DRIVING LESSONS: LEARNING FROM THE LEGAL HISTORY OF AUTOMOBILE SAFETY TO INFORM DOMESTIC DRONE REGULATION

KRISTEN THOMASEN[1]

WE ROBOT 2015 CONFERENCE WORKING DRAFT

INTRODUCTION

This paper examines the history of the automobile safety regulation in the United States in order to make recommendations for the future of drone surveillance regulation.

Surveillance drones have transformative potential. Pervasive, tireless, and alternately imposing or discrete, drones equipped with cameras or other surveillance devices can, among other things, provide a vicarious a sense of freedom and escape to their drivers, offer new opportunities for expression, creativity and exploration, constitute luxury items for consumption, and more importantly, change the lived experience of public space, all while providing commercial enterprises, personal users and the state with opportunities to obtain extensive visual information for profit, criminal justice, or personal uses.

Drones are not the first technology to have these cultural impacts. The car, another transformative technology, had many of these same influences on society. The automobile has become iconic in North American culture, associated with freedom, escape and exploration, prestige and luxury, and a pervasive impact on public space – one which ultimately led to the redesign of the modern city.[2] The car also serves as a major source of profit for private and public actors. The regulatory history of the car can therefore offer insights into the social and political challenges involved in integrating a new transformative technology like the drone into society, as discussed further in Section 1 of this paper.

Since the early days of automotive technology, there have been regulations in place attempting to improve the safety of car occupants and pedestrians. But many early regulations

---

[1] J.D., M.A., former Law Clerk to Justice Rosalie Abella of the Supreme Court of Canada, Ph.D. student, University of Ottawa. I would like to express my ongoing gratitude to my Ph.D. supervisor Ian Kerr for his unwavering mentorship and support, and for always being such an amazing supervisor and person.

[2] See e.g. Mark S. Foster, *A Nation on Wheels: The Automobile Culture in America Since 1945* (Denver: University of Colorado, 2003); James J. Flink, *The Car Culture* (U.S.: MIT Press, 1975); Clay McShane, *Down the Asphalt Path: The Automobile and the American City* (New York: Colombia University Press, 1994).

were only marginally effective in attaining this goal.[3] Cars remained dangerous to drive. For a long time though, the public considered the sense of freedom offered by the car to be worth the risk of injury or death to drivers, and continued driving at ever increasing rates. This attitude began to change in the 1960's when public interest groups seeking increased safety converged with a growing regulatory state. American lawmakers and regulatory agencies began a concerted effort to regulate the *design* of automotive technology, a divergence from the prior focus on driver behaviour.[4] While this approach showed promise, regulating manufacturing proved challenging. Driving culture and industry pushback presented two major obstacles to improving road safety. In particular, passengers and drivers did not consistently use the new safety measures available to them, and a powerful industry resisted calls for costly safety requirements.[5]

After years of conflict, regulators and manufacturers finally found a middle ground where the responsibility for road safety was shared between motorists and manufactures. Manufacturers (and through them, the technology itself) did not bare all of the responsibility for preventing injuries, and motorists were educated on the importance of the mandated safety mechanisms. Through this regulatory progression, safety regulations ultimately succeeded in making real improvements in the safety of automobiles.[6] But these political and social challenges slowed progress and left drivers, passengers and pedestrians at greater risk for years longer than might have been necessary.

This paper considers the legal history of automobile safety regulation in order to identify lessons for domestic drone surveillance regulation. Section 1 sets out the background to this investigation by explaining what drones are and why the regulatory history of the automobile is relevant to the task of regulating drone surveillance and security issues. Then the paper explores the evolution of automobile safety regulation in order to identify successes and failures of different approaches. Section 2 is subdivided into three "lessons" for drone regulation. Section 3

[3] Reece A Clothier, Neale L Fulton and Rodney A Walker, "Pilotless aircraft: the horseless carriage of the twenty-first centry?" (2008) 11 Journal of Risk Research 999.
[4] David MacGregor, "The Safety Race: Transitions to the Fourth Age of the Automobile" in *Car Troubles: Critical Studies of Automobility and Auto-mobility*, Jim Conley and Arlene Tigar McLaren eds (Burlington: Ashgate Publishing Co., 2009) at 95.
[5] Jerry L Mashaw and David L Harfst, "Regulation and Legal Culture: The Case of Motor Vehicle Safety" (1987) 4 Yale Journal of Regulation 256.
[6] MacGregor, *supra* note 4.

concludes the paper with suggestions for how these lessons can be applied to emerging drone regulation.

SECTION I: BACKGROUND

I. IT IS ALSO KNOWN AS A "DRONE"

"Drone" is a common term for a pilotless aircraft, also frequently referred to as an unmanned aerial vehicle (UAV) or unmanned aircraft system (UAS). "Drone" is a catch-all term for a device that can operate in the air without a person on board, either operating autonomously or guided by a human through remote control. The term "drone" can also refer to unmanned ships or ground vehicles, but in the context of this paper it will be used to refer specifically to aerial vehicles.

The concept of pilotless aircraft has existed for centuries.[7] Large, expensive predator drones have been used by the United States military for decades. However, recent advances in technology allowing for the creation of small, affordable drones may prove to be the turning point for their widespread domestic use. Basic drones can now be purchased online for as little as $50.00. More sophisticated drones that can fly longer and higher can also be purchased by anyone.[8] These drones range in size. They may be as large as a small helicopter, or tiny enough to fit in the palm of the hand, and continue to shrink as the technology advances.

Drones can be and often are equipped with monitoring or sensing technologies including video cameras, infrared, GPS and other sensors. Video observation is currently central to the use of drone technology. This is in part because video cameras are used to guide many human-directed drones in flight by giving the pilot a "first-person view" as they fly. Pilots can add infrared and other related sensors for lower-visibility flights. However, as drone technology moves towards greater autonomy, this use of video observation will become less important.

---

[7] Unmanned balloon filled bombs were used in Europe in the 1800s, and the November 1946 edition of popular science expounded on the possibility that "some day huge mother ships may guide fleets of long-distance cargo-carrying airplanes across continents and oceans. Long-range drones armed with atomic bombs could be flown by accompanying mother ships to their targets for perfect hits. …" "How to Fly a Drone", *Popular Science,* (November, 1946) 122.

[8] For instance, the Sawnn Xtreem Mini Stealth Drone is available through TheSource.ca for $54.00, but only has seven minutes flying time. By contrast the Draganflyer Guardian RC Electric Quadrotor Helicopter, which costs $7,000.00 flies for longer and is equipped with a digital video downlink system with 20 mega pixal, 3.6x optical zoom: http://www.draganfly.com/sku/DF-GUARDIAN-1.php5.

II. FREE OR REGULATED: WHY ARE DRONES IN NEED OF RULES?

Drones offer the opportunity for operators to do things they could not otherwise easily do. They can access hard to reach vantage points, allowing for the filming and surveillance of things otherwise kept private or inaccessible. This opens up both the words of cinema and journalism on the one hand,[9] and spying and recognisance on the other. [10] Drones can transport items without the need for the deliverer's attention or identification, allowing for the delivery of commercial goods to consumers [11] and aid to a remote location on the one hand,[12] or the delivery contraband into prison and explosives into secure locations on the other.[13] Drones can be hacked

[9] For instance, the first ever drone film festival took place in New York City in 2015: *Drone Film Festival*, online: NYC Drone Film Festival <http://www.nycdronefilmfestival.com>. Drones were also famously used to provide unparalleled footage of the aftermath of the Donetsk airport bombing in Ukraine, among many other examples. See e.g. Darren Orf, "This Footage of Ukrainian Aftermath Is Why We Need Drone Journalism" *Gizmodo* (January 18, 2015), online: Gizmodo, < http://gizmodo.com/this-footage-of-ukrainian-aftermath-is-why-we-need-dron-1680260221>.

