 percent are very likely, and 18 percent don’t know or gave no answer.”).

161. Wiggers, *supra* note 18.

study.¹⁶² That feeling of unease is palpable in Arizona, as has been shown by the recent attacks on Waymo vehicles' testing on the public roads following Herzberg's death and Uber's departure from Arizona.¹⁶³ In one instance, an assailant slashed a self-driving vehicle's tires.¹⁶⁴ People have thrown rocks at Waymo vans and attempted to run the vehicles off the road—"[o]ne woman screamed at one of the vans, telling it to get out of her suburban neighborhood. A man pulled up alongside a Waymo vehicle and threatened the employee riding inside with a piece of PVC pipe."¹⁶⁵ In one extreme example, a man waved a .22-caliber revolver at a Waymo vehicle and its designated driver, telling the police on the scene that "he 'despises' driverless cars, referring to the killing" of Herzberg.¹⁶⁶ Residents interviewed by the *New York Times* reported their son nearly being hit by a self-driving vehicle on their cul-de-sac, resulting in continued harassment against self-driving cars by community members and dangerous driving habits such as stopping short when self-driving vehicles are around.¹⁶⁷

Some analysts say this behavior is understandable and likely to continue "as the nation moves into a broader discussion about the potential for driverless cars to unleash colossal changes in American society. The debate touches on fears ranging from eliminating jobs for drivers to ceding control over mobility to autonomous vehicles."¹⁶⁸ Proactive and transparent regulation and monitoring of self-driving vehicle testing is a necessary step in encouraging the technology's acceptance on public roadways in Arizona.

E. Governor Ducey's Reactions

Eight days after Herzberg's death, Governor Ducey suspended Uber's self-driving vehicle testing privileges in Arizona after viewing the video footage of the fatal collision, which he described as personally disturbing in a March 27, 2018 tweet.¹⁶⁹ In another tweet, Governor Ducey also said, "We will hold companies accountable. We will enforce the law. We will take strong action against any company or operator that does not demonstrate they are ready for primetime. If you're going to operate in Arizona; you will have to meet these standards."¹⁷⁰ Unfortunately, the laws and standards alluded to are not clear—the original

162. *Three in Four Americans Remain Afraid of Fully Self-Driving Vehicles*, AAA (Mar. 14, 2019), <https://newsroom.aaa.com/2019/03/americans-fear-self-driving-cars-survey/>.

163. Simon Romero, *Wielding Rocks and Knives, Arizonans Attack Self-Driving Cars*, N.Y. TIMES (Dec. 31, 2018), <https://www.nytimes.com/2018/12/31/us/waymo-self-driving-cars-arizona-attacks.html>.

164. *Id.*

165. *Id.*

166. *Id.*

167. *Id.*

168. *Id.* One analyst, Douglas Rushkoff, author of *Throwing Rocks at the Google Bus*, likens "driverless cars to robotic incarnations of scabs." *Id.*

169. Doug Ducey (@dougducey), TWITTER (Mar. 27, 2018, 7:15 AM), <https://twitter.com/dougducey/status/978636729983778817>.

170. Doug Ducey (@dougducey), TWITTER (Mar. 27, 2018, 7:21 AM), <https://twitter.com/dougducey/status/978638182827810817>.

executive orders allowing Uber onto Tempe's roads were permissive and lacked teeth in deciding how to proceed (short of completely removing Uber's testing in Arizona) in the event of a public safety incident, such as Herzberg's death.¹⁷¹

In a March 26, 2018 letter addressed to Uber's CEO, Dara Khosrowshahi, Governor Ducey expressed a shift away from his previously unfettered welcoming of Uber into the state.¹⁷² Governor Ducey said:

