
Second Report of the Axon AI
& Policing Technology Ethics Board:

Automated License Plate Readers

OCTOBER 2019

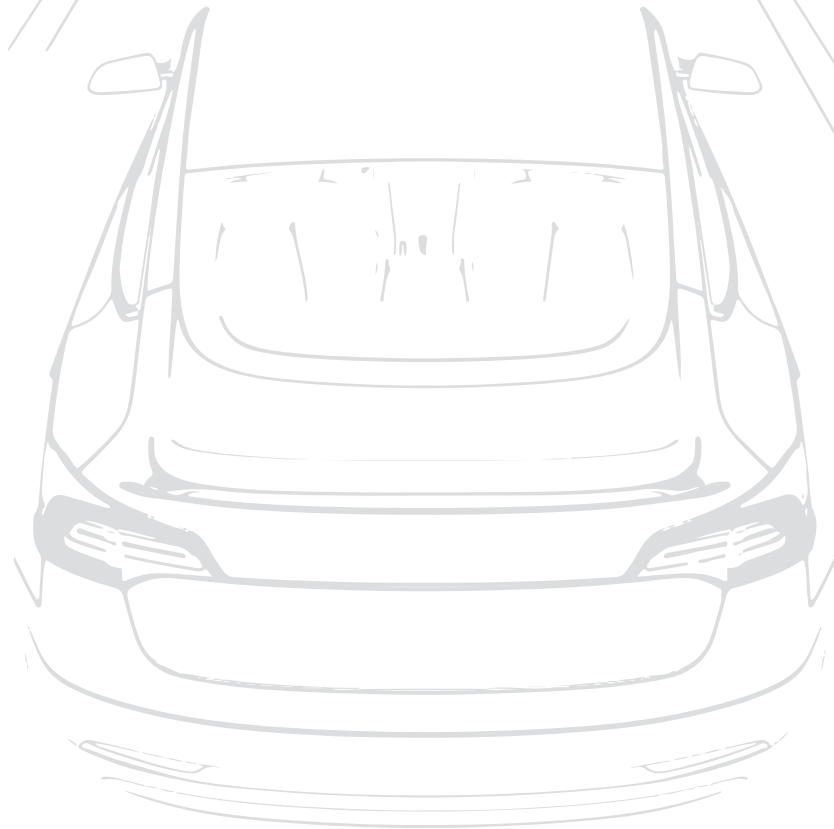


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I

Executive Summary



In 2018, Axon Enterprise, Inc. established the **AI and Policing Technology Ethics Board**. Its purpose is to help guide and advise the company on ethical issues relating to its development and deployment of new artificial intelligence (AI)-powered policing technologies that are under consideration or development, not to formally approve particular products. The Board’s first publication, First Report of the Axon AI & Policing Technology Ethics Board (“First Report”), was released in June 2019 and provided information about how the Board operates, as well as recommendations on the use of face recognition technology in Axon products.

This is the Board’s second report and concerns automated license plate readers (“ALPRs”).

ALPRs represent one of the most widely used surveillance systems in existence. ALPRs are computer-controlled camera systems that read passing license plates. As used by law enforcement, ALPRs alert officers when they encounter a license plate of interest—such as the license plate of a vehicle that has been reported stolen. ALPR systems typically store data on all of the license plates they read, creating extremely large databases of vehicle information over time (also known as “historical data”).

The use of ALPRs has become common across the private and public sectors—in everything from public toll collection to private surveillance and security—but there

is insufficient regulatory oversight. Indeed, while there is considerable concern about face recognition, the subject of this Board’s First Report, widespread face recognition use by law enforcement remains, for the most part, hypothetical. ALPRs, on the other hand, are ingrained into law enforcement operations across the country. They are here today, and they are very real.

Nonetheless, we lack information about key aspects of law enforcement’s ALPR use. We do not know how many ALPRs there are, where they are deployed, how effective they are at helping to catch serious criminals, or how frequently they are used simply to enforce low-level offenses. Retention rates

for ALPR data vary widely, yet we largely are ignorant of how that historical data is used and accessed. Within this report we cite evidence indicating that the impact of ALPRs falls disproportionately on lower-income individuals and people of color, but again, this impact has not been quantified or assessed.

From what the Board knows, we can say that the potential benefits of ALPRs appear real, yet the extent to which these potential benefits are realized is unknown. ALPRs can be used to locate stolen vehicles, identify vehicles of interest with regard to serious crimes, and locate the subjects of Amber or Silver alerts more efficiently and effectively. Police can use stored ALPR data to conduct investigations into a wide variety of crimes.

Yet, it also is clear that ALPRs impose very real costs. ALPR-aided enforcement may exacerbate racial and socio-economic disparities in the criminal system. This is particularly the case when, as we document below, ALPRs are used to enforce low-level traffic offenses or generate revenue in the form of fines and fees. ALPRs can generate false positives that may lead to intrusive and potentially dangerous traffic stops. ALPR systems store data, often for long periods of time, creating historical databases of our activities that for the most part are unregulated, creating serious privacy risks. ALPRs and the data they store can and have been used in ways that chill First Amendment liberties and threaten Fourth Amendment rights. The full extent of the costs of ALPRs are unknown as well.

Axon has informed us that it intends to enter the ALPR market in the near future, providing low-cost AI-driven ALPR technology as a part of its dashboard cameras. Consistent with a recommendation of our First Report, Axon notified us of its plans early, giving us an opportunity to influence the product's



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design. Axon also suggested a number of possible guardrails on its ALPRs.

Axon's entry into ALPRs comes at a pivotal moment. ALPR prices already have dropped sharply and will continue to decline, making widespread adoption seemingly inescapable whether Axon enters the market or not. At the same time, the market is not consolidated and each player is following its own rules. Without regulatory intervention, there is a risk that competition will encourage a race-to-the-bottom of more pervasive and more powerful surveillance.

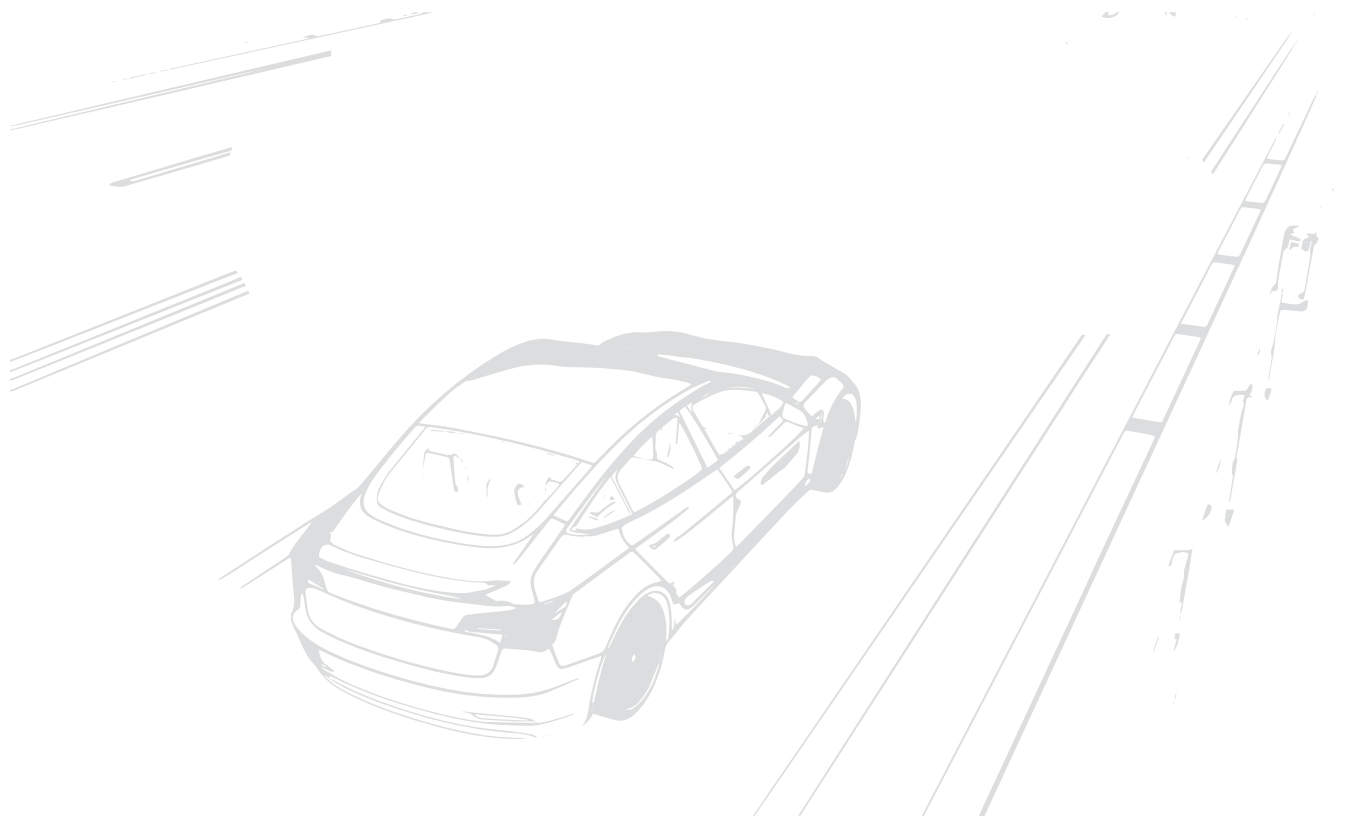
The Board hopes to help guard against a race-to-the-bottom in the use of ALPRs. Although some jurisdictions have laws governing ALPR use, most do not. Similarly, many agencies have policies addressing key issues around ALPRs, but many do not, and of those that

do, the policies are not always publicly available. In this report, we call for immediate regulation in all jurisdictions in which ALPRs are in use, including self-regulation by the industry and law enforcement, and—critically—government regulation as well. (We similarly believe the private usage of ALPRs should be regulated, but view that as beyond the scope of our review.)

In addition to calling for regulation of ALPRs, this report includes specific recommendations, both to inform law enforcement’s use of ALPRs around the country and to offer concrete ethical guidance to Axon as it pursues its ALPR. In making these recommendations, we do not necessarily endorse ALPR use generally, nor Axon’s decision to enter this market. Because Axon’s ALPR remains under development and a release date has not yet been determined, we will provide specific views to Axon about its product when we learn more about it and the state of the market it

will enter. The extent to which Axon follows our recommendations in this report will bear on our assessment of whether its product and its usage are appropriate and ethical.

As we said in our First Report, communities—not law enforcement agencies—are the ultimate customers for technology purchased by government. Not only should communities have a say in what surveillance technology gets purchased and how it is used, but law enforcement agencies must adopt policies and practices that ensure their use of ALPRs is equitable, well-informed, and transparent to the communities they serve. Vendors should design products to help ensure that—to the extent this technology is deployed—it is used transparently, equitably, and effectively. To this end, we have included, in **Attachment A**, a document the Board prepared that offers suggested questions community members can ask about ALPR use in their jurisdiction.