[10] Several high profile examples have included drones flying over French nuclear plants, and drones peeping into apartment windows: Dan Bilefsky, "Three arrested near French nuclear plant" *The Boston Globe* (November 7, 2014), online: The Boston Globe, <www.bostonglobe.com>; Rebecca J. Rosen, "So this is how it begins: guy refuses to stop spying on Seattle woman" *The Atlantic* (May 13, 2013), online: The Atlantic http://www.theatlantic.com. Additionally, the recent spate of drones flying over important Parisian monuments soon after the January attacks on Charlie Hebdo offices and a Kosher grocery left the city with a sense of unease and investigators stumped as to the origins and purpose of the flights, underscoring one of the reasons why regulation is needed – drones currently allow for *anonymous* and *hard-to-detect* surveillance. See e.g. Rob Price, "The French government is trying and failing to figure out who is behind the mystery illegal drone flights that are driving Paris crazy" *Business Insider* (March 9, 2015), online: Business Insider, <http://www.businessinsider.com/paris-mystery-drone-flights-continue-journalist-arrests-2015-3#ixzz3VFQZaCvY>.

[11] The oft-cited example of commercial drone delivery is the Amazon delivery drone: CBS, "Amazon unveils futuristic plan: delivery by drones" *60 Minutes* (December 1, 2013), online: CBS <www.cbsnews.com>; other examples have included using drones to deliver pizza and tacos, to bring food to tables at restaurants, or to bring shoes to shoppers at stores. See e.g. TacoCopter, online <http://tacocopter.com>; "Pizza delivered by drone – the next big thing?" *The Telegraph* (June 5, 2013), online <http://www.telegraph.co.uk/news/newsvideo/weirdnewsvideo/10100155/Pizza-delivered-by-drone-the-next-big-thing.html>; Mat Smith, "Crocs 'midair shoe store' is staffed by drones" Engadget (March 5, 2015) online: <http://www.engadget.com/2015/03/05/crocs-midair-shoe-store-drones/>; "Sushi restaurant launches flying 'iTray' waiter service" *The Telegraph* (June 10, 2013) online: <http://www.telegraph.co.uk/foodanddrink/foodanddrinkvideo/10110070/Sushi-restaurant-launches-flying-iTray-waiter-service.html>. Another interesting use of drones has been the "delivery" of advertising, including clothed mannequins to office windows in Brazil. But, the uncanny valley kicked in during this ad campaign: "Mannequin drones fly black Friday deals above Sao Paulo's high street" *DesignBoom* (November 27, 2014), online: DesignBoom <http://www.designboom.com>.

[12] See e.g. Mark Prigg, "The ambulance drone that could save your life: Flying defibrillator can reach speeds of 60mph" *Daily Mail Online* (October 29, 2014) online: <http://www.dailymail.co.uk/sciencetech/article-2811851/The-ambulance-drone-save-life-Flying-defibrillator-reach-speeds-60mph.html#ixzz3VFUZr6Wj>; Karen D. Lorentz, "Drones to aid ski area operations?" *The Mountain Times* (January 28, 2015) online: http://mountaintimes.info/drones-to-aid-ski-area-operations/.

[13] There have been numerous recent examples of people attempting to use drones to fly drugs, weapons and cell phones into prisons: for a review of several recent incidents and the predominant concerns see e.g. The Canadian Press, "Jail looks at ways of keeping out drug drones flying overhead" Maclean's (February 26, 2015) online: <http://www.macleans.ca/news/canada/jail-looks-at-ways-of-keeping-out-drug-drones-flying-overhead/>. The

and manipulated, can interfere with airspace management, are set to raise novel property and liability issues, and, perhaps above all, will challenge the concept of privacy in public. These are but a few examples of their many new uses and corresponding legal challenges.

Given the capacity of this technology, it is perhaps unsurprising that recent polls are showing that Americans want government drone regulation. In a 2015 Reuters/Ipsos online poll, just below three quarters of respondents supported federal regulation for drones, and 42% said they oppose private ownership all together.[14] Drones have engaged the public's attention given the seemingly unlimited range of uses – both good and bad – to which they can be put, particularly for their surveillance uses, as in the recent Paris incidents. In light of this, in order to streamline their acceptance into society both normatively, as well as logistically, coordination will be needed. The best way to do this is through regulation.[15]

Drones, as pervasive and tireless vehicles conducting intentional, inadvertent, or apparent surveillance, pose a specific risk to privacy. Generally speaking, privacy is a condition of being free from unwanted observation. It has been defined by courts and academic commentators as the "right to be let alone", "freedom from interference or intrusion" or the right to have some control over how one's personal information is collected and used.[16] According to privacy scholar Julie Cohen, privacy is "shorthand for breathing room to engage in the process of … self-development."[17] Constant data collection and surveillance "shape and produce our actions. We are different people when under surveillance than we are when enjoying some privacy."[18]

---

possibility of drones carrying explosives into secure areas has also become a growing concern. For instance in 2011 a Boston man was arrested for plotting to use a model airplane to fly explosives into the Capitol: "Could model airplanes become a terrorist weapon?" *Associated Press* (September 29, 2011), online: CBS News <http://www.cbsnews.com/news/could-model-airplanes-become-a-terrorist-weapon/>. In the hours after the drone crashed into the White House grounds, the possibility that it could have been weaponized was again emphasized as a serious security concern: Kevin Poulsen, "Why the US Government Is Terrified of Hobbyist Drones" *Wired* (February 5, 2015), online: <http://www.wired.com/2015/02/white-house-drone/>.

[14] Alwyn Scott, "Americans OK with police drones - private ownership, not so much: Poll" *Reuters* (February 5, 2015), online: Reuters http://www.reuters.com/article/2015/02/05/us-usa-drones-poll-idUSKBN0L91EE20150205

[15] Note to the reader – I would like to take a more philosophical approach in this section in future iterations of the paper (which was written in a different context originally). Any suggestions of directions/authors/considerations would be warmly welcomed!

[16] See e.g. Samuel D. Warren and Louis D. Brandeis, "The Right to Privacy" (1890) 4 Harv L Rev 193; *R v Edwards*, [1996] 1 SCR 128; *R v Tessling*, [2004] 3 SCR 67; *Hunter v Southam Inc*, [1984] 2 SCR 145; *R v Spencer*, 2014 SCC 43.

[17] Julie E. Cohen, "What Privacy is For" (2013) 126 Harv L Rev 1904 at 1906.

[18] Jathan Sadowski, "Why Does Privacy Matter? One Scholar's Answer" *The Atlantic* (February 26, 2013), online: The Atlantic <http://www.theatlantic.com/>.

A relentless intrusion on a sense of privacy can occur even in public, from a loss of anonymity and control over personal information. An expectation of privacy in public exists because people:

> … expect not to be recognized, or to have their presence noted and recorded, when making automobile trips far from home, attending large public functions, or visiting a shopping center to make cash purchases. Except for the possibility that they might encounter an acquaintance or violate a law and be asked by legitimate authorities to produce identification, they expect to be able to preserve their anonymity.[19]

This public anonymity is what gives us a sense of ease and comfort when we conduct our lives outside of our homes.[20] Drones have the potential to drastically undermine this sense of security, given their unique technological capacity to hover, observe, follow, and identify. As explained by robot law expert Ryan Calo,

> these unmanned aircraft systems threaten to perfect the art of surveillance. Drones are capable of finding or following a specific person. They can fly patterns in search of suspicious activities or hover over a location in wait. Some are as small as birds or insects, others as big as blimps. In addition to high-resolution cameras and microphones, drones can be equipped with thermal imaging and the capacity to intercept wireless communications.[21]

The feeling of being watched by an overhead technology, or of the potential to be seen inside one's high-rise apartment or office at anytime, can cause a person to modify her behaviour to accord with the sense of being observed.[22] Even if a drone is not looking at someone, its presence could have the same effect on that person as if it were because drones by their very nature "represent the cold, technological embodiment of observation."[23] This potential effect arising from the widespread use of drones, has generated a burgeoning literature highlighting the harms this technology could engender.[24] Unsurprisingly, calls for regulation are mounting.[25]