I found the video to be disturbing and alarming, and it raises many questions about the ability of Uber to continue testing in Arizona. As governor, my top priority is public safety. Improving public safety has always been the emphasis of Arizona's approach to autonomous vehicle testing, and my expectation is that public safety is also the top priority for all who operate this technology in the state of Arizona. The incident that took place . . . is an unquestionable failure to comply with this expectation . . . Arizona must take action now. In the best interests of the people of my state, I have directed the Arizona Department of Transportation to suspend Uber's ability to test and operate autonomous vehicles on Arizona's public roadways. Arizona will not tolerate any less than an unequivocal commitment to public safety.¹⁷³

However, this letter shutting down self-driving vehicle testing applied only to Uber, and not large-scale rivals of the company, including Waymo, despite reports of other collisions caused by non-Uber self-driving vehicles.¹⁷⁴ Waymo is continuing to test its self-driving vehicles in Arizona and rolled out an "early rider" program, Waymo One, in the Phoenix metro area in December 2018.¹⁷⁵

Governor Ducey's reasons for treating the two companies differently are not clear, but they cannot be anchored solely in safety.¹⁷⁶ Governor Ducey must lead Arizona in creating robust policies and regulations to ensure the safety of the community and to direct automated vehicle companies of their expectations and responsibilities while testing on Arizona's roads. Reactive removal of companies from Arizona in the event of a public safety incident will not suffice. There must be a proactive legal framework setting parameters for self-driving vehicle companies to work within to minimize—and hopefully prevent—public safety incidents from occurring while advancing valuable technology and industry in Arizona. Because of

171. See Governor Ducey's Order, *supra* note 88.

172. Ryan Randazzo, *Arizona Gov. Doug Ducey Suspends Testing of Uber Self-Driving Cars*, AZCENTRAL (Mar. 26, 2018, 6:59 PM), <https://www.azcentral.com/story/news/local/tempe-breaking/2018/03/26/doug-ducey-uber-self-driving-cars-program-suspended-arizona/460915002/>.

173. *Id.*

174. *Id.*

175. *Id.*

176. See Bree Burkitt, *Waymo Self-Driving Vehicle Involved in Arizona Crash*, USA TODAY (June 17, 2018, 4:38 PM), <https://www.usatoday.com/story/tech/nation-now/2018/06/17/waymo-self-driving-vehicle-arizona-crash/708809002/> (outlining the events of Waymo autonomous vehicle public safety incident that occurred in Mesa, Arizona on June 16, 2018).

Arizona's unique experience in dealing with self-driving vehicle technology, Governor Ducey must take the lead in setting an example for other states to follow in rolling-out such technology on public roads.

IV. WHERE TO GO FROM HERE?

A. *Responsibility of Uber*

Despite the tragic public safety incident in Tempe, Uber remains uniquely situated to not only clean up its practices, but also to create an operational framework for other players in the self-driving vehicle industry to adopt.¹⁷⁷ In November 2018, Uber released a safety report highlighting the lessons learned and a continued focus on public safety,¹⁷⁸ including operational, technical, and organizational changes.¹⁷⁹

Operational changes involve: (1) "revised operator roles," including increased technical competency requirements, medical qualification on par with commercial driver's license requirements, medical qualification additions, drug screening, and increasing involvement in the development process outside of the vehicle; (2) "enhanced operator training" on defensive and distracted driving, fatigue, system capabilities and failure modes, and internal policies; (3) "revised operator staffing" by re-implementing the second designated driver and limiting behind-the-wheel time to four hours a day and to two hours without taking a break or switching seats; and (4) a "driver monitoring system" via camera to detect distracted operators, alert the driver of such detected behavior, and immediately notify a remote monitoring team for review and escalation.¹⁸⁰

Technical changes involve: (1) "software improvements" and modification to reduce system latency, improve detection and tracking of pedestrians, and drive more defensively; (2) "automated emergency braking" modification to the Volvo system to simultaneously operate with Uber programming; and (3) "operator interface" revisions with a touchscreen to minimize distraction and add excess speed alerts during manual operation.¹⁸¹