As described in much more detail in the pages that follow, we have provided specific recommendations to help guide Axon, law enforcement, and the ALPR industry generally. These recommendations and their rationale are spelled out in detail in Part IV, and we summarize here:

- 01** Law enforcement agencies should not acquire or use ALPRs without going through an open, transparent, democratic process, with adequate opportunity for genuinely representative public analysis, input, and objection. To the extent jurisdictions permit ALPR use, they should adopt regulations that govern such use. (This is what we said about face recognition, and it is true as well for ALPRs.)
- 02** Agencies should not deploy ALPRs without a clear use policy. That policy should be made public and should, at a minimum, address the concerns raised in this report.
- 03** Vendors, including Axon, should design ALPRs to facilitate transparency about their use, including by incorporating easy ways for agencies to share aggregate and de-identified data. Each agency then should share this data with the community it serves.
- 04** Vendors, including Axon, should design their ALPRs so that agencies can adjust the list of vehicles to which an ALPR will alert law enforcement officers, so that the list includes only those offenses or reasons most of concern to that agency and its community. Although communities must decide the contours of their own alert lists (also known as “hot lists”), as a general matter, we believe that these lists should not be used to enforce civil infractions, offenses enforceable by citations, or outstanding warrants arising from a failure to pay fines and fees.
- 05** Vendors, including Axon, must provide the option to turn off immigration-related alerts from the National Crime Information Center so that jurisdictions that choose not to participate in federal immigration enforcement can do so.
- 06** ALPRs must be designed and operated in ways that ensure alert lists are checked routinely for errors and kept up to date.

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- 07** An ALPR alert, on its own, should not constitute sufficient grounds to stop a vehicle. Officers must make visual confirmation independently that the license plate matches the hot-listed plate. If the offense at issue is associated with the registered owner of the vehicle (as opposed to the vehicle itself), the officer also should ascertain whether the driver is consistent with the description of the registered owner.
 - 08** Axon should work with partner agencies to determine the shortest possible retention period for ALPR data that will serve law enforcement needs sufficiently, and set that period as the default retention setting on its ALPRs.
 - 09** ALPR design should create audit trails both of real-time ALPR alerts and agency accessing of historical data. Law and agency policy should require regular auditing of ALPR usage.
 - 10** Stored ALPR data must be encrypted and secured against outside access and breach.
 - 11** ALPR vendors should not retain the right to access or share ALPR data, and law enforcement's ALPR data never should be shared for use by for-profit third parties.
 - 12** ALPRs should be designed such that if agencies share data with other law enforcement agencies, they do so transparently and in a way that is governed by formal and lawful data-sharing agreements.
 - 13** Vendors, including Axon, never should profit from fines and fees obtained through law enforcement use of ALPRs.
 - 14** Vendors, including Axon, should provide adequate training materials for agencies and officers using their ALPRs, including about default settings and why they are set the way they are.
 - 15** It is imperative that data-gathering and impartial study be conducted of ALPR usage, so that communities and the country are aware of how ALPRs are being used, of what is required to make that usage effective, of any harms arising from ALPR usage, including whether ALPRs are exacerbating disparities, and of ways to eliminate or mitigate those harms.



II

ALPRs Today & Axon's Entry into the ALPR Market



Should Axon enter this market, we call on it to be a leader on this front—to design its product with controls to assure transparency, equity, and other ethical principles are in place. We hope that if one prominent vendor does this, communities will take notice and insist their agencies use products with similar controls.

Despite the fact that ALPR use has exploded internationally and nationally over the last two decades, in many places in the United States, ALPR usage is unregulated or under-regulated.

This relative lack of regulation, combined with rapid growth, has created an industry with little public accountability. Literally billions of license plate “reads” of ordinary individuals sit in ungoverned databases, leading to enforcement stops and allowing for historical tracking. It is difficult for law enforcement to resist the allure of these tools, and vendors are incentivized to outdo one another with regard to what capacities are built into ALPRs.

The way to stop a race-to-the-bottom is with regulation—including industry self-regulation and government regulatory intervention.¹ Should Axon enter this market, we call on it to be a leader on this front—to design its product with controls to assure transparency, equity, and other ethical principles are in place. We hope that if one prominent vendor does this, communities will take notice and insist their agencies use products with similar controls. But we also realize Axon is not alone in the ALPR market and cannot alone dictate its terms. Therefore, this report includes an urgent and emphatic call for government regulation of ALPRs.

How ALPRs Work

ALPRs are computer-controlled camera systems that can be mounted almost anywhere. They can be stationary or mobile. They can be attached to light poles, police cars, private tow-trucks, or even mobile phones. Any ALPR system has four essential components:



01 | Capture:

ALPR cameras are designed to record license plates by automatically capturing video or images of passing vehicles. Some ALPRs use infrared imaging, while others (often newer) operate with normal visual-spectrum imaging from a high-definition video camera.



02 | Compute:

An algorithm detects license plates in the captured image, and “reads” the characters of the license plate. Some ALPRs also are able to detect information about the vehicle, such as color or type. Because the camera captures an image of the passing vehicle (and not just the license plate), in the future, algorithms may be able to identify yet additional information, including occupants of the vehicle through face recognition.



03 | Catalog:

Most ALPR systems then “catalog,” or store, the license plate number, time, and GPS-coordinates of each scan. This allows the tracking of where vehicles have been over time through stored data.



04 | Compare:

Most, though not all, ALPRs then compare license plates they come across against a database of sought-after plates—commonly referred to as an “alert list” or “hot list.” If the ALPR detects a match with the hot list, the ALPR user—usually an officer in a patrol car—is notified in real time.



There are both national and local hot lists. The national hot list, from the National Crime Information Center (NCIC) maintained by the Federal Bureau of Investigation, contains license plates associated with vehicles of interest in a wide variety of concerns and offenses. States and municipalities can opt in to receive NCIC alerts and can generate their own local hot lists as well. State and local hot lists may include license plates associated with lower-level enforcement concerns, from individuals with local bench warrants to plates associated with outstanding parking tickets.

ALPR Use Today

ALPRs have been used by law enforcement agencies around the globe for over 20 years. The first large-scale implementation of ALPRs was in 1997 in the United Kingdom. ALPRs were integrated into London's "ring of steel," a network of CCTV cameras mounted around the perimeter of the central district of London, tracking every vehicle coming in or out. The following year the U.S. Border Patrol began to use ALPRs to track vehicle movement at the U.S. border.²

ALPRs first were used in the 1990s by local U.S. law enforcement to combat automobile theft. The idea was that if a stolen vehicle (or, more accurately, a vehicle with a license plate on a hot list of stolen vehicles) passed an officer, the officer would be alerted and could investigate.³

Over time, ALPR use has exploded along several dimensions.


According to one estimate, between 2007 and 2012, the number of U.S. law enforcement agencies reporting ALPR use jumped from 19% to 71% with 85% planning to buy or expand their systems.⁴ ALPR use is not limited to government and law enforcement. Certain ALPR vendors also sell their systems and databases to private users, including repossession companies, banks, and insurance companies.⁵ Others vendors focus on neighborhood and home security, bundling cameras with installation, maintenance, and data-retention services.⁶ ALPRs also are widely used for toll collection. Overall, the estimated value of the global ALPR market in 2018 was \$1.81 billion, with the projected value to increase to \$3.43 billion by 2025.⁷

This expansion has been fueled both by government and by private industry. Federal and state funding, including federal grants, provided tens of millions of dollars toward ALPR purchases and allowed many agencies to purchase their first ALPRs.⁸ Since then, private vendors have pushed ALPR costs lower and lower. Technological advancements have allowed off-the-shelf digital cameras to be converted into ALPR scanners.⁹ One company, which offers its software for free to run on ordinary security cameras (customers can optionally purchase cloud storage and analytic services), recently

reported a nearly 3,000% increase in downloads and use from 2017 to 2019.¹⁰

ALPRs also have expanded from their original purposes. Initially, ALPRs primarily were used to locate stolen vehicles. Today, ALPRs can connect to external databases to learn more about the license plate or the vehicle's registered owner, alert an officer to a vehicle's unpaid traffic tickets or expired insurance, or flag the registered owner's open warrants, unpaid property taxes, sex-offender status, or supposed gang affiliation.¹¹

Importantly, today ALPR scans typically are stored and retained, including time and location information, creating vast databases allowing for investigations into where particular cars have been over time.¹² We refer to the information in these databases as "historical data."



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These databases of historical data are amassed through a variety of methods. Private vehicles (often repossession trucks) travel the streets equipped with ALPRs. Police cars gather license plate reads as they patrol, storing the reads in agency systems. Vendors enter into contracts with law enforcement agencies that allow access to all agency plate scans, and retention even after the contract with the

agency terminates.¹³ Law enforcement agencies have contracts with vendors that grant access to the private databases and facilitate sharing license plate reads with other agencies.¹⁴

Today, ALPR databases store information about the locations of the vehicles of millions of people who are innocent of any offense. The current market leader in historical ALPR data boasts that it has a database of 9 billion nationwide plate scans from private companies, along with the ability to access 1.5 billion plate scans from law enforcement agencies.¹⁵

Axon's Entry into the ALPR Market

For decades, the cost of mobile ALPRs served as a natural limit on adoption. Most agencies were unable to afford to equip more than a few cars at a time.¹⁶ The most common mobile ALPRs consist of multiple cameras mounted externally on a vehicle. Given the expenses of installation, the need to make these cameras weather resilient and tamper-proof, and the underlying hardware and technology costs, early models retailed at nearly \$25,000 per vehicle. But, as noted above, new technologies are causing the price of ALPRs to drop precipitously. Vendors are now making ALPR systems, powered by AI-technology, that can run on almost any camera.

It is in this context that Axon informed the Board that it plans to enter the ALPR market. Axon intends to make ALPR technology available on a future version of the dashboard cameras that exist in many police patrol cars already.

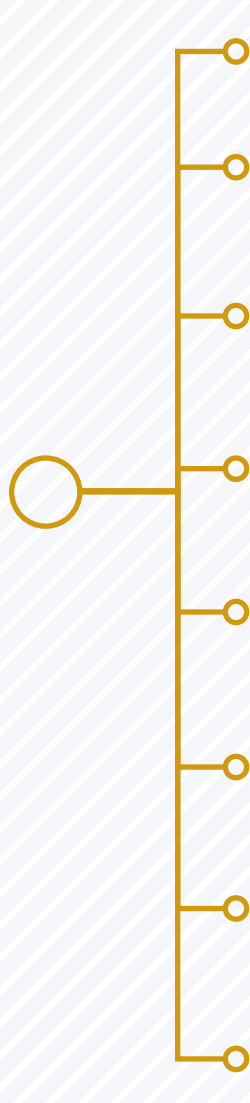
Axon already produces patrol car dashboard cameras ("dash cams") under the Axon Fleet brand name.¹⁷ Axon expects its next generation Fleet camera to include ALPR

capabilities. Axon's ALPR will use AI image processing and machine learning to extract license-plate data from video, which will be fed into a terminal (usually a laptop) that officers have in their cars. By integrating ALPRs into dash cams (as opposed to externally mounted cameras), Axon expects that its innovations will enable agencies to deploy ALPRs more broadly than before, potentially

across an agency's entire fleet of cars.