---

[19] M. Granger Morgan, "Protecting Public Anonymity" *Issues in Science and Technology* (November 27, 2013), online: Issues in Science and Technology <http://issues.org/21-1/granger_morgan/>.
[20] Helen Nissenbaum, "Toward an Approach to Privacy in Public: Challenges of Information Technology" (1997) 7(3) Ethics & Behavior 207.
[21] Ryan Calo, "The Drone as Privacy Catalyst" 64 Stan L Rev Online 29.
[22] Jeremy Bentham, *The Panopticon Writings* (London: Verso, 1995); Michel Foucault, *Discipline and Punish: The Birth of the Prison* (Toronto: Random House of Canada Ltd, 1977).
[23] Calo, "The Drone as Privacy Catalyst" at 33.
[24] Roger Clarke, "The Regulation of Civilian Drones: Impacts on Behavioural Privacy" (2014) 30 Computer Law & Security Review 286; Farber, Hillary B. "Eyes in the Sky: Constitutional and Regulatory Approaches to Domestic Drone Deployment" (2014) 64 Syracuse Law Review 1; Holman, DF, "The Future of Drones in Canada: Perspectives from a Former RCAF Fighter Pilot" (2013) *Strategic Studies Working Group Papers*, available at: http://www.cdfai.org. Kaminski, Margot E. "Drone Federalism: Civilian Drones and the Things they Carry" (2013)

III. WHAT TO DO: WHY THE HISTORY OF AUTOMOBILE SAFETY IS INFORMATIVE

Domestic drones are an emerging transformative technology. Regulating an emerging technology is complicated by the difficulties of predicting what future uses and features might emerge, in tandem with the maze of existing theories about how governments should address emerging technologies. Should (i) the industry self-regulate; or should government regulate (ii) users, (iii) uses or (iv) design features?[26] Scholar Carolyn Abbot explains this dilemma as follows:

> The presence of such uncertainties presents an interesting dilemma for government. On the one hand, the development of new technology is of strategic importance in the drive towards a high-tech knowledge economy and is crucial in remaining competitive in the global market. Governments are therefore keen to facilitate technological progress. On the other hand, in light of the uncertainty as to potential risks (and indeed benefits), governments must be confident in the way such developments are controlled. Where technology (or its application) poses seemingly unacceptable risks, then further advancement can and has been halted. However, in many cases, this is deemed neither

---

4 California Law Review 57; Kapnik, Benjamin, "Unmanned but Accelerating: Navigating the Regulatory and Privacy Challenges of Introducing Unmanned Aircraft into the National Airspace System" (2012) 77 Journal of Air Law & Commerce 439; Reid, Melanie, "Grounding Drones: Big Brother's Tool Box Needs Regulation Not Elimination" (2014) 20 Richmond Journal of Law and Technology 9; Schlag, Chris, "The New Privacy Battle: How the Expanding Use of Drones Continues to Erode our Concept of Privacy and Privacy Rights" (2012-2013) 13 Pittsburg Journal of Technology Law & Policy 1; Villasenor, John, "Observations from Above: Unmanned Aircraft Systems and Privacy" (2013) 36 Harvard Journal of Law & Public Policy 457; Volovelsky, Uri, "Civilian Uses of Unmanned Aerial Vehicles and the Threat to the Right to Privacy – An Israeli Case Study" (2014) 30 Computer Law & Security Review 306; Zoldi, Colonel Dawn M.K. "Drones at Home: Domestic Drone Legislation – A Survey, Analysis and Framework" (2013) 4 University of Miami National Security and Armed Conflict Law Review 1.

[25] Takahashi, Timothy T. "The Rise of the Drones – The Need for Comprehensive Federal Regulation of Robot Aircraft" Albany Government Law Review (forthcoming in 2014), available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2266221; Timothy T. Takahashi, "Drones in the National Airspace" (2012) 77 Journal of Air Law & Commerce 489; Geoffrey Christopher Rapp, "Unmanned Aerial Exposure: Liability Concerns Arising from Domestic Law Enforcement Employment of Unmanned Aerial Systems" (2009) 85 University of North Dakota Law Review 623; Troy Rule, "Airspace in an Age of Drones" (2015) 95 Boston University Law Review (forthcoming), available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2482567; Calo, M. R. "Robotics and the New Cyberlaw" (2015) 103 California Law Review (forthcoming) Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2402972.

[26] Carolyn Abbot, "Bridging the Gap – Non-State Actors and the Challenges of Regulating New Technology" (2012) 39 Journal of Law and Society 329; Roger Brownsword and Karen Yeung, eds, *Regulating Technologies: Legal Futures, Regulatory Frames and Technological Fixes* (Portland: Hart Publishing, 2008); Gregory N. Mandel, "Regulating Emerging Technologies" (2009) 1 Law, Innovation and Technology 75; Peter W.B. Phillips, *Governing Transformative Technological Innovation: Who's In Charge?* (Northampton, Mass: Edward Elgar Publishing Inc., 2007); Merritt Roe Smith and Leo Marx, eds. (1994) *Does Technology Drive History? The Dilemma of Technological Determinism* (Cambridge, Mass: The MIT Press).

> desirable nor appropriate and regulatory schemes are established with a view to controlling that development within acceptable bounds.[27]

The right approach to regulation can induce innovation while the wrong approach could stifle innovation or the growth of a valuable industry. Of course, the public debate over how to regulate can also lead to costly inefficiencies or delayed public protection against the harms the law seeks to address.[28] Often the optimal regulatory strategy will vary depending on the particular difficulties or harms arising from the use of the technology.[29]

When considering how to best regulate drone technology, which has the potential to transform the way we do business, create culture and experience public space, it can be helpful to consider another technology that had these same impacts on society during its early integration. For this reason, the automobile provides interesting historical insight for the drone. After an affordable version of the automobile was introduced to North American society, it quickly became an iconic symbol associated with freedom, escape and exploration, prestige and luxury, the workforce, and had an impact on public space so pervasive it ultimately led to the redesign of the modern city.[30] And the automobile served and continues to serve as a major source of profit for private and public actors. It presented new social opportunities while simultaneously presenting new public harms, legal challenges and unpredictable possibilities. The legal history of the car can therefore offer insights into some of the social and political dynamics involved in regulating the integration of a new transformative technology into society.

There are of course many facets of automobile regulation, including safety, environmental, and fuel efficiency regulations. Of all of these categories, this paper will explore safety regulation. This is perhaps the most comprehensive and helpful branch of automobile legal history for informing drone regulation.

Automobile safety and drone privacy share several similarities. Safety is central to the daily use of the automobile. By virtue of getting into a car and driving on a public road, one puts herself and potentially others at risk of injury. Similarly, as suggested above, the privacy

---

[27] Abbot, "Bridging the Gap" at 330.
[28] Mandel, Gregory, "Technology Wars: The Failure of Democratic Discourse" (2005) 11 Michigan Telecommunications & Technology L Rev 117.
[29] Phillips, *Governing Transformative Technological Innovation.*
[30] See e.g. Mark S. Foster, *A Nation on Wheels: The Automobile Culture in America Since 1945* (Denver: University of Colorado, 2003); Clay McShane, *Down the Asphalt Path: The Automobile and the American City* (New York: Colombia University Press, 1994).

implications of drones will be central to the day-to-day use of the drone, at least initially. Many of the contemporary or proposed private uses of drones rely on video surveillance to capture images of people, nature, accidents, crime scenes, or otherwise. By sending a drone out into the world, its operator is likely to interfere with the privacy (legal or normative) of others, and by walking into a public space a pedestrian is likely to experience a loss of privacy.

Additionally, automobile safety can be affected by both the inherent risks built into the car (e.g. sharp edges, the shape and cushion of the steering wheel), and the decision-making of the driver (e.g. buckling a seat belt, speeding). The same can be said of drone privacy (e.g. the inherent panoptic quality of drone design, versus the choice of where to fly a drone). Finally, both safety and privacy reflect public interest issues, suggesting that public demand can generate political pressure and profit incentives to address these concerns, as it did with automobile safety and may with drone privacy.[31] Given these similarities, the next section will explore this legal history of the automobile to identify lessons that can be used to inform future drone legislation.