Organizational changes include: (1) "operational safety" by merging the operational safety responsibilities (including training) to coincide with the independent system safety team; (2) "system engineering" by creating a consolidated team tasked with conducting a measured development process; (3) "safety concern reporting" through a retooled reporting system with "non-retaliatory protection as part of safety culture reinvestment;" and (4) a "voluntary safety self-

177. See Edward Niedermeyer, *10 Lessons from Uber's Fatal Driving Car Crash*, THE DRIVE (Mar. 18, 2019), <https://www.thedrive.com/tech/27023/10-lessons-from-ubers-fatal-self-driving-car-crash>.

178. See generally Uber Advanced Techs. Grp., *A Principle Approach to Safety* (2018), <https://uber.app.box.com/v/UberATGSafetyReport>.

179. Eric Meyhofer, *Learning from the Past to Move Forward*, MEDIUM (Dec. 20, 2018), <https://medium.com/@UberATG/learning-from-the-past-to-move-forward-f4af566f2c3>.

180. *Id.*

181. *Id.*

assessment” developed in line with the NHTSA’s guidance.¹⁸² It is still unclear how compliance with a voluntarily mandated internal safety framework will be monitored and enforced.

Uber has had its share of scandals, ranging from hacking (and subsequently paying \$100,000 to have the information deleted without informing the public of the data breach); to trade-secrets lawsuits (against Waymo); to underpaid drivers for their conventional car service (said to make an estimated \$3.37 per hour on average); to alleged sexual harassment and unequal treatment of its staff based on gender; to lawsuits regarding misleading safety practice statements (Uber was banned from using phrases like “industry-leading” when describing the background checks of drivers), and to the #DeleteUber movement.¹⁸³ However, with the replacement of the previous CEO, Travis Kalanick, by the current CEO, Dara Khosrowshahi, in August 2017, Uber’s “toxic” culture is thought to be improving.¹⁸⁴ Khosrowshahi is a master of the charm offensive, which stands in stark contrast to the Kalanick’s self-labeled “‘burn the village’ approach.”¹⁸⁵

When Khosrowshahi took over Uber, he considered shuttering the self-driving vehicle division.¹⁸⁶ Yet following a summit at Uber’s Pittsburgh-based self-driving research headquarters—which happened only days before Herzberg’s death and the subsequent suspension of Uber’s self-driving vehicle testing in Arizona—the CEO decided to continue the company’s self-driving vehicle efforts, calling it a “‘huge advantage’ for Uber to have its own self-driving technology while operating [a] global ride-sharing network.”¹⁸⁷ He explained that “[l]ots of tech companies out there are going after this problem [of big-time hardware manufacturing, software problem at scale], but I think there are very few companies who are taking this on end-to-end at scale the way we are.”¹⁸⁸

182. *Id.* Although outside the scope of this Note, the question remains: who is monitoring and enforcing voluntary compliance within a voluntarily mandated safety framework?

183. Kate Taylor & Benjamin Goggin, *40 of the Biggest Scandals in Uber’s History*, BUS. INSIDER (Nov. 24, 2017, 1:50 PM), <https://www.businessinsider.com/uber-company-scandals-and-controversies-2017-11#march-2017-the-new-york-times-reveals-uber-has-been-secretly-deceiving-authorities-for-years-with-a-tool-called-greyball-25>; Dara Kerr, *Uber’s U-Turn: How the New CEO Is Cleaning House After Scandals and Lawsuits*, CNET (Apr. 27, 2018, 5:00 AM), <https://www.cnet.com/news/ubers-u-turn-how-ceo-dara-khosrowshahi-is-cleaning-up-after-scandals-and-lawsuits/>.

184. Kerr, *supra* note 183.

185. *Id.*

186. Mike Isaac, Daisuke Wakabayashi & Kate Conger, *Uber’s Vision of Self-Driving Cars Begins to Blur*, N.Y. TIMES (Aug. 19, 2018), <https://www.nytimes.com/2018/08/19/technology/uber-self-driving-cars.html>.

