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## *ESSAY*

### COMMUTING TO MARS: A RESPONSE TO PROFESSORS ABRAHAM AND RABIN

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As Yogi Berra once said, it is difficult to make predictions, especially about the future. In *Automated Vehicles and Manufacturer Responsibility for Accidents: A New Legal Regime for a New Era*, Professors Kenneth Abraham and Robert Rabin propose a detailed system for addressing injuries caused by driverless cars.<sup>1</sup> The system strikes me as sensible and well thought out given how we use cars today. But if our relationship to vehicles continues to shift with the technology, then the solution on offer has the potential to unravel.

The remarks that follow are less about the particular wisdom of manufacturer enterprise responsibility (MER) for driverless cars, and more about the limits of legal scholarship in grappling with unfolding technological change. The contingency of technology and its social impacts caution against sweeping interventions. And the role of law and technology scholarship—as opposed to legal scholarship that touches upon technology—is arguably to recognize the unique challenges that arise at this intersection.

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<sup>1</sup> Kenneth S. Abraham & Robert L. Rabin, *Automated Vehicles and Manufacturer Responsibility for Accidents: A New Legal Regime for a New Era*, 105 Va. L. Rev. 127 (2019).

## I.

Driverless cars are having a moment. It is not their first. In the 1990s, the Department of Transportation (DOT) became very invested in the prospect of automated vehicles for many of the same reasons that Professors Abraham and Rabin cite. The agency wrote lengthy reports on the technology and even funded an ambitious demonstration, which took place in California in 1997 to great acclaim.<sup>2</sup> The event garnered unprecedented media attention and popularized a term, “Intelligent Transportation Systems,” that Professors Abraham and Rabin never use, and that you have probably never even heard.<sup>3</sup>

Thirty years ago, the DOT assumed that the intelligence behind automated vehicles would arise from the infrastructure—street smarts, as it were. The cars of the future (i.e., of today) were to ride upon virtual rails embedded in highways and roads. Automated vehicles would avoid collision by monitoring one another, but primarily they would interact with an augmented transportation environment.

This configuration did not come to pass. If it had, the legal structures Professors Abraham and Rabin propose—responsive as they are to the complex, sometimes inscrutable design decisions made by individual manufacturers—would be of limited utility. What occurred instead is that innovations in sensing technology and machine learning in the wake of the Defense Advanced Research Projects Agency (DARPA) Grand Challenge in Nevada shepherded in an era of driverless cars with good enough sensors and processors to navigate our streets without coordination or assistance.<sup>4</sup>

Professors Abraham and Rabin aim their sensible intervention at the contemporary model of a driverless car and the “radically new world of auto accidents” it portends.<sup>5</sup> On their view, which is widely shared by government and industry, we should expect more and more vehicles on the road that are capable of driving without human intervention. At some

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<sup>2</sup> For a first-hand description, see Chuck Thorpe et al., *The 1997 Automated Highway Free Agent Demonstration*, 1998 IEEE 496–501.

<sup>3</sup> Berkeley California PATH, National Automated Highway Systems Consortium (2019), [<https://perma.cc/PV68-GR49>] (last visited Feb. 21, 2019) (“Demo ’97 generated an unprecedented level of media attention for Intelligent Transportation Systems, and we have made no attempt to capture the media aspects of that event here.”).

<sup>4</sup> See John Markoff, *Machines of Loving Grace: The Quest for Common Ground Between Humans and Robots* 23, 28–29, 36 (2015) (discussing advances in machines in the wake of the DARPA Grand Challenge).

<sup>5</sup> Abraham & Rabin, *supra* note 1, at 128–29.

point these vehicles will reach a critical mass—say, twenty-five percent of all registered vehicles<sup>6</sup>—at which time the recommendation is to pass sweeping national legislation that preempts state regulations and common law and establishes primary and exclusive liability for bodily injury in manufactures through a mandatory fund.<sup>7</sup>

The authors assume that driverless cars will continue to operate roughly as they do in prototype. I see this as a solid assumption about the technology. From what I know of the state of driverless car technology, and particularly given the enormous investments by industry in sensors and machine learning, I would be surprised if the basic approach to automating vehicles were to shift again dramatically in the near term.

I would be equally surprised if Americans retained anything like their present relationship to cars.