SECTION 2: LESSONS FROM THE LEGAL HISTORY OF AUTOMOBILE SAFETY REGULATION

The legal history of automobile safety is rich, complex and well-recorded. It is beyond the scope of this paper to explore every facet of this history. Instead, this section focuses on the evolution of the regulatory approach over time in order to identify successes and failures in regulating what was once a new and revolutionary technology. At least three lessons can be drawn that are pertinent to emerging drone regulation: (i) controlling the user is not always enough. Sometimes people use technology inappropriately, and more importantly, sometimes properly used technology will still cause problems. So, the design of the technology should also be considered. This can be addressed through law, because (ii) there is little market incentive to design for inappropriately used technology. However, (iii) in order to get industry on board with preventative-design, government agencies should strive to distribute responsibility between designers, users, and the environment by shifting norms of use using educational measures, laws, and market incentives.

[31] See e.g. Calo, "The Drone as Privacy Catalyst".

LESSON 1: REGULATING THE UNSAFE USER IS NOT ENOUGH

Early automobile regulation in the United States was driven by an attitude that motor vehicle technology was only dangerous when used dangerously. The first motor vehicles appeared on the roads in the United States in the 1890s.[32] It was only upon the advent of mass-production techniques and the creation of the affordable Ford Model T beginning in 1908 that the American car industry exploded.[33] Compared to the United Kingdom, where a climate of concern for the risks associated with the new technology meant significant prohibitions on the use of motor vehicles[34], in the United States a climate of largely favourable public opinion supported the early growth of the industry. But, while favourable to the automobile as a new technology of mobility, the public was concerned from an early stage with the dangerous uses to which drivers were putting their automobiles. For example, the then popular periodical *Outlook* explained in 1908:

> It is difficult to persuade the public, who find in almost every morning's paper a report of one or more automobile accidents of a serious nature, that it is as safe to drive an engine twenty to forty miles an hour over a highway as to drive a pair of horses eight to ten miles an hour. It is certain that *the present law is not adequate for the protection of persons traveling on the highway from reckless drivers of automobiles*. The automobile has become almost a necessity; it certainly is a permanent method of locomotion to which society must adapt itself, and from the careless use of which society must protect itself.[35] [emphasis added]

This comment foreshadowed the general approach to regulating the automobile that would persist until the mid-twentieth century – the automobile is a beneficial technology, but dangerous drivers need to be restrained.

Accordingly, the first automobile safety regulations were focused on controlling unsafe drivers. Early regulations set speed limits at the same maximum speed of a horse-drawn vehicle, between eight to fifteen miles per hour. Cars were of course capable of travelling much faster than that –that was their primary advantage over the existing horse drawn technology. These laws were aimed at maintaining a status quo in the face of technological change.

---

[32] James J. Flink, *America Adopts the Automobile, 1895-1910*, (Massachusetts: The MIT Press, 1970) at 20-25.
[33] Joel W. Eastman, *Styling vs. Safety: The American Automobile Industry and the Development of Automotive Safety*, 1900-1966 (University Press of America Inc, Boston: 1984) at ix; James J. Flink, *The Automobile Age*, (Massachusetts: The MIT Press, 1988) at 26-28.
[34] See e.g. the discussion in Reece A. Clothier, Neale L. Fulton and Rodney A. Walker, "Pilotless Aircraft: The Horseless Carriage of the Twenty-First Century?" (2008) 11 *J of Risk Research* 999.
[35] "Concerning Automobiling", *Outlook* (July 25, 1908) 632 cited in Flink, *America Adopts the Automobile*, at 181.

Eventually, under political pressure from automobile clubs and other drivers, cities and later states eventually increased speed limits.[36] Nevertheless, anti-speed organizations such as the New York Committee of Fifty continued to push for greater enforcement of these increasing limits, including the first speed traps.[37] These organizations were always quick to clarify that they were not opposed to the vehicle itself. Their motive was to stop fast *driving*, not safe driving.[38] Drunk driving laws also sought to protect society from reckless drivers. State laws emerged in the first and second decades of the twentieth century.[39]

In addition to laws preventing unsafe driving behaviour, cities limited the presence of cars in certain spaces. In particular, automobiles were banned from use in many city parks where the machines could spook horses due to their size or noise. These laws were only necessary until horses became accustomed to motor vehicles. However, much early litigation relating to automobiles arose from cars spooking horses, causing horses to injure the riders or the passengers of a carriage.[40] These are several of the most common examples of early safety regulation, each targeted at controlling the behaviour of the driver.

Other laws were designed to control who could become a driver. For instance, an increasing number of automobile accidents were attributed to driver incompetence, prompting cities and states to regulate who could drive a motor vehicle. This was carried out through a testing, licencing and identification regime.[41]

In addition to the user of the technology, the environment in which the automobile operated was also regulated. A "good roads" movement had existed since the 1880s, initially established by bicyclists and later taken over by automobile interests. The movement successfully lobbied states to improve road surfaces and to build more total road mileage. It also pushed Congress to support the costs of road improvements.[42] Road signs and, later, light systems also regulated how individuals were to conduct themselves in the automobile's environment.[43]

---

[36] Flink, *America Adopts the Automobile*, 180-181.
[37] Flink, *America Adopts the Automobile*,182; "Anaheim Police Department History: 1900" online: Anaheim < http://www.anaheim.net>.
[38] "Opinions of Anti-Speed Organizations", *Horseless Age*, (November 5, 1902) 497, cited in Flink, America Adopts the Automobile, at 183.
[39] R.N. Harger, ""Debunking" the Drunkometer" (1949) 40 J of Crim L and Criminol 497.
[40] "Some Leading Automobile Suits" *The Horseless Age*, (November 5, 1902) 512.
[41] Flink, *America Adopts the Automobile* at 174.
[42] Eastman, *Styling vs. Safety*, at xi-xii.
[43] Flink, *America Adopts the Automobile* at 174.

Despite a significant period of behavioural and environmental control, the design of the car remained largely unregulated by governments, though, states did mandate certain basic safety features for all vehicles. New York State was among the earliest to regulate motor vehicles in 1901. *The Act of April 25, 1901* required vehicle registration and identification and required minimal safety equipment – brakes, a bell or horn, two lamps and a red taillight.[44] Other states soon followed this approach.[45] By 1915 all states had some form of legislation, requiring at a minimum registration and identification of vehicles.[46] But the actual design of the automobile was left to industry, market-forces and to some extent the common law.

This meant that relatively little thought went into how cars could be designed to be safe when used improperly. In his investigation of automobile safety design, Joel W. Eastman explains how the quickly growing demand for vehicles combined with the absence of any governmental regulation meant that manufacturers did not devote time to scientifically studying what design would be the safest. Instead, they adopted the basic French design created in 1894 by the Panhard Company, which is largely the same one used today.[47] Eastman conjectures that had human motion and reflex been considered, we might imagine a car in which the gas and breaks are operated by the arms, which are better suited for quick reactions.

The oligopolistic nature of the early market in America, dominated by a few powerful car companies, and the accompanying strong competition for consumers, maintained this early tendency to overlook safety in design. Since consumers were relatively unknowledgeable about automobile engineering, competition focused on creating new styles or fashions, ultimately leading to the annual model change still seen today. Changes were made without any real consideration for their safety implications, and were driven entirely by consumer demand.[48] By the 1920s and 1930s speed and horsepower became common marketing features of cars, and accordingly, manufacturers strove to design faster automobiles.[49] As Eastman points out, the fact that lawmakers focused only on speed limits, overlooking the speed capacity of the vehicle, meant they were "ignoring a fundamental twist in human nature: a contrivance built to run forty

[44] *The Act of April 25, 1901,* ch. 531, 1901 NY Laws 1313.
[45] See e.g. Robert E. Ireland, *Entering the Auto Age: The Early Automobile in North Carolina*, 1900-1930, (Raleigh: North Carolina Division of Archives and History, 1990) at 79.
[46] Flink, *America Adopts the Automobile* at 174.
[47] Eastman, *Styling vs. Safety*, at 1-2.
[48] Eastman, *Styling vs. Safety*, at 2-24; Ralph Nader, *Unsafe at Any Speed: The Designed-In Dangers of the American Automobile* (New York: Grossman Publishers, 1965).
[49] Eastman, *Styling vs. Safety*, at 83-85.

miles an hour was going to be run forty miles an hour, laws and ordinances not withstanding."[50] Since the problem was perceived to be the driver, and not the automobile itself, there was no incentive on manufacturers to address the issue of safe design. Thus, for the first half century of the automobile's history, the only regulatory force ensuring safe design was the common law doctrine of product liability - cars had to be free from defect.