187. *Id.*

188. *Id.*

Khosrowshahi has also raised the possibility of licensing its technology to outsider companies.¹⁸⁹ “The internal debates are unfolding at a time when many companies can ill afford to pause on autonomous technology given stiff competition from carmakers and other tech companies.”¹⁹⁰

Additionally, Uber (under Khosrowshahi) went public in May 2019,¹⁹¹ further complicating the role of the Advanced Technologies Group (“ATG”), the wing of Uber charged with advancing self-driving vehicle technology, which has “around 1,500 employees, including plenty of well-regarded engineers, and more than 200 prototype cars.”¹⁹² In the second quarter of 2019, Uber posted a \$5.2 billion loss (its largest quarterly loss to date), \$3.06 billion of which went to research and development for the company (including ATG).¹⁹³ Despite such substantial losses, Uber has described self-driving vehicle technology as an “important part of [its] platform over the long term”¹⁹⁴ since it believes “that autonomous vehicle technologies will enable a product that competes with the cost of personal vehicle ownership and usage, and represents the future of transportation.”¹⁹⁵ However, Uber itself recognizes the risks involved with developing self-driving vehicle technology, stating “W]hile we believe that autonomous vehicles present substantial opportunities, the development of such technologies is expensive and time-consuming and may not be successful.”¹⁹⁶

With the company’s economic pressures in sharp view (and despite Khosrowshahi’s more amenable and proactive approach to running Uber), it is necessary to question the motivations of the corporate behemoth. Is its “voluntary” safety report a reliable indication of its forward-moving progress in terms of actual safety? Or is it an attempt to seem altruistic and focused on the community while feeding its bottom line and dealing with extreme losses following its IPO without facing any material repercussions? Maybe it is a little bit of both. Whatever the motivation, Uber is now appropriately working to earn its place as the verb for not only conventional ride-hailing, but also for self-driving vehicle technology. The most vital signal informing such a claim is found in Khosrowshahi’s opening “Letter to the Reader” of their safety report:

189. *Id.*; see also *Full Video and Transcript: Uber CEO Dara Khosrowshahi at Code 2018*, RECODE, <https://www.recode.net/2018/5/31/17397186/full-transcript-uber-dara-khosrowshahi-code-2018> (last updated June 4, 2018, 1:27 PM).

190. Isaac et al., *supra* note 186.

191. *Id.*

192. Efrati, *supra* note 104.

193. Graham Rapier & Troy Wolverton, *Uber Lost \$5.2 Billion in 3 Months. Here’s Where All That Money Went.*, BUS. INSIDER (Aug. 9, 2019, 3:59 PM), <https://www.businessinsider.com/where-uber-spends-its-money-lost-5-billion-second-quarter-2019-8>. However, it is important to note that \$2.6 billion of the research and development costs came in the form of stock-based compensation. *Id.*

194. Rob Price, *Uber Says Its Future is Riding on the Success of Self-Driving Cars, But Warns Investors That There’s A Lot That Can Go Wrong*, BUS. INSIDER (Apr. 11, 2019, 6:12 PM), <https://www.businessinsider.com/uber-future-self-driving-cars-s1-2019-4>.

195. *Id.*

196. *Id.*

[M]ost important, we know that open, regular communication with you, the public, and with other stakeholders is absolutely essential to earn your trust. Voluntary Safety Self-Assessments like this report, developed in line with the National Highway Traffic Safety Administration’s guidance, will be important for facilitating public transparency and consumer education. The competitive pressure to build and market self-driving technology may lead developers to stay silent on remaining development challenges. At Uber, we believe there is extraordinary value in sharing operational safety approaches and coordinating with others in the industry to develop methods to measure and demonstrate the progress in self-driving development.¹⁹⁷