It is tempting to understand driver automation as simply the end point of a continuum, a mental model that the five “levels” developed by the Society of Automotive Engineers reinforces.<sup>8</sup> In actuality, the prospect of vehicles that do not require humans to drive them represents a qualitatively distinct affordance. Think of how different cities would look if parking downtown were unnecessary.<sup>9</sup> Imagine the variations in vehicle design that the absence of steering wheels, pedals, or even windshields will support. Consider how a vehicle that could safely drop your child off at school would affect your commute or the shape of your school district.

Indeed, traditional automotive engineers are not driving the present revolution. The leaders in the field of automated vehicles are technology companies. Driverless car pioneer Waymo is a spinoff of Google, which of course provides free digital services on an advertising model. Its nearest rival is Uber, a ride-sharing app that delivers transportation on demand. These companies are not interested in selling cars to individuals—they invest billions in automation because of the prospect of a limitless, exquisitely coordinated reservoir of robots capable of moving people around.

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<sup>6</sup> Id. at 132.

<sup>7</sup> See id. at 148–49, 151–52.

<sup>8</sup> The authors describe and embrace the levels in the Introduction. Id. at 129–31.

<sup>9</sup> See Alan Ohnsman, *The End Of Parking Lots As We Know Them: Designing For A Driverless Future*, *Forbes* (May 18, 2018, 11:31 AM), [<https://perma.cc/FSJ5-A34J>]; Tech Policy Lab, *Driverless Seattle: How Cities Can Prepare for Automated Vehicles* (Mar. 1, 2017), [<https://perma.cc/M7GN-ZMUC>].

The prospect that widespread vehicle autonomy will dramatically alter the way humans get around has consequences, including for the proposal Professors Abraham and Rabin lay out in careful detail. As Professors Abraham and Rabin remark in passing, “private vehicle ownership may go the way of the horse-and-buggy.”<sup>10</sup> Nevertheless, the liability system on offer repeatedly assumes that individuals will own and insure their own cars. For example, MER would exclude property damage on the apparent assumption that highly automated vehicle owners “still will likely purchase conventional auto insurance.”<sup>11</sup>

When I conceive of even the immediate future of driverless vehicles, I do not think of a trip to the Volkswagen dealership to trade in my level three for a shiny new level four. I think of diversified fleets of automated vehicles owned by the companies that made them, or by large civic units such as cities, and deployed as a transportation resource in the near term. The relationship between an injured consumer and a private or public *service*, meanwhile, raises distinct considerations from traditional products liability. And while Uber and Volkswagen are each capable of spreading and avoiding costs, the incentive structure of an app-based technology company that both owns and operates its vehicles differs rather markedly from that of a car manufacturer that sells vehicles to people.

I don’t have a crystal ball, any more than the authors. Imagine that neither I nor Professors Abraham and Rabin have correctly identified the future relationship of most Americans to vehicles or the timescale upon which change will occur. The very prospect that dramatically distinct modalities of transportation could arise from the ability of vehicles to drive themselves seems to caution against a preemptive, administratively intense solution that forbids state legislatures or courts from experimentation. Not even the apparent inspiration for MER—workers compensation—represents federal policy; workers comp is rather a creature of the state that can vary accordingly. Said another way, the authors’ proposal is certain; the future is not.

## II.

The puzzle of how to deal with the contingency of technology and its social impacts is not limited to driverless cars, but endemic to law and

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<sup>10</sup> Abraham & Rabin, *supra* note 1, at 130.

<sup>11</sup> *Id.* at 151–55.

technology scholarship. Personally I doubt Professors Abraham and Rabin—each renowned scholars of civil liability—identify themselves as working in “law and technology” as such. I imagine that for the authors, the ascendance of automated vehicles is just a fact about the world like any other, as the progress of technology often is.<sup>12</sup> In my experience, however, reasoning about technological change sometimes requires special care.

Take the concept of the “driverless car.” The underlying innovations that make driverless cars possible are, again, the introduction of new sensors (especially lidar) and improvements in techniques of machine learning that help computers recognize and react to patterns. These innovations introduce new human affordances, in the sense of additional capabilities to interact with our environment.<sup>13</sup> But even assuming the end goal is safely moving people about, there is nothing inevitable about combining these constituent technologies in a traditional car. That decision flows from a constellation of choices dating back to the concerted effort of the automotive industry to promote individual car ownership, and the attendant—and, some allege, purposive—decimation of public transportation.<sup>14</sup>