The landmark case was Justice Cardozo's decision in *MacPherson v Buick Motor Co*, 217 NY 382, 111 NE 1050 (1916) at the New York Court of Appeals. The plaintiff was injured when a wheel on his 1909 "Buick Runabout" collapsed while he was in the car. In finding for the plaintiff, Cardozo J. emphasized that defective cars are dangerous.[51] Buick, as a manufacturer, was responsible for the finished product and was not at liberty to put it on the market without first subjecting it to ordinary tests. Of course, so long as the car functioned properly – it could drive, stop, and none of its constituent parts broke – the common law also did not regulate design. A well-built car was perceived as a neutral object, which was only unsafe when humans behaved irresponsibly.

This judicial sentiment was evident in one commonly cited case from the early twentieth century, *Lewis v. Amorous* 3 Ga. App. 50 (1907). The plaintiff, a nine-year-old boy, was struck and killed by an automobile driven by an unlicenced 19-year old. The court rejected the plaintiff's claim that strict liability should apply to hold the owner of an automobile responsible for any harm it causes, as would be the case with dangerous animals. The Court's perspective was that vehicles, on their own, were not dangerous:

> It is not the ferocity of automobiles that is to be feared, but the ferocity of those who drive them. Until human agency intervenes, they are usually harmless. … there are times when these machines not only lack ferocity, but assume such an indisposition to go that it taxes the limits of human ingenuity to make them move at all. They are not to be classed with bad dogs, vicious bulls, evil-disposed mules, and the like.[52]

This attitude was echoed by the Court of Appeals of California in *Hatch v Ford* 163 Cal App 2d 393 (1958). The plaintiff, a child, collided with a sharp part on a parked Ford car and suffered injuries causing him to lose his eye. Hatch's claim that the manufacturers failed to use reasonable care in the design of the car were rejected because the car was not defective:

---

[50] Eastman, *Styling vs. Safety*, at 85.
[51] Cardozo J. explains at 390: "the nature of an automobile gives warning of probable danger if its construction is defective."
[52] *Lewis* at 11-12.

> The vehicle in question here, in the condition in which it was by the complainant alleged to be, was safe to park and could cause no harm except to one whose own acts or the acts of some third person caused him to collide with it. Such a risk is not one which the defendant was required to anticipate or protect against.[53]

Instead, it was Hatch's fault (or rather, his mother's) for carelessly playing near the automobile.[54] Pedestrians, like drivers, were to blame for their own injuries even if a safer design might not have had the same physical effect.

These judicial opinions echoed the popular opinion throughout the first half of the twentieth century that the root cause of automobile accidents and injury was the driver or the roads. Throughout the 1930s, safety organizations formed and ultimately institutionalized the assignment of responsibility for safety to drivers, pushing the "drive safely" mantra in their campaigns.[55] While the automobile industry did not develop this approach, it certainly supported it.[56] Though public concern over automobile safety continued to grow throughout the 1930s to 1950s, regulation remained focused on the role of the driver in preventing accidents. Despite the public focus on unsafe drivers and the attempted legal control over such users, accidents and automobile death rates continued to climb eventually to alarmingly high rates, as the automobile became increasingly popular.[57] Dictating how people should and should not drive, or legislating how they should use with their cars, was not enough to prevent catastrophic accidents because the technology was not neutral. This is not a novel concept.[58] But it bears repeating with regard to drone regulation since, as will be discussed in Section 3, the existing drone legislation has not yet sought to consider the design of the technology and thus far is on the same trajectory as the early automobile regulations. The next sub-section explores how automobile regulators moved away from this driver-centric approach to regulation.

---

[53] *Hatch* at 607.
[54] See Jain, "Dangerous Instrumentality" for an interesting analysis of the role that decisions like *Lewis* and *Hatch* played in shaping legal subjects such as bad mothers and negligent drivers.
[55] Eastman, *Styling vs. Safety*, at 119-122.
[56] See Chapter VI "The Automobile Industry and the Highway Safety Movement" in Eastman, *Styling vs. Safety*, at 135-166.
[57] For a comprehensive introduction to this problem, see Ralph Nader's book *Unsafe at Any Speed;* Eastman *Styling vs Safety*.
[58] See as but one e.g. Langon Winner, *The Whale and the Reactor: A Search for Limits in an Age of High Technology* (Chicago, IL: The University of Chicago Press, 1986).

LESSON II: REGULATING THE MACHINE

The approach to regulating automobile safety by controlling the driver was eventually reassessed when the highway death rate climbed to shockingly high levels. But this shift in regulatory and public thinking was not easy. It took over a decade and required significant political and social momentum. Beginning the 1950s, a small but growing number of critics, particularly physicians, began to emphasize the fact that automobile design could be changed in order to minimize injuries in collisions. In 1956, three United States Senators[59] attempted unsuccessfully to hold Senate hearings on the issue.[60] Democratic Congressman Kenneth A. Roberts from Alabama, having already once passed a Bill mandating safety designs in another technology,[61] introduced a resolution calling for the establishment of a sub-committee of the House Interstate and Foreign Commerce Committee to study traffic safety, which was endorsed by the House on January 5, 1956.[62] Congressman Roberts soon after passed a Bill requiring certain safety standards for all vehicles purchased by the General Services Administration (GSA).[63] The Bill was passed in order to protect the safety of passengers in federally owned vehicles, and to set a national example for the public.[64] These standards would ultimately form the basis for the government's first set of private sector safety rules.

In 1962, Senator Abraham A. Ribicoff was elected and made chairman of the Executive Reorganization of the Government Operations Committee. He had recently read a review of the book *Accident Research*, edited by Dr. William Haddon Jr., which explained the concept of the "second collision" in automobile crashes referring to the phenomenon when the occupant of a vehicle makes impact with the inside of the vehicle after the vehicle collides with something in the external environment.[65] This was an influential moment in the regulatory history in two ways: it challenged Senator Ribicoff's then view that speed was the main cause of injuries in

[59] Senators Paul H. Douglas of Illinois, Margaret Chase Smith of Main and John Blatnich of Minnesota.
[60] Eastman, *Styling vs. Safety*, at 241.
[61] After a child in his district suffocated from being locked inside a refrigerator, he passed a Bill mandating latches that could be opened from the inside on all new fridges sold in the US.
[62] House Committee on Interstate and Foreign Commerce, Traffic Safety Hearings, 1956, pp. 185.
[63] *An Act to Require Passenger-Carrying Motor Vehicles Purchased for Use by the Federal Government to Meet Certain Passenger Safety Standards*, 78 Stat. 696, 1964.
[64] 110 Cong. Rec. 16479, July 21, 1964.
[65] William Haddon Jr., Edward A. Suchman and David Klein, *Accident Research: Methods and Approaches* (New York : Harper & Row, 1964).

accidents, and it set the author of that book, Dr. Haddon, on a path to become the first NHTSA administrator.[66]

In 1964, the reform-minded democratic administration was re-elected in an overwhelming victory, now led by President Johnson. In March of 1965, a subcommittee of the Senate Government Operations Committee headed by Sen. Ribicoff initiated a series of hearings now known as the "Ribicoff Hearings". The Committee amassed a huge record of evidence of the industry and government failures that had contributed to the dramatic highway injury and mortality rates.[67] Not only did the Committee recognize that automobile design could play a role in injuries, it also acknowledged that drivers are fallible, and, importantly, not always to blame in their motor vehicle injuries and deaths. As Senator Ribicoff explained: "Empirical evidence is woefully inadequate, but a strong argument can be made for the contention that the average motorist is performing near the limits of his potential as a master of the modern automobile. … What I am saying is this, since human beings err, since drivers err, since drivers make mistakes, and they are always going to make mistakes, that automobiles should be built in such a way as to minimize the damage being done."[68]

Contemporaneously, Ralph Nader, who was acting as one of the advisors to the Committee, published his now famous book, *Unsafe at Any Speed*, on November 30, 1965. In the book, Nader accused automobile manufacturers of prioritizing sales over safety. He demonstrated through numerous examples, including in particular the design of the Chevrolet Corvair, the ways in which industry had resisted spending even relatively small amounts of money on design modifications that could significantly improve the chance of a passenger's survival in an accident. The book was highly publicized and generated significant public attention to the issue. Following on the heels of the publication of his book came a media scandal, in which GM admitted to investigating Nader's personal life, apparently because he was likely to serve as counsel in injury cases against the company. However, the public perception following these events, in conjunction with the evidence collected at the Ribicoff Hearings, was that industry could no longer be trusted to self-regulate. The time was ripe for government involvement.