Below, we have included the information we have so far about Axon's proposed ALPR. We expect to be provided with additional details in time. In addition to ironing out engineering and design issues, Axon faces a range of choices that will impact how its ALPR can be used by law enforcement agencies, including data ownership, data access, privacy, and security.

What we know about Axon's ALPR:

- 
- Integrated with in-car cameras, either dash cams or rear cams;
 - Equipped with 60-degree field of view allowing for scanning three lanes of traffic;
 - Accuracy of plate reading algorithm approaches 100% under ideal conditions;
 - Accuracy decreases depending on lighting, distance, and relative speed of vehicles;
 - Outperforms four major competitors on accuracy, according to Axon testing claims;
 - Calibrated to register a scan only if the system is at least 90% confident that it has identified all of the license plate characters correctly;
 - Not an infrared camera, so will be able to read temporary plates and plates that are not retro-reflective;
 - It likely will be able to recognize other vehicle characteristics, in addition to extracting plate data.



III

Preliminary Assessment and Guidance Regarding ALPR Benefits & Costs



We begin with what must be obvious: Axon’s entry into this market with what appears to be a powerful and low-cost ALPR has the potential to increase dramatically the use of ALPRs by law enforcement.

In our First Report (page 17), we wrote, “We have found it essential to be involved at the earliest possible stage of product development, preferably before Axon even begins to design a product. Early involvement means that we can guide Axon’s research and that we can suggest design modifications before they become cost prohibitive for the company.” Axon has followed that recommendation and solicited our input at this developmental stage.

In this section, we offer a preliminary assessment of potential benefits and potential harms of low-cost ALPR systems in use by law enforcement. We do so using the benefit-cost Framework outlined in our First Report, which we have included here as [Attachment B](#).

We begin with what must be obvious: Axon’s entry into this market with what appears to be a powerful and low-cost ALPR has the potential to increase dramatically the use of ALPRs by law enforcement. It will become viable for law enforcement to outfit their entire fleet with ALPRs. Increased usage is likely to expand substantially the amount of historical

data available to track vehicle movement. Axon’s ALPR-equipped cars will be able to scan three lanes of traffic simultaneously, potentially front and back, reading and storing all the license plates those cars come across.

There is publicly available information suggesting Axon is not the only vendor contemplating this course of action. Thus, whether or not Axon pursues this course, it is likely that the state of affairs we just described will come to pass.¹⁸

We cannot and will not evaluate Axon’s ultimate decision to enter the ALPR market until we have more specific information about its ALPR. At that time, we anticipate knowing not only what Axon’s product can do, and how—and whether it has developed the product consistently with our recommendations—but also a great deal more about the market Axon enters. If Axon is the only market entrant of its size, that presents one scenario. If Axon enters a burgeoning market, with a product that is capable of leading the way to regulated and ethical usage, that is another.

Preliminary Assessment of Potential ALPR Benefits

We begin with the potential benefits to society and law enforcement. As we make clear in our Framework (see **Attachment B**), if a technology does not yield concrete benefits, there is no reason to proceed further.

As set out above, it is clear ALPRs are being used for a variety of purposes, from locating stolen vehicles to identifying vehicles associated with individuals with outstanding warrants. ALPRs also have the potential to identify make and model of a car, or



A major difficulty we encounter is that for the most part we lack clear data on how useful ALPRs presently are to these various purposes. For almost every benefit of ALPRs anyone advances, there is a dearth of evidence to make clear precisely how real or extensive that benefit is.

even identify people in a vehicle. Some of these capabilities amount to massive force multipliers, quickly automating what an officer would need to do by hand or by calling in to dispatch. Yet others represent entirely novel tools previously unavailable to police.

A major difficulty we encounter is that for the most part we lack clear data on how useful ALPRs presently are to these various purposes. For almost every benefit of ALPRs anyone advances, there is a dearth of evidence to make clear precisely how real or extensive that benefit is. We believe it is imperative that such data be developed, so that society has the information it needs to regulate ALPRs appropriately.

1. IMPROVED REAL-TIME LOCATION OF HOT LIST LICENSE PLATES

Law enforcement agencies frequently seek to locate particular vehicles in real time. For example, a license plate may be radioed out to officers as part of a BOLO (“be on the lookout”). Agencies can issue a BOLO for almost any reason—from locating a stolen vehicle, to identifying one associated with an Amber or Silver Alert. The severity of the matter under investigation can vary considerably. For example, the outstanding warrant at issue could be for a violent crime, unpaid fines, or suspended driver’s license.

Before ALPRs, the best an officer could do either was to remember a license plate of interest or search dozens of plates over the course of their shift. This was labor intensive and unlikely to be very successful. ALPRs make a substantial difference here. Once license plates of interest are compiled into a hot list, an agency can use ALPRs to automate the search process. Hundreds or thousands of plates can be scanned by one patrol car and compared

against the hot list. In the event of a match, the officer is notified and can investigate.

Unsurprisingly, then, there have been a number of studies that indicate ALPRs improve an officer's ability to detect vehicle-related violations.¹⁹ With respect to stolen vehicles, specifically, one study put the increase at 140%.²⁰ More generally, there is substantial evidence that officers with ALPRs will recover a greater number of vehicles, seize more contraband, and make more arrests.²¹

Although these increases appear real when compared to officers without ALPRs, it is worth noting the data indicates that ALPR hit rates remain astronomically low. Most importantly, they are lower still for serious offenses. For example, the ACLU examined data from Maryland's state data fusion center, which aggregates plate reads from three-quarters of Maryland law enforcement agencies. Of the over 29 million plate reads gathered in the center's data in the first half of 2012, only 0.2% were hits of any kind, and of those, 97% were for a suspended or revoked registration or emissions violation. The ACLU found similarly low hit rates for cities and agencies across the country.²²

2. IMPROVED HISTORICAL INVESTIGATIONS

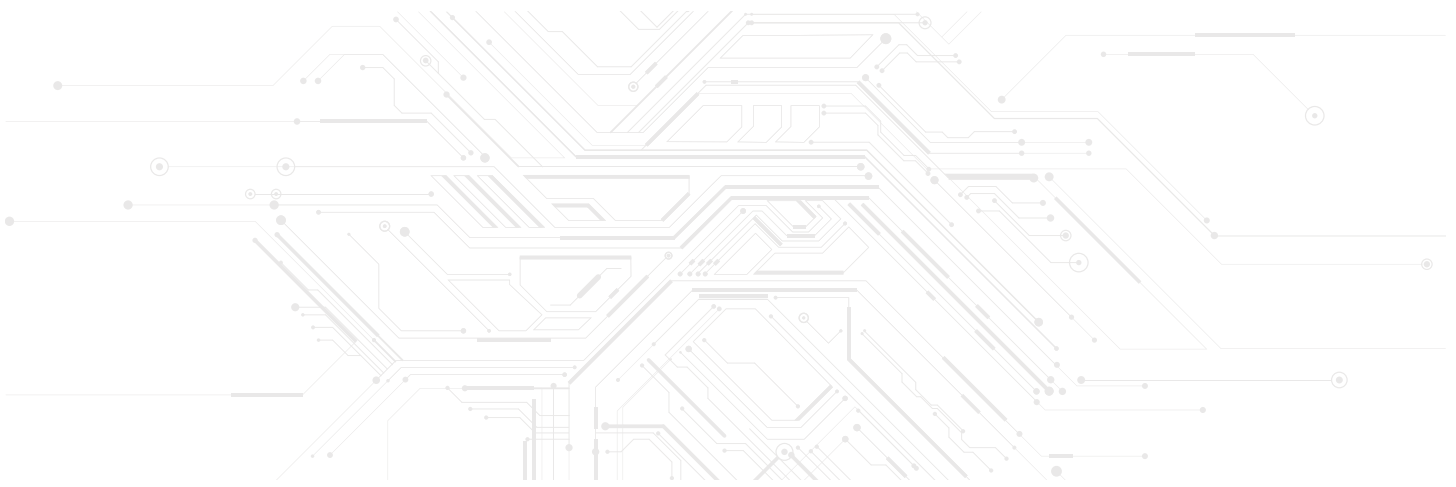
In addition to real-time alerts, many agencies use ALPRs to assist with criminal investigations. ALPRs generate huge searchable location-history databases. For example, an officer who knows where and roughly when a crime occurred can generate a list of vehicles near the scene at the time. This list might identify potential suspects or witnesses. Or, investigators can examine the historical path of a vehicle, helping to build a case that the vehicle was involved in an offense.

Although there are reports of ALPRs being used successfully for investigations, there is little data or study about the frequency or effectiveness of this type of ALPR use.²³ There are some indications that agencies use ALPRs for general investigative purposes more frequently than they initially expected, but it is impossible to assess the utility of ALPRs in this regard without knowing how often this type of investigation occurs, for what sorts of cases, and how often they are successful.²⁴

There is a particularly critical need for study on how far back in time stored ALPR data

There is a particularly critical need for study on how far back in time stored ALPR data proves valuable, and with what frequency. Knowing this would inform a decision about how long to retain ALPR data.





proves valuable, and with what frequency. Knowing this would inform a decision about how long to retain ALPR data. At present, we know that there are several jurisdictions that manage to conduct their investigations with 30 days or less of data storage, suggesting that the usefulness of stored ALPR data may diminish rather quickly.²⁵

3. GENERAL CRIME DETERRENCE

There is little evidence that increased arrest rates due to ALPRs decrease crime overall. The few studies examining this issue suggest otherwise.²⁶

4. IMPROVED TRAFFIC SAFETY

ALPRs in police patrol cars might be useful in enhancing traffic safety, but again we have no evidence in this regard. There is some evidence that stationary ALPRs in red light cameras—not mobile ALPRs—provide some benefit by reducing fatal collisions.²⁷ More generally there is some research suggesting a negative correlation between receiving a moving violation and subsequent involvement in a fatal crash, though it is not evident to what extent mobile ALPRs are used to enforce moving violations.²⁸ None

of this research focuses on mobile ALPRs. In short, the suggestion that mobile ALPRs will improve traffic safety, remains conjectural.

5. INCREASED REVENUES

ALPR use may increase revenue for a jurisdiction. We are loath to call this a benefit, especially when it comes to represent a significant portion of a jurisdiction's budget. We present the evidence in this regard in our discussion of costs. But some jurisdictions may consider it a benefit.

6. REDUCING ARBITRARINESS AND BIAS

One intriguing potential benefit of ALPRs is that they might be used to make policing less biased, less arbitrary, and more productive. For example, it is well-documented that traffic stops often occur for pretextual reasons, i.e., enforcing the traffic violation is simply a means of investigating more serious crime. What we do know is that hit rates on such stops are notoriously low, that unnecessary traffic stops interfere with people's liberty, and that such pretextual stops disproportionately burden racial minorities.²⁹

One could imagine how the use of ALPRs might reduce the costs of traffic stops, because ALPR alerts might be more indicative of vehicles that actually justify officer attention. Particularly if agencies calibrate their hot lists to include only relatively serious reasons for stops (as defined by the communities those agencies serve), agencies might be able to focus their officers on fewer, higher quality stops, rather than the somewhat arbitrary manner in which stops are conducted today.