The CEO’s statement signals the value Uber places in community involvement with, and understanding of, emerging technology such as self-driving vehicles to ensure a symbiotic relationship between the two.¹⁹⁸ Here, such symbiosis is critical to the success of both parties involved, so that individuals can use self-driving vehicle technology in a safe and informed way while companies such as Uber can reap the benefits of their foresight and development of respected industry standards while still serving their bottom lines. Other entities, including AAA, align with such feelings—as Greg Brannon, AAA’s Director of Automotive Engineering and Industry Relations explained, despite three out of four Americans expressing fear regarding self-driving vehicles, AAA’s studies show “that Americans are willing to take baby steps toward incorporating this type of technology into their lives [h]ands-on exposure in more controlled, low-risk environments coupled with strong education will play a key role in easing fears about self-driving cars.”¹⁹⁹

This emphasis on sharing, transparency, and prudence is unfortunately not currently clear from Governor Ducey. There must be a more proactive move toward active monitoring and clear regulations to ensure a working legal framework within which self-driving vehicle companies can safely and confidently test their products on Arizona’s roads. Data-driven decision-making should be part of the construction of such a working legal framework, as “[d]ata sharing among companies deploying [self-driving vehicles] could improve industry practices as a whole.”²⁰⁰ Requiring data sharing, especially safety-related data, between self-driving vehicle companies would provide policymakers with invaluable information to comprehensively and effectively create regulations for self-driving vehicles on public roads.²⁰¹

B. Responsibility of the Governor’s Office

Governor Ducey has been Arizona’s “most visible cheerleader of self-driving cars, and helped bring Uber to Arizona while bragging about the state’s minimal requirements—for safety, or anything else.”²⁰² The onus of correcting Arizona’s seemingly lax oversight in continued monitoring of self-driving vehicles

197. Uber Advanced Techs. Grp., *supra* note 178, at 5.
 198. *Id.*
 199. *Three in Four Americans Remain Afraid of Fully Self-Driving Vehicles*, *supra* note 162.
 200. Brown et al., *supra* note 75, at 10.
 201. *See id.*
 202. Stern, *supra* note 95.

on public roads falls squarely in his lap, especially following his reelection in November 2018.

Governor Ducey must also reevaluate Arizona's willingness to expand the use and testing of such technology in the future. Uber's priority seems to be on its customers and bottom line, while the Governor's priority in allowing self-driving vehicle testing should be on Arizonans and their safety. Some of his constituents have expressed concern, positing that "[i]f Ducey hadn't invited the company so warmly, or if he'd asked for stricter standards, an Uber car in autonomous mode almost certainly wouldn't have struck Herzberg. He shares some of the blame because of his decisions."²⁰³ To proactively and effectively move forward, Governor Ducey must use this public safety tragedy to inform future policies.²⁰⁴

When looking at the different responsibilities held by Uber and Governor Ducey in this tragedy, it is necessary to look at the tone of these two players moving forward. Uber has apparently shifted its strategies and promised more transparency going forward, but Governor Ducey's response of shuttering Uber's testing while allowing other companies to continue to test²⁰⁵ seems like more of a knee-jerk reaction lacking necessary contemplation.

203. *Id.*; see also Ryan Randazzo, *Family of Woman Killed in Crash with Self-Driving Uber Sues Arizona, Tempe*, AZCENTRAL (Mar. 19, 2019, 3:44 PM), <https://www.azcentral.com/story/news/local/tempe/2019/03/19/arizona-city-tempe-sued-family-uber-self-driving-car-crash-victim-elaine-herzberg/3207598002/>. In a lawsuit filed on the one-year anniversary of the incident, lawyers representing Herzberg's adult children stated in their complaint:

The state of Arizona allowed Uber Technologies Inc. and others to conduct experiments with driverless automobile technology on Arizona roadways and on Arizona citizens, including Elaine Herzberg. . . . This lawsuit does not challenge those decisions. Instead, this lawsuit challenges what plaintiffs and their counsel believe is the careless and imprudent manner in which state transportation authorities allowed this experimental technology to be used on Arizona roadways and citizens. . . . The state and city have failed to make roadways safe, allowing autonomous vehicles to operate on public roadways in an unsafe manner. . . . The state negligently conducted or performed oversight over this program. . . . Gov. Doug Ducey's executive order was negligently implemented without sufficient investigation into the safety of Uber Technologies Inc.'s autonomous vehicles.