---

[66] From Eastman's personal interview with Ribicoff on October 30, 1969, see Eastman, *Styling vs. Safety*, at 243-4.
[67] The record can be found online at: "Legislative History Collection – Sample Documents", online: Motor Vehicle Hazards Archives <www.mvhap.org>. For example, GM had spent only $1.25 million on safety research in 1964 when the corporation had earned $1.7 billion in profits: Eastman, *Styling vs. Safety*, 245-46.
[68] *Traffic Safety Hearings on S. 3005 Before the Senate Comm. On Commerce*, 89th Cong., 2d Sess. 32, 47 (1966)

In 1966, the federal government adopted the federal *National Traffic and Motor Vehicle Safety Act of 1966*, 80 Stat 730 (NTMVSA). This marked a turning point in the regulation of automobile safety. It created the National Highway Traffic Safety Administration (NHTSA) (originally called the National Highway Safety Bureau), a federal government agency under the Department of Transportation. NHTSA was given the authority to write and enforce Federal Motor Vehicle Safety Standards and to conduct or fund research into new automobile safety innovations, among other tasks.[69] In fact, the NTMVSA gave the Secretary of Commerce, and later the Department of Transportation, what was at the time seen as "revolutionary"[70] power to issue safety standards for every motor vehicle in the United States.

While the same forces might not come into effect with respect to the drone industry, with regard to the prioritization of profit over safety or other concerns, or with respect to the popular distrust for the industry, this stage of automobile legal history is nevertheless relevant in demonstrating that there can be an important role for government agencies to play in technological design that addresses social problems caused by public use of transformative technologies, like public safety. Neither the common law nor the market will necessarily incentivize manufacturers to design technology in a way that adjusts for improper use. Products liability law requires that a product function properly when used as expected. Market incentives rely on an informed consumer group is aware of technological options in order to demand fixes, which may not exist in the case of a complex new technology.

As was demonstrated throughout this phase of the automobile history, given the market conditions, industry was for a long time able to produce unsafe vehicles without any motive to make simple fixes that would greatly improve safety. The drone industry could eventually be in a similar position where the consumer base similarly does not have the technological background to know to demand that privacy measures be designed into drones. This is particularly true for commercial drones where the general public has less direct market control over the choice and design of the drones that will be used in public. Accordingly, like the automobile, there may be a place for government involvement in the development of drone design. How that development can be carried out is the subject of the next and final sub-section.

---

[69] See Philip A. Lorang and Lawrence H. Linden, "Automobile Safety Regulation: Technological Change and the Regulatory Process" (1977) MIT Energy Laboratory Working Paper No 77-036WP for an in-depth discussion of these two roles.

[70] Senator Abraham Ribicoff, 112 Cong. Rec. 14, 230 (1966).

LESSON III: BALANCING RESPONSIBILITY – COLLABORATING ON DESIGN, CHANGING NORMS, CREATING MARKET INCENTIVES

There may be a role for government agencies to play in influencing the design of a transformative technology. However, as will be demonstrated below, where regulation applies to a financially and politically influential industry, government success may depend to varying degrees on industry acceptance. While the drone industry is not yet comparable to the automobile industry in this regard, this stage of automobile regulation provides some important lessons about reducing the legal risks and financial burdens that the industry must carry, and improving the willingness of users to properly implement technological features, in order to enhance the likelihood of regulatory effectiveness.

The NTMVSA gave the NHTSA the authority to enforce safe automobile design. But this was not to be accomplished by dictating which designs manufacturers would implement. Instead, the NHTSA was permitted to create safety *standards* with the aim of attaining certain testable outcomes that manufacturers had to meet. In other words, rather than telling manufacturers how to design their cars, the NHTSA told manufacturers what safety outcomes their designs needed to achieve, and left the innovation to manufacturers.

NHTSA standards must be: (1) "reasonable, practicable and appropriate", (2) "minimum" standards, (3) "able to meet the need for motor vehicle safety", (4) "performance" and not design-based standards, (5) "objective", and (6) "based upon existing safety standards."[71] In other words, NHTSA could only require that certain standards be implemented by a particular date if it was practicable and the standard would achieve a measurable ("objective") safety goal.[72] Additionally, under the NTMVSA, industry was given an opportunity to comment on all proposed standards. This allowed for industry input and collaboration in determining the most appropriate and feasible standards.[73]

Through this authority, the NHTSA had the ability to regulate the automobile itself. The agency immediately implemented its first set of standards. On January 31, 1967 it adopted the 17 standards that applied to government vehicles for *all* new cars sold in the United States.[74] This

[71] *National Traffic and Motor Vehicle Safety Act* §102 and 103.
[72] See e.g. Crawford Morris, "Motor Vehicle Safety Regulation: Genesis" (1968) 33 Law and Contemporary Problems 536 at 540.
[73] Morris, "Motor Vehicle Safety Regulation" at 540.
[74] *Initial Federal Motor Vehicle Standards*, 32 Fed. Reg. 2408 (1967).

first group of standards included passenger restraints (seat belts), among other things.[75] These initial standards were accepted without much controversy, as they had already become standard industry practice. Nevertheless, the adoption of this initial set of standards marked the successful transition from regulators holding the driver entirely responsible for her safety, to recognizing the role of manufacturers and automobile design in highway safety outcomes.

After this initial set of standards, a perception that technology was a panacea solution to the road safety issue emerged amongst advocates and regulators. Seatbelts were considered the most important of the safety features implemented in this first group of standards, as they were the most likely to prevent death or further injury in an accident. However, seatbelts only worked when automobile occupants wore them, and usage rates were exceedingly low upon their first introduction. Early studies projected that this was due to failure to remember, or lack of habit.[76] Yet as late as 1975, less than one of every four drivers was wearing a seatbelt.[77] The growing sentiment amongst safety advocates and the NHTSA was that drivers were not going to be agents for their own safety, and therefore, technology would have to step in to protect them. This regulatory approach proved challenging.[78]

When high numbers of drivers still were not wearing seatbelts consistently, the NHTSA shifted its focus from active to passive safety protections. A "passive restraint" is one that works automatically in a crash to keep passengers from colliding with the windshield, dash, door, or steering column, without any "active" effort by the passenger, such as the act of buckling a seat belt.[79] Passive restraint options included automatic seatbelts that would buckle automatically for the driver upon starting the car, and air bags that would deploy in a collision, cushioning front seat occupants' impact with the front of the car. Neither requires any discipline on the part of the user.[80]

---

[75] *Initial Federal Motor Vehicle Standards;* Flink, *Automobile Age*, at 384.
[76] Patricia F. Waller and Patricia Z. Barry, Seat Belts: A Comparison of Observed and Reported Use (Chapel Hill, North Carolina: The University of North Carolina Highway Safety Research Centre, 1969).
[77] Donald Elman and T. Jeffrey Killebrew, "Incentives and Seat Belts: Changing a Resistant Behavior Through Extrinsic Motivation" (1978) 8 J App Soc Psych 72.
[78] NHSB "Occupant Crash Protection; Passenger Cars, Multipupose passenger vehicles, trucks and buses: Notice of proposed motor vehicle safety standard" 1970 Federal Register 35(89) (May 7, 1970) 7187-89.
[79] US, Subcommittee on Oversight and Investigations, 94th Cong, *Federal Regulation and Regulatory Reform* (Washington, DC: US Government Printing Office, 1976) at 183.
[80] Bruno Latour discusses the automatic seatbelt as a mechanism for controlling human decision-making in his chapter "Where are the Missing Masses? Sociology of a Door" in Shaping Technology/Building Society, W. E. Bijker anf J. Law eds. (Cambridge, MA: The MIT Press, 1992) 225.