The Board certainly hopes that this positive use of ALPRs comes to be—i.e., rather than increasing enforcement of low-level offenses, agencies use ALPRs to focus their officers’ attention on high-quality stops; and that rather than allowing officers unlimited discretion to conduct stops, that ALPR use fosters attention on an objective reason to stop a vehicle.

We have not, however, seen any evidence to date that the use of ALPRs reduces stops for other reasons. Thus, this potential benefit is speculative at present. Still, as we discuss below, we believe there are design steps that Axon could take to make this scenario somewhat more likely to occur.

7. OFFICER SAFETY WHILE DRIVING

Officers are involved in vehicle accidents at twice the rate of the average driver, with distracted driving being a relatively

significant contributing factor. Axon has suggested to us that some portion of these accidents are caused by officers who are distracted by typing in (or “running”) license plates manually (as opposed to other distractions, including cell phones and radios). If this is true, it is at least possible that ALPRs would minimize some amount of this distracted driving, thereby reducing officer-involved accidents.

We have two concerns about this benefit. First, although some figures show “inattentive/careless driving” as a significant (but not leading) cause of officer collisions, we have no evidence of the degree to which running license plates contributes to these incidents.³⁰ And perhaps more important, as discussed below, we are uncertain whether officers should be running license plates as often as some do.

8. PREDICTIVE ANALYSIS

It is possible that ALPR scans could be used as an input into predictive analysis tools. For example, ALPR data might allow police to anticipate where a particular wanted vehicle will be in the future, or it might provide a basis for identifying vehicles operating in suspicious patterns.³¹ The Board has seen no evidence that such tools are near operational. Any such tool would require its own careful ethical analysis.



In sum, it is possible to think of benefits of ALPRs, and some, such as locating stolen vehicles or investigation of crime, may be quite real. But the evidence in support of these benefits is, at present, remarkably lacking, making it difficult to assess the impact of the pervasive use of low-cost mobile ALPR units.

Preliminary Assessment of Potential ALPR Costs

After considering potential benefits, our Framework turns to potential costs. As we explained in our First Report, it is essential at this step to try and capture not only obvious costs, but unintended consequences as well.

As with benefits, many of these costs are difficult to quantify. They are real, but it is hard to know how extensive they are, both because they have not been studied sufficiently, and because ALPR use is going to increase as the costs of mobile units drop.

1. INCREASED ENFORCEMENT GENERALLY AND ITS LIKELY DISPARATE RACIAL, ETHNIC, AND SOCIOECONOMIC IMPACTS

At their core, ALPRs promote greater enforcement.³² That's their purpose. If it were not for their capacity to alert officers to vehicles deemed by law enforcement worthy of attention, the value of ALPRs would be severely limited in law enforcement's eyes.

Every enforcement action is an intrusion on a person's daily life. Those intrusions have inherent costs—both for the individuals stopped and for communities bearing the brunt of enforcement efforts—that must be accounted for and balanced against the reason for the actions. This is especially true when it comes to over-enforcement of low-level offenses, which can have a corrosive effect on community trust in law enforcement. This impact on trust and legitimacy may lead to people being unwilling to report crimes or cooperate with law enforcement, which in turn makes law enforcement's

work more difficult around serious crimes.³³

Thus, the costs associated with ALPRs will vary dramatically depending on how hot lists are constructed and what prompts alerts sent to officers. ALPRs obviously are going to alert officers most frequently to lower-level matters, unless they are set to disregard them.³⁴

What's more, the impact of increased enforcement will not be felt equally across all communities. Typically, communities of color and lower income communities bear the brunt of increased enforcement, for two related reasons:

First, mobile ALPRs go where officers go. More officers are deployed to neighborhoods that are perceived to be "high crime," which tend to be minority and low-income neighborhoods. ALPRs thus will be more active in those neighborhoods, both enforcing real-time alerts and gathering historical ALPR data. This disparate impact was seen in a study from the Electronic Frontier Foundation, which examined ALPR scans in Oakland, California and found that areas with greater numbers of black and Latinx residents were more likely to be scanned.³⁵

Second, hot lists inevitably will reflect existing racial, ethnic, and socioeconomic disparities in the criminal justice system and our society at large. For example, to the extent ALPRs are used to enforce expired vehicle registration or unpaid fines and fees, they will fall disproportionately on low-income communities and communities of color.³⁶ To the extent ALPRs are used to enforce open warrants for low-level offenses (e.g., drug possession), they will reflect pre-existing disparities in low-level enforcement across the system.³⁷

In short, ALPR technology necessarily operates within the context of police practices and deployment decisions that often have clear disparate racial and socioeconomic impacts.³⁸

2. INCREASED FINES-AND-FEES ENFORCEMENT AND ITS DISPARATE IMPACTS

Closely related to increased enforcement are the costs associated with increased fines and fees. As noted above, ALPR hit rates for low-level offenses are far higher than for serious crimes.³⁹ Given the evidence that ALPRs today sometimes are used to generate revenue, we are concerned that more ALPRs will mean increased collection of fines and fees by jurisdictions looking to raise revenue. One major vendor has called ALPRs “a proven force multiplier that helps generate revenue,” and said that ALPRs helped generate \$200,000 in 30 days for one department, with “the end result [being] fewer scofflaws getting away with nonpayment.”⁴⁰

Heavy fines and fees enforcement can have severe impacts on individuals, often with disparate racial and socioeconomic results.⁴¹

Overreliance on fines and fees already is a problem plaguing many areas of the country. Smaller jurisdictions, particularly those with high rates of poverty, frequently rely on fines and fees to fund huge portions of their budget. In a recent survey of 600 jurisdictions by GOVERNING magazine, at least 284 financed over 20% of their budget from fines.⁴² That level exceeds the limit set by the State of Missouri after the U.S. Department of Justice investigation into fines-and-fees enforcement in Ferguson, Missouri, which found that the city’s law enforcement practices were “shaped by [its] focus on revenue rather than by public safety needs.”⁴³

The more private companies align their financial interests with fines-and-fees enforcement, the more likely the disparate impacts of such enforcement will be realized. There are reports that one vendor

has offered free ALPRs to law enforcement agencies so long as those agencies hot list plates of individuals with outstanding court costs and fines. When these drivers are pulled over by law enforcement, they are told they can either be arrested or pay their fine on the spot, with an additional 25% “processing fee” paid to the vendor.⁴⁴

Jurisdictions ultimately have to make their own decisions regarding how ALPR enforcement occurs, but the Board has real concern about imposition of these sorts of costs, which potentially could increase notably as the costs of mobile ALPR use come down.

3. INAPPROPRIATE STOPS

Increased ALPR use carries with it the risk of unconstitutional, wrongful, or otherwise inappropriate stops. Such interactions pose a danger if an officer stops a vehicle believing that the individual in the vehicle is a violent offender.

One source of such erroneous stops is the ALPR technology itself.⁴⁵ Inaccurate reads can create false alerts that lead to unnecessary police interactions. Although this has occurred, we lack data on how often.⁴⁶

A different form of false positive occurs when hot lists are inaccurate or not up to date. Although we have no idea how extensive these incidents are, there have been reported instances of officers holding innocent people at gunpoint because of erroneous ALPR alerts.⁴⁷ There is evidence that outstanding warrants—a potentially large part of hot lists—include a variety of errors that could lead to false ALPR alerts and enforcement actions against innocent drivers.⁴⁸

Finally, even if the technology works properly, it goes without saying that a car is not the same as a person. For offenses not directly related to a vehicle, an officer often stops a car because they

are interested in the person they believe to be driving the car (usually the registered owner). But particularly in less affluent households, there are likely to be multiple drivers sharing a single vehicle. What's more, the car-sharing market continues to grow.⁴⁹ Thus, it is a matter of probability, not certainty, whether the person driving the car is the registered owner.

4. THE PRIVACY IMPLICATIONS OF GROWING ALPR DATABASES

ALPRs raise very serious privacy concerns. They reveal information about drivers in the vicinity of the ALPR systems, and amass an enormous amount of historical data that could be used to determine an individual's whereabouts.

We begin by noting that it is a reasonable question why law enforcement officers are permitted to scan license plates at random on the road at all—whether by manually running plates or via ALPR. Apparently, the practice is widespread and routine. It may well be that because license plates are displayed publicly, scanning and running plates is not a “search” within the meaning of the Fourth Amendment, under existing precedent. That does not mean, however, that such scanning necessarily is appropriate. To be clear, officers may well have sufficient legal cause at times to want to know more about a particular automobile. But it is not clear why individuals going about their lives and business, and doing nothing that rises to the level of reasonable suspicion, should have anything about themselves investigated or recorded.

The massive ALPR databases being amassed allow those with access to reconstruct a history of where a car has been. Using one of these databases, a reporter was able to track a man's vehicle

over years.⁵⁰ Some ALPR manufacturers own and aggregate ALPR scans, and share this data with purchasers, whether law enforcement or private entities.⁵¹ It also may be possible to use ALPR data to predict where vehicles can be found in the future.

As the Supreme Court has made clear, location history can paint a detailed picture of our personal lives. The longer the data is stored, the more intimate the picture.⁵² For this reason, the Supreme Court has held that even though law enforcement viewing information such as location is not a “search,” if historical data over a certain period of time is searched, the Fourth Amendment is implicated, and access to that data requires a warrant.⁵³

There is significant concern in the public sphere at the moment about the use of face recognition, for these very reasons. Yet, while the widespread use of face recognition is still hypothetical in this country, the use of ALPRs is ongoing and the data is readily available. We do not know enough about the use of this ALPR data, but the privacy risks here are evident and substantial.