If we disaggregate the innovation of more accurate sensors and better machine learning from the construct of a driverless car, then far broader legal ramifications seem to follow. Consider Professors Abraham and Rabin’s key argument around why MER is necessary: neither federal agencies nor courts and juries possess the expertise to unpack the “esoteric, algorithm-based design differences” between highly automated vehicles.<sup>15</sup> Surely this concern extends well beyond driverless cars to the

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<sup>12</sup> Thus, for example, the Washington Supreme Court found no negligence on the part of the county for failing to build guardrails in 1928 capable of stopping a horse-drawn cart but not a car. *Davison v. Snohomish Cty.*, 270 P.2d 422, 423 (Wash. 1928). That same court would later require a jury to determine whether a railway company was negligent forty years later for failing to protect against a similar accident on the theory that materials had become stronger and cheaper. *Bartlett v. N. Pac. Ry. Co.*, 447 P.2d 735, 737 (Wash. 1968).

<sup>13</sup> For a discussion of affordances, see Ryan Calo, *Can Americans Resist Surveillance?*, 83 *U. Chi. L. Rev.* 23, 26–30 (2016).

<sup>14</sup> See, e.g., Robert C. Fellmeth, *Politics of Land: Ralph Nader’s Study Group Report on Land Use in California* 406, 415 (1973); see also Kate Crawford & Ryan Calo, *Comment, There Is a Blind Spot in AI Research*, 538 *Nature* 311, 311–313 (2016) (discussing how the trolley problem obscures the ways that investment in autonomous driving perpetuates prioritization of private cars over public transport).

<sup>15</sup> Abraham & Rabin, *supra* note 1, at 142–44. The Toyota sudden acceleration scandal of 2011 provides an excellent example. Congress instructed the DOT to determine whether the reported propensity of Toyotas suddenly to accelerate was the product of a glitch in the

very wide array of robotics and cyber-physical systems being marketed and developed today.<sup>16</sup> The reader would be forgiven for wondering what intellectual foundation there could be to arguing for an elaborate and expensive MER regime for vehicles but nothing else.

My own view—which I am developing in connection to a larger project on law and technology—is that any legal scholarship that interacts with physical and digital artifacts would do well to state and defend a series of assumptions. Legal scholarship in general tends not to dwell on questions of methodology. I understand that Professors Abraham and Rabin expect MER to be evaluated on the basis of efficiency and cost-benefit analysis because I teach torts and I recognize the language of “optimal,” “adverse selection,” and “transaction costs.” But law and technology scholarship in particular would benefit from reflecting on a series of choices that are today largely implicit.

One set of choices involves the methods and goals of the author. Much law and technology literature follows Professor Rabin’s former colleague Lawrence Lessig in understanding new technology as revealing “[l]atent ambiguities,” or gaps in the law that jurists must now resolve.<sup>17</sup> Scholarship in this mold is at once progressive, in that it takes technological progress as inevitable, and conservative, in that it understands the role of law as restoring the status quo ex ante in light of a disruption. There are alternatives to this approach, ranging from purely descriptive research that helps provide ground truth, to normative projects that understand new technology as an invitation to rethink what constitute realistic societal goals.

The response you are reading concerns another choice: What is the scope of the technology under examination? Relatedly, what assumptions are the authors making around the trajectory of the technology or its social impact?

As a longtime science fiction fan, I remember coming across the early days of the genre depicting marvelous progress in technology even as social norms somehow remained constant—1950s science fiction classics

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software. The DOT lacked the requisite expertise to answer this question and wound up having to ask NASA to take a break from *placing robots on Mars* to look at a Toyota for them. It took NASA four months, but they eventually cleared Toyota’s software. See Ryan Calo, *The Case for a Federal Robotics Commission*, Brookings Inst. (Sept. 15, 2014), [<https://perma.cc/4LS2-T7HM>].

<sup>16</sup> These include drones, delivery carts, surgical robots, and personal and service robots.

<sup>17</sup> Lawrence Lessig, *Code and Other Laws of Cyberspace* 22 (1999).

that invite the viewer to picture a world in which businessmen routinely commute to Mars on aircraft piloted by white men and serviced by stewardesses in short skirts. The reality is far more complex. Technological change occurs against a backdrop of social, cultural, and economic forces that in turn shape the trajectory of the technology itself.

A wide variety of factors suggest that we may be on the cusp of a sea change in transportation. The very distinctions between manufacturer, owner, and consumers seem likely to collapse. The trouble with technology—and hence law and technology scholarship—is that truly novel affordances tend to invite reexamination of how we live. Legal scholarship must acknowledge this prospect or risk being its casualty.