Some advocates saw passive restraints as the cure-all for automobile safety. As explained by William Haddon Jr., the former head of the NHTSA (then called the NHSB) and then president of the Insurance Institute for Highway Safety: "The universal provision of air bags to achieve [automotive restraint] … would require only … a simple binding decision, by one federal official…"[81] The NHTSA went so far as to suggest that vehicles equipped with air bags may not even need to be equipped with seat belts.[82] Since airbag technology had also existed for over a decade at this point.[83] The NHTSA turned its focus here first.

NHTSA first proposed a rule in July 1969 requiring airbags in all cars.[84] It reissued this rule as a 'passive restraint' requirement on November 3, 1970, requiring vehicles to have safety equipment that would protect a 50th percentile adult American male test dummy in a 30mph crash into a wall without requiring the occupant to take any action.[85]

But, the standard met strong industry resistance because of the high cost to implement. Several automobile manufactures challenged the Agency's legal authority to impose such a rule, and the industry expressed concerns about the financial implications of the mandate. A group of manufacturers took the NHTSA to court arguing that the demanded technology was not feasible.[86] The court held that the regulation did not adequately establish the specifications for crash test dummies and the effectiveness of the regulation had to be postponed until it developed such specifications. The effective date was changed, from 1974 to 1977.[87]

In the meantime, political interference with the NHTSA rulemaking led to one of the NHTSA's more widely rejected alternative safety measures – the ignition interlock. The interlock prevents the vehicle from being driven until occupants have buckled their seatbelts. In 1971, Henry Ford II made a personal visit to the White House to complain about the costs of

[81] Jameson Wetmore, "Implementing Restraint: Automobile Safety and the US Debate over Technological and Social Fixes" in *Car Troubles: Critical Studies of Automobility and Auto-Mobility*, Jim Conley and Arlene Tigar McLaren eds. (Burlington VT: Ashgate Publishing Company, 2009) 111 at 115; William Haddon Jr. "Passive vs active approaches to reducing human wastage" (1974) 9:19 IIHS Status Report 1.
[82] Wetmore, "Implementing Restraint" at 115; NHSB, "Motor Vehicle safety standards: occupant crash protection in passenger cars, multipurpose passenger vehicles, trucks and buses (final rule)" 1970 35(214) Fed Reg (November, 1970): 16927-31.
[83] Subcommittee on Oversight, *Federal Regulation and Regulatory Reform* at 186.
[84] NHSB, "Inflatable Occupant Restraint System" 34 Fed. Reg. 11148 (July 2, 1969).
[85] NHSB, "Motor Vehicle safety standards" (November 3, 1970).
[86] Chrysler, Jeep, American Motors, Ford and the Automobile Importers of America initiated *Chrysler v Department of Transportation*, 472 Fd2 659 (6th Cir. 1972); Subcommittee on Oversight, *Federal Regulation and Regulatory Reform* at 186-87; see also Jerry L. Mashaw, "Regulation and Legal Culture: The Case of Motor Vehicle Safety" (1986-87) 4 Yale J on Reg 258.
[87] NHTSA "Motor vehicle safety standards: Occupant crash protection (notice of proposed rule making)" 1974 Fed Reg 39(54) (March 19, 1974) 10271-73.

government automobile safety and emissions regulations, and proposed the ignition interlock as an alternative solution to airbags. Despite resistance from the Secretary of Transport, White House pressure led to a delay in the passive restraint standard, substituting it with the adoption of a mandatory ignition interlock.[88] The system was widely rejected by the public, which even found ways to work around it and continue to resist the use of seatbelts. In response to public outcry, Congress had the requirement repealed in 1974.[89] Clearly, this paternalistic technological fix, which was encouraged by industry but not by the regulatory agency, was not the safety solution that automobile safety advocates were hoping for.

The rule requiring airbags was then suspended under the Ford administration.[90] It was reissued in June 1977 by under the Carter administration, requiring a phase in of the restraint by 1984.[91] In 1981, under the Reagan administration, the rule was delayed and then rescinded.[92] A group of insurance companies brought a challenge to the NHTSA decision to rescind the standard. The United States Supreme Court overturned the rescission and sent the rule back for reconsideration.[93]

The debate about airbag regulation continued on until what scholar Jameson Wetmore has identified as two important events in 1984. First, German manufacturer Mercedes-Benz began offering airbags as options to customers in Europe in the early 1980s, and wanted to bring that option to its American cars in 1984. However, Mercedes did not advertise airbags as a panacea, as they had been considered in America. Instead, airbags were identified as "supplemental restraint systems," providing added protection to that received from wearing a seatbelt.[94] This reconceptualization shifted some of the responsibility for ensuring the safety of

[88] Subcommittee on Oversight, *Federal Regulation and Regulatory Reform* at187-88
[89] P.L. 93-492 (§125) cited in Subcommittee on Oversight, *Federal Regulation and Regulatory Reform* at 188.
[90] Lauren Pacelli, "Asleep at the Wheel of Auto Safety? Recent Airbag Regulations by the National Highway Traffic Safety Administration" (1999) 15 Contemp Health L & Pol 739; NHSB, "Motor Vehicle Safety Standard no. 208: seatbelt installations – passenger cars" 1967 Fed Reg 32(40) (March 1, 1967) 3390.
[91] NHTSA, "Federal Motor Vehicle Safety Standards: occupant restraint systems (final rule)" 1977 Fed Reg 42(128) (July 5, 1977) 34289-99.
[92] NHTSA "Federal Motor Vehicle Safety Standards: occupant restraint systems (final rule)" 1981 Fed Reg 42(128) (July 5 1981) 34289-99.
[93] *Motor Vehicles Manufacturers Association v. State Farm*, 463 U.S. 29 (1983); see also John D. Graham and Patricia Gorham, "NHTSA and Passive Restraints: A Case of Arbitrary and Capricious Deregulation" (1983) 35 Admin L Rev 193 for a discussion of the administrative issues in the case, but before the release of the Supreme Court's decision.
[94] "The Mercedes-benz supplemental restraint system: it works slightly faster than you can blink an eye" *Newsweek* (April 23, 1984) 45 cited in Wetmore, "Implementing Restraint" at 117.

the driver off of the manufacturer and back onto the driver, as it was the driver's primary obligation to properly use her seatbelt.[95]

The second significant event in 1984 was the adoption of strict mandatory seatbelt laws across the vast majority of the country. Then Secretary of Transportation Elizabeth Dole incentivized industry to engage in the promotion of safety measures by reissuing Standard 208 in July 1984 to allow that if by April 1, 1989 two-thirds of the American population was covered by mandatory seatbelt use laws, then the restraint regulation would be dropped.[96] The automobile industry jumped at the opportunity to avoid mandatory airbag regulation and formed an organization to lobby states to pass mandatory seatbelt use laws. Industry also worked on an education campaign to promote seatbelt use, in conjunction with the National Safety Council, the NHTSA, insurance companies and others.[97]

As public seatbelt use increased following more ardent educational campaigns supported by industry, the NHTSA relaxed its emphasis on the airbag as the primary restraint.[98] In the meantime, industry had been preparing to have to implement the technology, and by late 1980s, manufacturers started making air bags part of their marketing campaign. A 1987 press release from General Motors explains why it finally abandoned its long held opposition to airbags:

> The market now seems ready to accept air bags as a supplement to manual lap/shoulder belts. We also were motivated by what we perceive to be a more positive attitude today concerning air bag technology, where the inflatable restraint is used in conjunction with seat belts. We believe that supplemental air bag technology has come of age.[99]