Additionally, the collection of ALPR data runs the risk of chilling First Amendment protected activities, such as attending houses of worship or public protests. There already is evidence that ALPRs have been used for investigations around First Amendment protected activity, both by law enforcement and groups with a particular political agenda.⁵⁴

There also is a very real risk that ALPR data will be abused by those with access. There have been documented cases of officers using ALPR data to stalk or harass individuals, or to tamper with and sell records they obtained, though again we have no way of knowing how widespread this is.⁵⁵

Finally, there is the risk of data breaches, which can lead to personal data being used

for any number of troubling purposes. For example, a 2015 investigation found more than 100 exposed ALPR systems online, “often with totally open web pages accessible by anyone with a browser.”⁵⁶ Three years later, a similar investigation found that little had improved, with the information from more than 150 ALPR cameras searchable on the internet, most using factory-default passwords.⁵⁷

5. ADDITIONAL POTENTIAL COSTS DEPENDING ON USE

There are additional potential costs of ALPRs, depending on how an agency chooses to use the technology. We cannot possibly know or review every scenario here, but we note some additional major concerns that arose during our discussions:

Gang Databases:

The Board would have huge concerns about agencies linking their ALPRs to gang databases in either direction—i.e. to use ALPRs to alert officers when they are in the vicinity of a vehicle believed to be associated with gang activity, or to add individuals or vehicles to a gang database based on ALPR scans. There are reports that this is occurring in some jurisdictions.⁵⁸ These sorts of lists have been criticized as inaccurate and overbroad, leading to the possibility of unnecessary enforcement, and perpetuating racial disparities.⁵⁹

Immigration Enforcement:

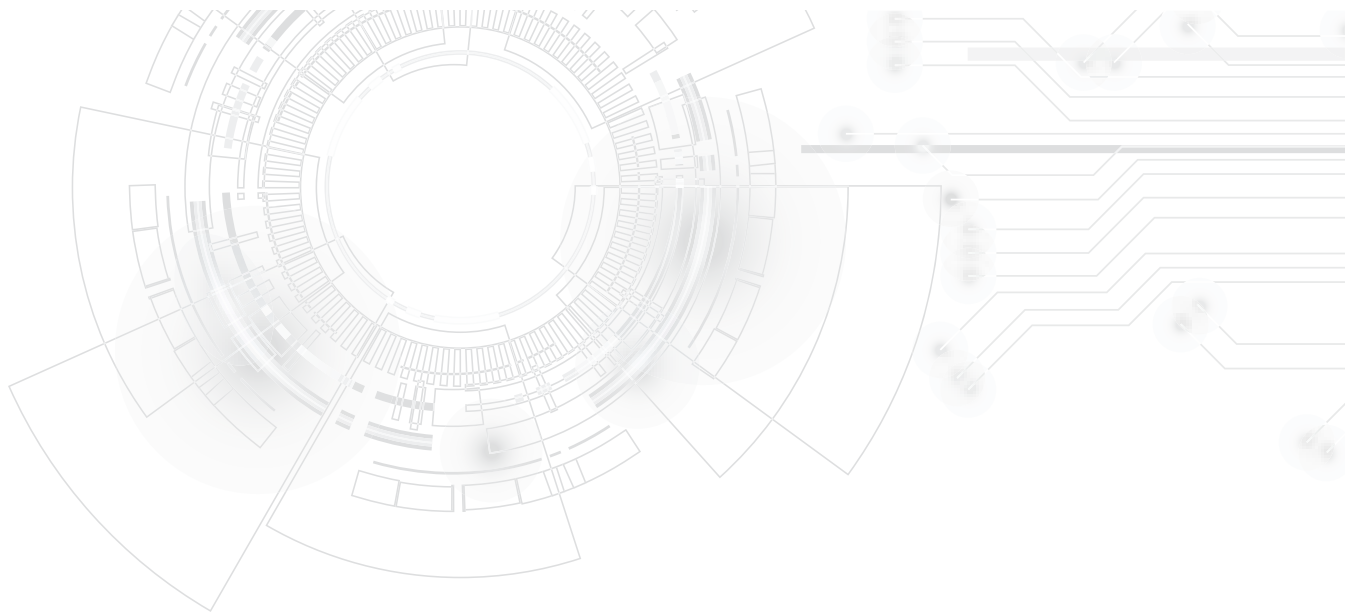
The Board has a particular concern relating to the federal NCIC system and its relationship to immigration enforcement. In general, the Board favors using the NCIC system over local hot lists, as local hot lists are more

susceptible to generate ALPR alerts for minor offenses and fines-and-fees enforcement. The NCIC Vehicle List generally is restricted to serious crimes. But NCIC also includes civil immigration violations (such as visa overstays).⁶⁰ It therefore is possible that when running names or plate through NCIC, an alert will be generated solely for immigration enforcement. The Board is deeply troubled by the possibility that the spread of ALPRs might co-opt local law enforcement into federal immigration enforcement when those agencies otherwise would not choose to engage in such enforcement.

Expanded Capabilities Over Time:

At the time that Axon has a final product available for review, we will ask precisely what data or images the ALPR can collect and analyze (e.g., license plate, state of origin, type of vehicle), whether the ALPR camera can be repurposed to capture additional or different data (such as through use as a stationary ALPR), and whether the software can be run on other cameras (such as CCTV or body-worn cameras). This information will allow us to think about specific use cases, and say more about them.

But in addition to specifics about how an agency actually will use ALPRs, it is important to be conscious of how the technology can develop over time, and what capabilities could simply be added on to existing systems. For example, at present ALPRs do not read vehicle registration stickers. Adding this capability would raise serious questions about increasing enforcement of a violation that, at times, simply reflects financial hardship. Additional capabilities—such as capturing non-plate text (e.g., bumper stickers) or photos of passengers—would raise a number of serious considerations. The same is true of any predictive capabilities.



6. LACK OF INFORMATION AND TRANSPARENCY AROUND ALPR USE

There is too little information about the details of how ALPRs are used across the country, including where ALPRs are deployed, the compositions of hot lists (both what types of crime, but also demographic breakdowns), how often historical data is accessed, and much more.

Vendors must share some of the responsibility for this lack of transparency. There are provisions in certain contracts that actively impede transparency, barring agencies

from publicizing their use of ALPRs or disclosing their agreements to the public.⁶¹

Lack of transparency around how and where ALPRs are being used magnifies many of the costs discussed above, as well as limiting information about benefits. When law enforcement agencies operate without transparency, it detracts from their legitimacy, and inhibits their ability to act effectively. And communities cannot make decisions about ALPR use without information. Although some degree of secrecy around law enforcement is essential at some times, the Board is skeptical that is the case around the use of ALPRs.



In summary, with respect to both benefits and costs, we are operating with limited information, often extrapolating from anecdotes, and doing our best to estimate effects. We have acknowledged there are potential benefits, but it is clear to us that there are very real costs as well.



IV

Recommendations

A faint, light gray icon of a lightbulb with several short lines radiating from the top half, symbolizing an idea or recommendation. It is centered behind the main title.



What follows are a set of recommendations that we hope will be of use to society as a whole, including legislative bodies, communities concerned about policing, law enforcement agencies, and the broader ALPR industry.

We have identified what we know regarding benefits and costs, as well as the product Axon anticipates producing. The recommendations that follow provide guidance on what we believe an ethical and appropriate usage of ALPRs might look like. Although we understand that ALPRs are used internationally, our recommendations focus on the United States, and are sensitive to U.S.-specific laws and policy challenges.

In light of the concerns we have expressed in this report, we do not limit our recommendations to Axon. Rather, what follows are a set of recommendations that we hope will be of use to society as a whole, including legislative bodies, communities concerned about policing, law enforcement agencies, and the broader ALPR industry.

01 Law enforcement agencies should not acquire or use ALPRs without going through an open, transparent, democratic process, with adequate opportunity for genuinely representative public analysis, input, and objection. To the extent jurisdictions permit ALPR use, they should adopt regulations that govern such use. (This is what we said about face recognition, and it is true as well for ALPRs.)

Too often, in law enforcement, as in other parts of society, we operate from the assumption that because it is possible to do something, we should. Technology has exacerbated this type of thinking. As explained in our First Report (pages 31–32), we take the view that one antidote to this problem is that decisions around the use of powerful surveillance tools “should be made in an open and transparent manner, in ways that allow for democratic accountability.” We think it essential that the public debate occur before law enforcement acquires and uses such tools, not after we have become acculturated to them. This is particularly important so that law enforcement does not move ahead of public sentiment, only to run into public concern that undercuts legitimacy and trust in the public safety mission.

We believe that government regulation of ALPRs is imperative.

As detailed in Part II, ALPRs in the U.S. have been deployed widely, with few limits. In the United Kingdom, however, ALPRs are used widely, but within a detailed regulatory and policy framework. Protections include publishing information about how ALPRs are used, information about data-retention periods, and who is authorized to search historical databases.⁶² We do not endorse any particular part of that regulatory scheme, but believe there should be similarly comprehensive ALPR regulation in the United States.

Courts are unlikely to offer this regulation.

United States constitutional law is lagging behind the technological revolution we are undergoing. It excludes many law enforcement activities from the scope of constitutional review simply because they occur out in public, such as taking pictures of our faces or our license plates. But such pictures are used to gain more information and may well lead to enforcement or other social costs. Simply because technology makes it possible to do something at scale does not mean we should not ask the question why government should be able to collect such information without some specific basis. Constitutional law presents a floor, whereas legislation can go further.

At present, the regulation that exists in the U.S. is piecemeal and does little to tackle the systemic risks. There is no federal law governing ALPRs.⁶³ The federal Driver's Privacy Protection Act (DPPA) provides some protection to Department of Motor Vehicle records, but does not limit law enforcement investigations, nor does it impact the ability of private vendors to amass billions of ALPR reads.⁶⁴

Several states have adopted regulations around ALPRs. Most do so by statute, though a few executive agencies also have issued guidance.⁶⁵ New Hampshire, for example, appears to have adopted what we call a "Snapchat model"—barring stored non-evidentiary plate reads for any period of time.⁶⁶ A few other states include relatively short limits—from 21 days to 90 days.⁶⁷ But many others permit retention for years.⁶⁸ In Virginia, the Supreme Court, confronting what it called "sweeping randomized surveillance and collection of personal information" via ALPRs, has held that images taken of license plates are protected personal information under the state's 1976 Government Data Collection & Dissemination Practices Act, and rejected law enforcement's argument that this type of surveillance fell under the

statute's exception for criminal investigations and criminal intelligence gathering.⁶⁹

Most state regulations, however, include only general language requiring a law enforcement or public safety purpose, and do little to limit how ALPRs can be used.⁷⁰

In our view, although ALPR use is local and should be regulated at the lowest level possible—so that each community can express its view of how local law enforcement and private companies will operate—the nature of cross-jurisdictional databases suggests a need for federal legislation as well. Technology vendors, law enforcement agencies, civil society, community groups, and legislators should work together to achieve meaningful regulation of ALPRs. Legislation should address, at a minimum, the issues we have raised in this report, including the recommendations that follow.

02 Agencies should not deploy ALPRs without a clear use policy. That policy should be made public and should, at a minimum, address the concerns raised in this report.

This recommendation requires little explanation. We believe both that agencies should not deploy surveillance technologies without clear policies governing their use, and that basic transparency requires that these use policies be made public. It is possible some operational aspects will need to be kept confidential, but we expect that to be the exception, not the rule.

Unfortunately, this is far from the status quo. A few states require law enforcement agencies to have written ALPR use policies.⁷¹ A subset of those, such as California, require that those policies be posted on

agency websites.⁷² In our view, however, whether required by state law or not, ALPR policies should be disclosed publicly.

Axon has suggested to us that it could create a website or web tools for each law enforcement agency that purchases its ALPR system, where all of these policies—and much more information—could be made available to the public. We believe this is the right direction, as we explain in greater detail below. We believe transparency around the use of ALPRs is essential.

03 Vendors, including Axon, should design ALPRs to facilitate transparency about their use, including by incorporating easy ways for agencies to share aggregate and de-identified data. Each agency then should share this data with the community it serves.