Id. Uber settled with Herzberg's family within a week of the accident for an undisclosed amount. See Connie Loizos, *Uber Has Settled with the Family of the Homeless Victim Killed Last Week*, TECHCRUNCH (Mar. 29, 2018, 3:53 PM), <https://techcrunch.com/2018/03/29/uber-has-settled-with-the-family-of-the-homeless-victim-killed-last-week/>.

204. *E.g.*, Niedermeyer, *supra* note 177 ("The short-term advantages of lowering regulatory limitations on self-driving cars are tempting, but the long-term risk of a death are massive. The broader message: if you forgo regulation, you invite personal injury lawsuits. Either regulation can be done proactively in a way that balances public safety with responsible public road testing, or it can be done proactively by ambulance-chasing lawyers and an angry public. Clearly the first option is preferable.").

205. See Randazzo, *supra* note 172.

Seeing as “[t]here’s a growing sense the giant corporations honing driverless technologies do not have our best interests at heart,”²⁰⁶ and the role Governor Ducey has played in bringing such technology onto Arizona’s roads, it would be in Arizona’s best interest to make some major changes to the State’s oversight of these projects, beginning most importantly with public transparency and interaction.

Governor Ducey took a page from Uber’s playbook and established the Institute of Automated Mobility (“IAM”) in a September 2018 Executive Order.²⁰⁷ Governor Ducey explained that the IAM, focused on pioneering research to improve self-driving vehicle safety and efficiency:

will bring together global industry leaders, a public sector team and the brightest minds in academia, focused on advancing all aspects of automated vehicle science, safety and policy . . . Arizona is committed to providing the leadership and knowledge necessary to integrate these technologies into the world’s transportation systems.²⁰⁸

However, having Intel Corporation as a “Founding Partner” of the IAM, and its “key role in defining the structure and mission of IAM,”²⁰⁹ raises questions about Governor Ducey’s motivations. A clear move toward more transparency and community involvement is not stated anywhere in the Order or press releases.²¹⁰

C. Recommendations

In order for Arizona to remain a viable player in the self-driving vehicle industry space and to guarantee public safety if such vehicles are on public roads, Arizona must implement more stringent regulations and monitoring protocols of

206. Romero, *supra* note 163.

207. Ariz. Exec. Order No. 2018-09 (Oct. 11, 2018), <https://azgovernor.gov/file/29646/download?token=bmTMIRAS>.

208. *Arizona Governor Doug Ducey Creates Institute for Automated Mobility in Arizona*, ARIZ. COM. AUTH. (Oct. 11, 2018), <https://www.azcommerce.com/news-events/news/arizona-governor-doug-ducey-creates-institute-for-automated-mobility-in-arizona/>.

209. *Id.*

210. As Edward Niedermeyer explains, transparency and trust from the community are the “currency” of self-driving vehicle technology’s potential success:

Anticipating the possibility of a bad outcome no matter how hard everyone tries to prevent it requires that good players be as honest and transparent as possible, not hyping up the technology but communicating about it realistically. It requires an acknowledgement that some risk is inevitable in any public road testing, but that the risk is clearly understood, mitigated to the extent possible, and not something that will overturn everything you thought you knew about the developer or its public-sector partners. It requires that [self-driving vehicle] developers have a sense of sharing incentives with the public rather than acting as if they exist in an alternate reality, making millions by creating safety risks that can be walked away from.