Shortly thereafter, NHTSA required manufacturers to begin phasing in airbags. Despite the difficulties faced by NHTSA in regulating safety for unsafe drivers, evidence has generally confirmed that cars produced with these safety features produce fewer fatalities than older models.[100]

This long and difficult history of design regulation makes several points clear where agencies attempt to resolve public issues through the regulation of technology. First, regulating the design

[95] Wetmore, "Implementing Restraint".
[96] NHTSA, "Federal Motor Vehicle Safety Standards: occupant restraint systems (final rule)" 1984 Federal Register 49(108) (July 17, 1984) 28962-9010.
[97] Wetmore, "Implementing Restraint" at 119.
[98] Wetmore, "Implementing Restraint" at 119.
[99] General Motors Press Release from March 5, 1987, cited in Wetmore, "Implementing Restraint" at 121.
[100] Subcommittee on Oversight, *Federal Regulation and Regulatory Reform:* The General Accounting Office found that the 1966-70 standards may have saved 28,230 lives between 1966 and 1974 nationwide. Another study found that vehicles built before 1984, compared to those made after 1994 were associated with three times more fatalities and injuries: S. Blows et al, "Vehicle year and the risk of car crash injury" (2003) 9 Injury Prevention 353.

of the technology is not a panacea, as it was briefly believed with respect to the car. Such an approach places too much legal and financial responsibility on manufacturers, as it requires the design to protect against harm in all circumstances, which may not always be feasible. Manufacturers accordingly resist this pressure, resulting in a delayed response to a public problem. The automobile example may be an extreme case of industry resistance. But as this case nevertheless makes clear, regulation works better when industry is on board with it. A multifaceted approach targeting both users and design may have a greater chance of prompt success. The next section will discuss the application of these lessons to the issue of drone surveillance regulation.

SECTION 3: LESSONS FOR DRONE REGULATION

The regulatory history of automobile safety has responded to early public apprehensiveness to a new technology, then to an increasing focus on the user of the technology as the source of risk, and gradually to an acceptance of design as a contributing, though not exclusive, way in which to mitigate risk to the public. The evolution of this regulatory history offers insight for how regulators might approach the range of domestic drone issues, including surveillance in particular. Perhaps future regulation can benefit from the successes of the past and avoid some of the delays and pitfalls experienced by automobile regulation by applying these lessons. This section considers how those lessons might be applied.

Take for example the issue of privacy in public. Should the public react to the domestic use of surveillance drones by public or private operators, regulators may be called upon to act. The Fourth Amendment guides state behaviour in this regard. However, in public there is minimal if any constitutional protection for privacy. Even if user behaviour with respect to the use of cameras on drones in public were regulated, though, as discussed in Section 1, the mere presence of a drone may still have a panoptic and unsettling effect. The only way to address this effect on the sense of personal privacy might be through a design or "architectural" solution.[101] Acknowledging this effect appreciates the first lesson from the automobile history, that the drone

[101] To borrow the term from Lawrence Lessig, see *Code 2.0* (New York: Perseus Books Group, 2006).

itself is not a neutral object that only becomes intrusive depending on how it is flown. It may be intrusive by its very nature.[102]

The NHTSA uses performance standards to obtain safety outcomes without (ideally) overly interfering with automobile design. A similar approach could be taken with respect to drone surveillance issues in terms of the framing of regulations.[103] In this case, a social problem would be identified and a standard developed through which to address it. Performance standards could require limited observation capabilities – either through limits on the zoom or resolution of drone cameras; or since video cameras are heavy and require weight-bearing capacity, a maximum upper weight capacity of drones could be delineated. This latter requirement could serve a dual purpose with respect to concerns about drones carrying contraband or explosives. These types of standards align with lesson two from the automobile history – design can provide solutions to public risks posed by a transformative technology, which might not otherwise be incentivized by the market. It is difficult to imagine a market demand for less capacity on a technological device.

But, for this same reason, neither of these solutions is ideal. Each would prevent many beneficial uses of the technology, including the use of drones for film, journalism and delivery – some of the most viable commercial and personal applications of the current technology. Accordingly, drawing from the third lesson, further consideration should be given to any technical solution that balances the risk of public harm between the technology, the user and perhaps in this case, the public itself. An example of such an innovation could be a performance standard requiring cameras that allow people to shade or block out certain spaces (e.g. a backyard) from being caught on the film or view of the camera using a technology or online registry. This would allow individuals to protect the privacy of their spaces, while keeping other public space visible and usable for media, culture and so on. While it would place the protective burden on the public, requiring individuals to take steps to protect their own privacy, this would only apply to their privacy in public, which is tenuously guarded under the current state of the law anyhow. This could also serve as a balance between the roles of the technology, the user and the public in protecting privacy while supporting the growth of a significant industry. Locational

[102] See e.g. Calo, "Drone as Privacy Catalyst"
[103] Which agency would be responsible and whether it should be afforded more or less or different authority than the NHTSA are still open questions for debate. See for instance, Calo, "Robotics and the New Cyberlaw", proposing a Federal Robotics Agency.

limits on where drones can fly that could be GPS-enforced, by design, as well as other design options, could surely also be considered.

Recent incidents have also raised concerns about the potential to fly over secure space with video cameras. There are several reasons for this concern. Small drones can be difficult to see in advance of their arrival in the impugned space. Additionally, it can be difficult or impossible to trace the operator of the drone even if the drone is ultimately obtained.

Most countries have laws that prohibit this operator behaviour – flight in controlled airspace. It happens nevertheless, not unlike speeding or drunk driving. Furthermore, even where the operator has no intention to violate these laws or drive their drone improperly, sometimes accidents happen, just as in the case of cars and recognized in the second regulatory phase. A recent example was the drone that crashed into the White House grounds accidentally.

The automobile safety history also offers regulatory insights here. In addition to rules about where drones can be flown and how they can be used, regulators can work with manufactures to address some of these issues through design. A performance standard requiring some form of signal, to make the drone discoverable to those monitoring the protected space, may be one example. Another consideration might be a method for determining the origins of the drone. The privacy interests of drone operators would need to be balanced here as well, and an anonymous system like automobile licence plates may be an appropriate solution. However, given the vantage point of drones, a design solution would be necessary allowing this "licence plate" to be read from the ground while the drone is in the sky.

These are just two examples of the possible applicability of the lessons from the automobile regulatory history to drone regulation. The timing for such considerations is apt. At the time of writing, the Federal Aviation Administration (FAA), which regulates drones in the United States, only permits commercial drone flights by exemptions, which are granted by the agency, but has proposed a new set of rules for domestic drone use in the United States. These rules deal predominantly with regulating the user and are all aimed at addressing safety issues, not privacy.[104] This is unsurprising given that the FAA's mandate is safe airspace.[105] This leaves open the questions of who will deal with the other legal issues raised by drones, and more specifically, will the FAA have the authority to regulate safety designs, like the NHTSA did for

[104] For an overview of the proposed rules see: "Overview of Small UAS Notice of Proposed Rulemaking", *FAA*, online: <https://www.faa.gov/regulations_policies/rulemaking/media/021515_sUAS_Summary.pdf>.
[105] "Mission" *FAA,* online: <https://www.faa.gov/about/mission/>.

the automobile. Some states have sought to fill the gaps with respect to regulating drone privacy, either by banning the use of drones all together or by limiting their use by the state or private citizens.[106] Again, these regulations focus on regulating the user, to attempt to prevent him or her from using a drone for a nefarious purpose. Accordingly, drone regulation is thus far following the first phase of automobile regulation. It is time, instead, to start thinking about how privacy, surveillance and other concerns raised by drones might be addressed through a multi-faceted regulatory approach in order to facilitate their safe and accepted integration into society.

[106] "Current Unmanned Aircraft State Law Landscape" *National Conference of State Legislatures* (December 29, 2014) online: <http://www.ncsl.org/research/civil-and-criminal-justice/current-uas-state-law-landscape.aspx>.