Throughout this report we have discussed potential costs of ALPRs, such as the privacy impact of long retention periods for data, or the fact that ALPRs can be used for low-level enforcement with disparate burdens on communities of color or economically disadvantaged communities. Some of these problems can be mitigated to some extent through transparency. At the very least, communities should know how long ALPR data is being retained, and how ALPRs are being used, i.e. for serious felonies alone, or for low-level or traffic offenses. “Heat maps” can show the neighborhoods where ALPRs are employed most frequently.⁷³ Hit rates can show the efficacy of ALPRs for various items on a hot list.

Axon has represented that it has the capability to build a “transparency portal”—a publicly accessible website, customizable for each community—where agencies can post policies,

the settings they will use on their ALPRs (such as data retention periods and the criteria that trigger alerts), and data from ALPR use such as heat maps and hit rates. This website could be integrated with Axon’s ALPR such that usage statistics were automatically uploaded, without requiring any additional work on the part of the law enforcement agency.

The Board is well aware that this sort of transparency is not the norm in the policing tech industry. Indeed, vendors often require secrecy from law enforcement, and at the same time sometimes impose requirements that give the vendors nearly unlimited rights to use and share data.⁷⁴ We cannot accept this status quo.

Axon not only should design for transparency in the way suggested above, but should incentivize agencies to use the product’s transparency features. For example, Axon should include these web tools as a default part of its ALPR package, and offer monetary discounts to agencies that leave it enabled. Communities should be able to learn easily if their agency is being transparent. Axon should also, in consultation with the Board, law enforcement, and community stakeholders, develop a model ALPR use policy, make it widely available, and offer resources to customers to help customize the policy if they agree to make it public.

04 Vendors, including Axon, should design their ALPRs so that agencies can adjust the list of vehicles to which an ALPR will alert law enforcement officers, so that the list includes only those offenses or reasons most of concern to that agency and its community. Although communities must decide the contours of their own

alert lists, as a general matter we believe that these lists should not be used to enforce civil infractions, offenses enforceable by citations, or outstanding warrants arising from a failure to pay fines and fees.

As detailed above, ALPRs can be used solely for very serious matters, such as stolen vehicles, Amber and Silver alerts, and to identify vehicles associated with violent felonies. Conversely, ALPRs could be used much more widely, such as for traffic or fines-and-fees enforcement. Although we feel strongly that using ALPRs for low-level offenses and fines-and-fees enforcement is not appropriate and will have serious deleterious consequences, ultimately, communities should confront and address these issues for themselves.

Axon has said it can build its ALPR so that communities and agencies can choose specifically the matters for which officers will receive alerts (for example, permitting alerts for outstanding felony warrants and stolen vehicles, but not overdue fines or civil infractions). Axon should design its technology with default settings to encourage ALPR use in ways that avoid some of the more serious concerns expressed here, including over-enforcement of civil infractions, offenses enforceable by citations, or outstanding warrants arising from a failure to pay fines and fees. These same default limits should be applied when a jurisdiction links to external hot lists, such as NCIC, so that the ALPRs automatically filter out offenses that do not meet these criteria.

Axon also has told us that it can design features into its ALPR that track the geographic disparities that ALPRs produce, given that officers are not deployed evenly across a city. For example, Axon's technology could include features that assess the concentration of

ALPR scans in particular neighborhoods, and periodically seek to correct any imbalances (for example, by limiting the number of scans that occur in already saturated neighborhoods or by alerting only for the most serious offenses). Doing so would help to ensure that simply because a person lives in a "high crime" neighborhood, they will not necessarily be subject to disproportionately more surveillance or enforcement for less serious matters.

We commend Axon for considering these controls, and encourage that its ALPR be built with them integrated and available for agency use.

05 Vendors, including Axon, must provide the option to turn off immigration-related alerts from the National Crime Information Center so that jurisdictions that choose not to participate in federal immigration enforcement can do so.

This recommendation is closely related to the previous one. Although some jurisdictions have chosen to cooperate with federal officials on immigration enforcement, others have expressed the view that they do not wish to be part of the federal government's immigration enforcement efforts. Although it is a complicated issue, as a general matter, the law is clear that the federal government cannot force local law enforcement agencies to enforce the immigration laws.⁷⁵ The Board believes strongly that ALPRs should be designed in a way that preserves this local choice.

The complication here is that the federal NCIC dataset includes data on both criminal and civil immigration violations. Immigration-related files can include license plates, and running an individual's name through NCIC also can trigger immigration alerts.

In our view, communities must confront this issue for themselves and should not be forced into another path simply as a function of the technology they purchase. If ALPRs are by default alerting for immigration offenses, individual officers might make enforcement choices based on the alert even if contrary to community preferences. Therefore, in order to preserve each community’s ability to choose, vendors—including Axon—should design their technology such that immigration-related offenses in NCIC do not automatically trigger ALPR alerts.

06 ALPRs must be designed and operated in ways that ensure alert lists are checked routinely for errors and kept up to date.

Based on our preliminary conversations with Axon, we believe that ALPRs can be designed to minimize stale and inaccurate data. For example, Axon might incorporate features that require agencies or officers to confirm periodically that a “vehicle of interest” remains of interest, rather than letting license plates sit on a hot list indefinitely. Or Axon might allow for automatically removing hot-listed plates by cross-referencing hot lists against other datasets such as recently paid tickets or recently paid registration fees. The better option might be to require hot listing to be repeated at certain intervals, so that the ALPR could reject alerts from hot lists that have not been updated and confirmed within a certain time span.

That said, we doubt this problem can be solved by technology alone. Agencies can help ensure ALPR data is accurate and up to date through their use policies. Agencies, for example, can require a second person to double check every entry onto a hot list, can institute periodic reviews of hot-listed plates, can routinely scrub stale warrants and paid fines, and so on.⁷⁶

07 An ALPR alert, on its own, should not constitute sufficient grounds to stop a vehicle. Officers must make visual confirmation independently that the license plate matches the hot-listed plate. If the offense at issue is associated with the registered owner of the vehicle (as opposed to the vehicle itself), the officer also should ascertain whether the driver is consistent with the description of the registered owner.

Because of the potentially harsh consequence of false positives, we do not believe it is sufficient for an officer to receive an alert and respond, or even simply to be told it is her or his job to confirm that the license plate of a vehicle matches the alert. The Board has discussed with Axon various ways to minimize the impacts of false positive alerts by implementing “human in the loop” design. Although the final design is for Axon to decide, we expect the design to ensure that officers verify using the actual license plate in their view, not by reflexively approving the ALPR’s read.

When the offense at issue relates to a person (typically the registered owner) and not the vehicle, additional steps should be taken to confirm that the driver matches the description of the person that law enforcement is seeking (typically the registered owner). Whether or not this is required as a matter of constitutional law, this practice can be essential in avoiding needless stops, particularly in communities in which vehicle sharing is common.⁷⁷

Officers should be trained that ALPR matches alone are insufficient and must be instructed on what to do when they receive an alert, and agency policy should mirror these requirements in a verifiable and auditable way.

08 Axon should work with partner agencies to determine the shortest possible retention period for ALPR data that will serve law enforcement needs sufficiently (as explained below), and set that period as the default retention setting on its ALPRs.

At present, we have very little information as to how often historical ALPR information is used, how far back in time these searches go, and for what sorts of cases. For this reason, we do not, at this point, suggest a specific data-retention limit. We suspect, though we cannot be certain, that even when agencies conduct investigations, they rarely use very old data. Still, concrete answers to these questions would be invaluable for sound policymaking. We encourage Axon to work with partner agencies to study these issues and share their findings with us.

Retention of ALPR data—that is, default retention of a plate scan absent a hot-list match or some specific investigative need—for periods of time poses serious risks, as outlined in Part III. Some agencies, by law, use a “Snapchat model” in which scanned data that do not result in a hot-list match are not retained for any period of time. Some agencies or states have short retention periods, others relatively long ones, and others have no stated end to retention.

The Board believes that retention periods must be as short as possible. Jurisdictions may want to use ALPRs to identify stolen vehicles, help with Amber and Silver alerts, and track down the most serious violent offenders. A “Snapchat model” of ALPR use could accomplish much of this with absolutely no data retention.

Although we believe that there must be hard data retention limits (assuming data is retained

at all), we are not yet prepared to recommend a specific length of time. With additional information we expect to be able to make a more specific recommendation in the future.

09 ALPR design should create audit trails both of real-time ALPR alerts and agency accessing of historical ALPR data. Law and agency policy should require regular auditing of ALPR usage.

We have outlined above the concerns with retaining and searching historical ALPR data, as well as the potential for abuse and misuse of ALPR systems. In light of these concerns, we believe it essential that access to historical data be monitored closely.

Vendors can facilitate this monitoring through design. For example, vendors can design their ALPRs so that supervisor approval is required before any historical data is accessed or searched. That might be limited to key supervisors, as is the case (we understand) in the United Kingdom.⁷⁸

Communities also should consider whether their agencies must obtain warrants before historical scan data ever is accessed—a requirement Axon should make available on its technology. In any event, the technology should assure warrants are utilized in any situation in which governing law so requires (for example, when seeking more than seven days of historical data).⁷⁹

Design allowing for close monitoring of ALPR use applies after-the-fact as well. For example, ALPRs should be designed to generate clear audit trails. At a minimum, these audit trails should identify the officer that added a license plate to a hot list, any instance when a hot-listed plate is identified in real time, and every instance when historical data is searched. The

audit trail should provide departments (or oversight bodies) with sufficient information to review both the agency's and any officer's actions for compliance with law and agency policy. Knowing these audit features exist hopefully will dissuade misuse of the technology.

10 **Stored ALPR data must be encrypted and secured against outside access and breach.**

This recommendation should go without saying, except there are many documented cases in which ALPR data has been left unencrypted and available to the world.⁸⁰

11 **ALPR vendors should not retain the right to access or share ALPR data, and law enforcement's ALPR data never should be shared for use by for-profit third parties.**

It is one thing to authorize law enforcement to conduct criminal investigations with ALPRs. It is quite another thing for third-parties to benefit financially from that ALPR data. Mixing law enforcement ALPR use with private financial motives threatens to undermine legitimacy and trust in law enforcement in much the same way as over-enforcement of fines and fees.

As such, the Board recommends that: (1) private vendors, including Axon, not retain ownership or the right to share ALPR data; and (2) law enforcement refrain from sharing ALPR data with private entities (e.g., repossession companies, insurers, private investigators). Axon can exert huge influence on these issues by making a public pledge to abide by the former recommendation, and exhorting its law enforcement partners to abide by the

second. Axon can do this by making sharing data with private third parties more difficult, and by being transparent about which law enforcement agencies chose to do so.

Per this recommendation, we encourage law enforcement agencies and communities to not purchase access to privately owned ALPR data that is conditioned on providing the private entity with access to the jurisdiction's own ALPR data.