See Niedermeyer, *supra* note 177.

self-driving vehicle testing. Governor Ducey's IAM program is a step in the right direction. However, establishing an oversight committee without legislative involvement or any clear regulatory or sanctioning power is one step short of what is needed.²¹¹

Arizona needs a clear and robust set of standards and rules within which self-driving vehicle companies must work as well as a legislatively created²¹² advisory and regulatory entity in place, which would have the power to supervise self-driving vehicle companies and to sanction companies who overstep the boundaries and parameters established. That way Arizona can continue its policy of "open-arms" for technology companies, including a wide-range of freedom for self-driving vehicle testing, while companies like Uber will know what to expect under the power of a legislatively created advisory and regulatory entity in the event of a public safety incident.²¹³

With a well-defined hierarchy and clearly laid-out legislatively created system for oversight and sanctions in place in Arizona, companies like Uber will have an incentive to be self-correcting while still maintaining their freedom to test without much outside interference unless a public safety incident occurs. Technology companies like Uber will have a clear message: keep your product safe and in line with community objectives and everything will be okay; if you mess up, you know exactly what outcomes you may face.

There will be greater due process and clarity for both self-driving vehicle companies *and* consumers, and the outcome will be based solely on objective factual analysis of the situation rather than knee-jerk reactions that occurred when Governor

211. See Lin, *supra* note 24.

212. The concept of legislative inaction is not novel—in fact, 29 out of 50 states have enacted legislation dealing with self-driving vehicle technology in one way or another. See generally *Autonomous Vehicles: Self-Driving Vehicles Enacted Legislation*, NAT'L CONF. OF ST. LEGISLATURES (Mar. 19, 2019), <http://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx>, for up-to-date information regarding the enacted legislation and executive orders regarding self-driving vehicles across the country.

213. For example, Arizona should look to Oregon's HB 4063 (2018), and legislatively establish a task force instead of an "advisory committee" constructed unilaterally by Governor Ducey and private interests. HB 4063 established a Task Force on Autonomous Vehicles led by Oregon's Department of Transportation. The task force includes two members from the Senate and two members from the House (with each chamber represented by a member of each party) holding an advisory and nonvoting position, in addition to 27 other legislatively appointed members representing an array of specialties and interests. The task force is to propose legislation on licensing and registration, law enforcement and accident reporting, cybersecurity, and insurance and liability, as well as study and consider the potential effects of autonomous vehicles on land use, road and infrastructure design, public transit, workforce changes, and state responsibilities relating to cybersecurity and privacy. See H.R. 4063, 79th Leg. Assemb., Reg. Sess. (Or. 2018). By having Arizona's Department of Transportation take the lead in such an endeavor, Governor Ducey could distance himself from any question of skewed motivation (such as having Intel taking the lead on the IAM) and could ensure that constituents' best interests are at heart.

Ducey pulled Uber's—and only Uber's—testing capabilities in Arizona.²¹⁴ In addition, such a system will serve the public (namely, Arizonans) by encouraging community safety and allowing clearly defined recourse in the event of a public safety incident involving a self-driving vehicle.

Such a system will let technology companies know what to expect when testing in Arizona—they must always keep community safety in mind or they will be heavily monitored, regulated, and sanctioned. There is a middle ground, which Arizona must find, that can at once encourage innovation and focus on the current state of safety and market interests. As the system currently stands, self-driving vehicle testing is a live-or-die industry in Arizona. That cannot continue. Even the Wild West needs a sheriff.

214. See Niedermeyer, *supra* note 177 (explaining that “[t]rust, at its most fundamental level, is about long-term relationships. Trusting someone or something means knowing that it will be there for the long haul, understanding what it wants and how it operates, and having assurances that it will respond to concerns. This is why the situation in Arizona is such a mess: lowering all barriers brought in a flood of of [sic] Uber AVs which then left again as soon as Herzberg was killed. Cycling from one extreme to another does the opposite of building trust . . .”).