12 **ALPRs should be designed such that if agencies share data with other law enforcement agencies, they do so transparently and in a way that is governed by formal and lawful data-sharing agreements.**

Sharing historical ALPR data is a complicated issue. As discussed in the previous recommendation, sharing with private parties raises a host of potential concerns. But sharing with other law enforcement agencies does so as well. For one thing, although one jurisdiction or department may have regulations or policies concerning their collection and storage of ALPR data (for example, the length of retention), these regulations can become moot when they share the data with an agency that does not observe them. This is certainly the case when the data is shared into a private, unregulated database such as those that operate today.⁸¹

Because Axon intends to provide not only ALPR-enabled cameras but their database technology as well, it again can have a palliative impact on this state of affairs. First, Axon should require agencies to make their sharing arrangements transparent, or at a minimum incentivize them to do so. Second, Axon should design its sharing arrangements (either contractually or technically) such

that even once historical data is shared, it continues to follow the regulations of the originating jurisdictions. This means that if data originated in a locality with a 21-day retention limit, it will retain that limit after it is shared. If the data originates in a jurisdiction that bar sharing with private parties, that limit too should follow the data.

13 Vendors, including Axon, should never profit from fines and fees obtained through law enforcement use of ALPRs.

When private companies profit from law enforcement use of technology, it both creates adverse consequences for individuals and creates inappropriate financial incentives for jurisdictions (particularly smaller ones) to over-engage in fines-and-fees enforcement. This simply should not be allowed.

14 Vendors, including Axon, should provide adequate training materials for agencies and officers using its ALPRs, including about default settings and why they are set the way they are.

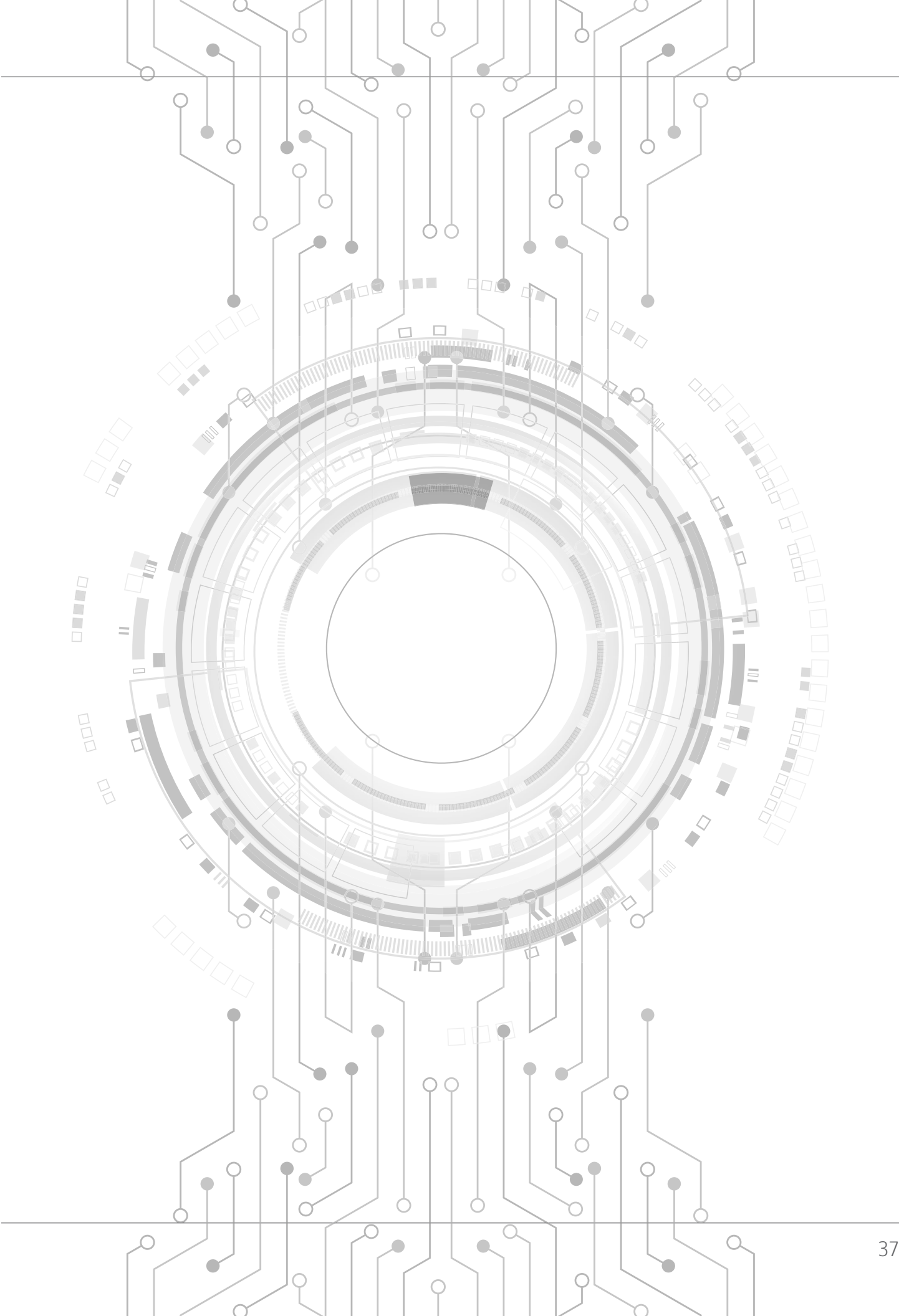
We have discussed with Axon the concerns expressed in this report, and we also have discussed default settings on various aspects of ALPRs (such as for retention periods or transparency requirements) to mitigate some of those concerns. Axon should

provide instructional materials in various forms to educate agencies and officers both as to why the defaults were chosen, and the consequences of choosing other settings. Axon has indicated it has the capability to do this.

Also, as should be clear from the above, even in a well-working system, there is a lot of room for error, such as items on hot lists that do not belong there, misreads by ALPRs and the like. The costs of errors are substantial. Axon should provide instructional materials as to best practices for officers to deal intelligently with these situations. Axon has indicated it has the capability to do this.

15 It is imperative that data-gathering and impartial study be conducted of ALPR usage, so that communities and the country are aware of how ALPRs are being used, of what is required to make that usage effective, of any harms arising from ALPR usage, including whether ALPRs are exacerbating disparities, and of ways to eliminate or mitigate those harms.

As we have said throughout this report, we (and the country) are operating without sufficient information. Before the use of ALPR technology expands further, it is essential that we know more so that we can properly assess benefits and costs and set policy in a way that allows for the former while minimizing the later.





V

Future Study & Stakeholder Engagement

What we've written here will not be our final word on this matter. Both Axon and the Board must continue to learn and to engage with community and law enforcement stakeholders.⁸² Below we outline a few preliminary ideas on next steps:

Continued Research

It simply is impossible to weigh the benefits against the costs without information as to how valuable those benefits in fact are or how often the costs are encountered.

We have had limited time thus far to consider this issue. As such, we are confident that there is much we do not know about ALPRs—there almost certainly is research and thinking on ALPRs that we have not yet come across. We intend to continue our review, and we encourage anyone to share information with us.

But still, based on what we do know, there is a real dearth of concrete information about ALPR use and a variety of unanswered questions that might be critical to our future evaluation of Axon's ALPR. Board members are considering conducting some

additional study of our own between now and product release, although that would require both funding and law enforcement agency cooperation. Whether we are able to do so or not, the public would benefit from knowing:

- The breadth of existing hot lists across a variety of jurisdictions, including the proportion of various types of crimes on federal, state, and local hot lists;
- Hit rates and efficacy for serious offenses;
- Hit rates for low-level offenses, including traffic offenses;
- How traffic violations are and could be enforced using ALPRs;
- How officers experience ALPR use on patrol and how it impacts their behavior;
- How often there are false positives, and for what reasons;
- The costs of false positives; and
- The value of retaining license-plate reads.

Axon ALPR Timeline



May/June 2019

Axon first raised potential ALPR product with the Board and shared potential ethical-design elements.



Summer 2019

Subcommittee of Ethics Board met several times to discuss ALPRs in advance of September meeting.



September 2019

Board met to discuss ALPRs and possible Board statement.



October 23, 2019

Axon announces its ALPR product, and Board releases report.



Q1 & Q2 2020

Study and stakeholder engagement, as outlined below.



Q4 2020

Updated assessment report from Board.

Stakeholder Engagement

Axon has expressed interest in hearing from law enforcement, the advocacy community, impacted communities, government officials, and other stakeholders on any issue related to ALPRs that those stakeholders deem relevant. At present, we have a few ideas about what form this engagement might take:

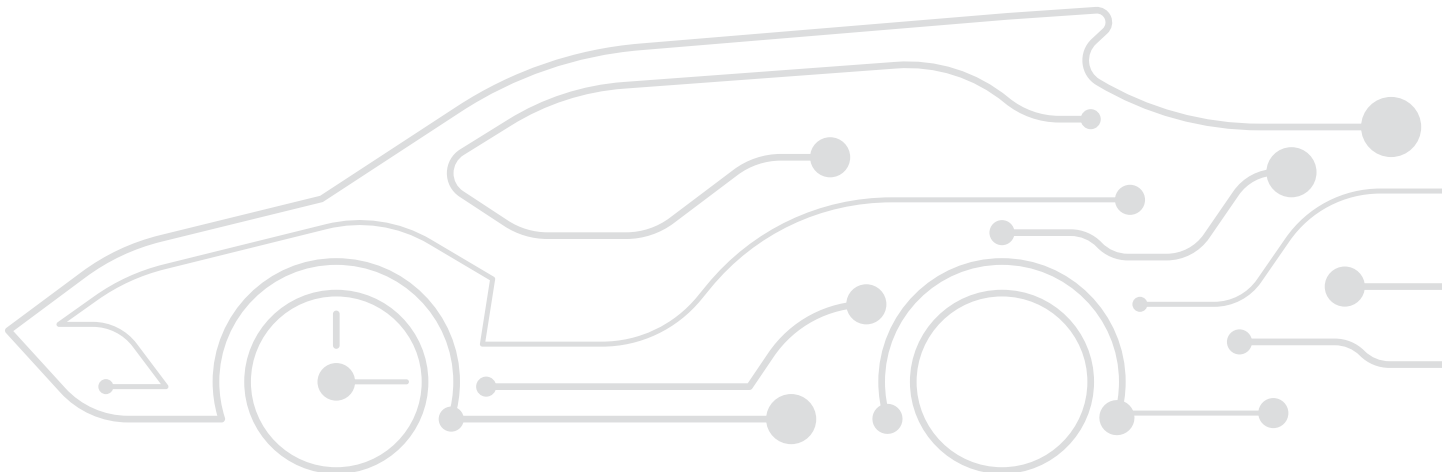
- As with any product development, Axon engages law enforcement agencies through the development stage. The Board would like to help inform that engagement and learn from it. We encourage Axon to focus on agencies of all different sizes during the course of this engagement.
- The Board is open to feedback from all stakeholders on the various issues raised in this report. We are discussing possible mechanisms for obtaining this information, including paid focus groups or an open comment period, but also hope that organizations with ties to these communities will help us in this process.

Model Statute & Model ALPR Policy

Learning from our additional study and stakeholder engagement, the Board intends to draft both a model ALPR statute and a model ALPR use policy.

The former will be aimed at communities and government officials interested in bringing a level of restraint to this otherwise unregulated industry. We do not intend to lobby any particular jurisdiction to adopt our model, but we are happy to offer guidance in support of those considering legislative action.

Our model use policy will be aimed primarily at law enforcement agencies. We expect to go beyond a bare bones policy and address some of the more difficult issues raised in this report, including conditions for adding a license plate to a hot list, obtaining and documenting supervisor approval before accessing historical data, public reporting around ALPR use, and much more. We understand that law enforcement agencies will want to customize this policy for their particular department, and we hope Axon will be able to offer this type of support to its customers, along with training around proper ALPR use.



VI

Conclusion

The Board sees the potential value in ALPRs, but we also find the current state of affairs deeply concerning. Law enforcement and private actors vacuum up plate data across the country creating databases of billions of scans, too often available to anyone willing to pay. These scans are sometimes used to enforce civil infractions, collect fines and fees, or even pursue purely private profits. There is evidence this enforcement falls disproportionately on low-income individuals and communities of color, and much of this occurs out of the view of the public and with minimal democratic input. As the purchasing costs of ALPR technology drop, it only will become more widely available and more powerful.

In this report, the Axon AI Ethics Board hopes to call attention to this state of affairs with four goals in mind: (1) that communities and governments will heed our call for democratic regulation of this industry; (2) that Axon will take our guidance and recommendations into account as it develops its ALPR; (3) that law enforcement agencies currently using ALPRs will modify their policies to comply with our recommendations; and (4) that other vendors will follow suit.



VII

Attachments



Attachment A: 10 Questions to Ask Your Law Enforcement Agency About ALPRs

WHAT ARE ALPRs AND WHY DO THEY MATTER?

Automated License Plate Readers (“ALPRs” for short) are one of the most widely used law enforcement systems in existence. Although the adoption of ALPRs has been rapid and widespread, it has happened with too little public oversight.

ALPRs are camera systems that record license plates, as well as the time and place of where the license plate was scanned. ALPRs often are capable of taking in much more than license plates, including the surrounding scene, and even images of drivers and passengers. ALPRs can be mounted almost anywhere: light poles, overpasses, police cars, private tow-trucks, or even run on smart phones.

Many police departments use ALPRs in patrol cars. The ALPR alerts officers if it scans a vehicle whose license plate is in the system, perhaps because the car was reported stolen or is associated with someone with an outstanding warrant.

Besides being used to alert law enforcement to vehicles of interest, the information they collect can be stored away for future reference. Thus, if the police want to know where a vehicle has been at different times, they can consult the stored license-plate database.

ALPRs CAN AID LAW ENFORCEMENT:

- ALPRs can help locate missing children or adults through the use of Amber or Silver alerts.
- ALPRs can help track officers track down more stolen cars by increasing the efficiency with which plates are checked.
- ALPRs can help locate people wanted for investigation of serious crimes, including witnesses and suspects.
- ALPRs may help remove individual officer discretion from police stops, potentially leading to more equitable law enforcement and criminal justice outcomes.

UNREGULATED USE OF ALPRs CAN LEAD TO SERIOUS ISSUES:

- ALPR errors can cause the police to stop the wrong vehicle or wrong person.
- ALPR-aided enforcement can worsen racial and socioeconomic disparities, particularly when used to enforce low-level offenses or generate revenue through fines and fees.
- ALPR data can be used to reveal details about a person’s life, leading to privacy concerns.
- ALPRs can be used in ways that chill First Amendment liberties (such as monitoring all the cars parked outside a particular place of worship) and threaten Fourth Amendment rights by allowing law enforcement and private companies to track your location over time.

Unfortunately, because of lack of data and study, we know very little about how large the benefits or costs are—all the more reason every community should do its best to be informed about how its law enforcement is using ALPRs.

10 QUESTIONS TO ASK YOUR LAW ENFORCEMENT AGENCY ABOUT ALPRs

1. Is your agency using Automated License Plate Readers (ALPRs)?

- How long have they been in use, and how many do they have?
- Are they mobile (on police cars) or fixed (on light poles, etc.)?

2. Did the public or elected officials have an opportunity to provide input before the agency acquired or deployed ALPRs?

- Who was consulted about the decision to purchase ALPRs?
- Did the agency weigh the benefits and costs of using ALPRs before purchasing the equipment?

3. Has your state or municipality passed any laws governing the use of ALPRs?

- Do these laws regulate use, transparency, data-retention limits, reporting or audits?
- Is your agency in compliance with all applicable laws?

4. Where did your agency acquire the ALPRs it is using, and under what terms?

- Are the contracts publicly available?
- Is there a non-disclosure agreement barring public disclosure of certain ALPR functions?
- Who owns and retains rights to the ALPR data?

5. Does the agency have an ALPR use policy? Is it publicly available?

- Who is authorized to use ALPRs and under what conditions?
- Do certain functions require supervisory approval, such as searches of historical data?

6. What types of offenses does the agency enforce using ALPRs?

- Is ALPR-use limited to serious crimes (e.g., auto theft, Amber alerts) or are they used for low-level offenses (e.g., traffic, immigration

violations, outstanding fines and fees)?

- On what basis will the agency add a license plate to its alert list (or “hot list”)?

7. What protections are in place to keep ALPRs from being used in a way that has a disparate racial or socioeconomic impact?

- Where are ALPRs deployed, and does it result in unequal surveillance of some communities?
- What demographic data is being tracked to allow the public to audit the use of ALPRs?

8. What types of data does your agency retain from ALPRs?

- Does the agency keep only the records of license plate characters, or does it retain the video or other related images, include the surrounding area and pictures of the drivers?
- Is the data cross-referenced against other databases (e.g., gang or criminal history databases)?

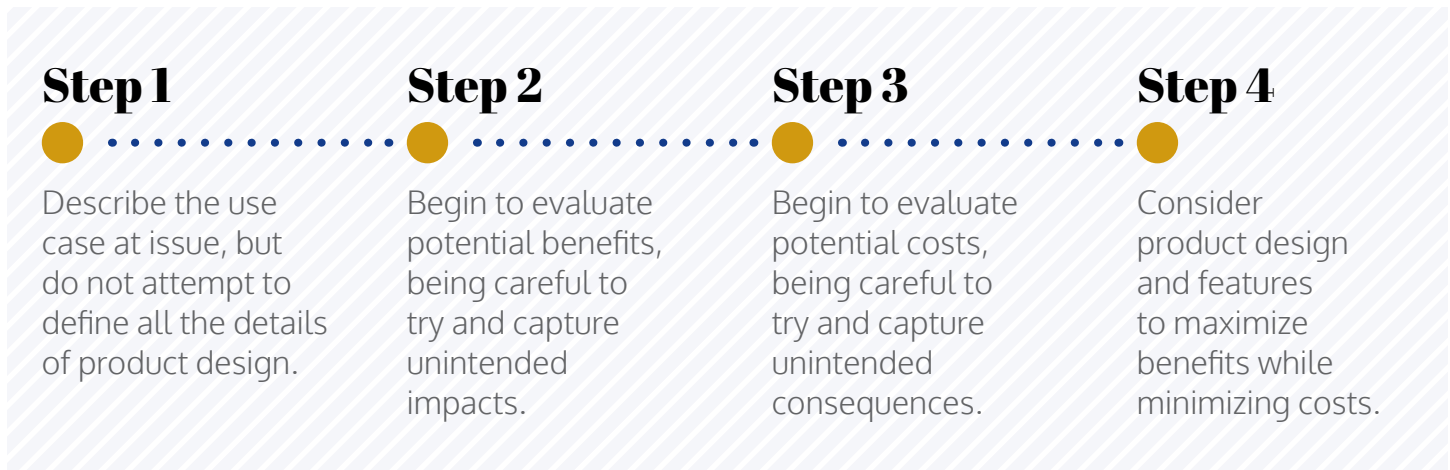
9. How long does your agency retain ALPR data?

- Does the agency keep scan data for 7 days, 30 days, 90 days, a year, etc.? Or does your agency scan plates for live alerts only, without retaining the information, absent evidence of a crime?
- Do different rules govern your agency’s use of ALPR data when accessing historical data beyond a certain period of time, such as requiring a warrant to run a search?

10. Does your agency share data with or access data from any other law enforcement agency or private party? Under what terms?

- Does your agency share its ALPR scans with, or incorporate scans from, private companies (e.g., tow trucks, private investigators, debt collectors, etc.)?
- If so, under what agreements, and how are outside parties accountable for handling your data?

Attachment B: Product Evaluation Framework



GUIDANCE ON ASSESSING POTENTIAL BENEFITS

Although most products bring an expected benefit, we found it essential not to speed through this stage of the process. Thus, for each use case, we asked:

1. What is the **specific problem(s)** the product is intended to solve?

- “Problem,” here, might be a law enforcement problem (e.g., improving law enforcement methods), it might be a social problem, or it might be a problem relating to the internal operations of a police department. It is important, particularly when framing the problem as a “law enforcement” problem, to be able to articulate the public safety goal that would be addressed through the use of technology, rather than considering “law enforcement needs” as an end in itself. This approach is essential to ensuring that the ultimate consumer of every Axon product is the community that a policing agency serves.

2. How important/what is the **magnitude** of the problem you expect to solve?

3. How **certain** is it that the technology will address the problem?

- Have there been evaluations (either internal or external)?
- Are there product performance concerns that might limit effectiveness?
- Will benefits be evenly distributed throughout society?
- What countermeasures might individuals take in response to the adoption of this tool, and how much would such countermeasures reduce the expected benefits?

4. Could using the technology have **unintended or secondary benefits** on any of the following issues:

- Minimize criminalization of low-level offenses?
- Additional control and protection of personal data?
- Mitigation of racial and/or identity bias?
- Improved transparency or public trust?
- Better compliance with U.S. constitutional requirements?
- Other societal benefits?

GUIDANCE ON ASSESSING POTENTIAL COSTS

We have done our best to maintain a holistic assessment of potential social costs of a given technological use.¹ We are well aware that hard or quantifiable costs can at times loom larger than intangibles simply because of the difficulty of valuing intangibles.

One key in conducting this assessment is thinking through *downstream* or *unintended* consequences. Although the questions we ask will necessarily depend on the nature of the technology, for most use cases we ask:

1. Once deployed, can the technology be used (or misused) in ways other than contemplated in this use case?

2. Will this use of this technology lead to greater criminalization (people being stopped, ticketed, arrested, or incarcerated) or to policing in counterproductive ways?

3. How will this use of technology impact personal information privacy? Be sure to consider:

- What data are captured and from whom? How are they aggregated and/or mined?
- What are the data retention practices?
- Who owns the data? Who has access, and what are the security practices?

4. Does the use of the technology raise concerns regarding racial or other identity bias or disparities? Be sure to consider:

- Disparities in design (e.g., whether the technology itself has any inherent bias, including algorithmic bias relating to personal identity, for example, by employing

statistically unrepresentative training data or exhibiting any algorithmic bias)?

- Disparities in operation (e.g., whether the technology might be used in ways that create or exacerbate identity bias and/or disparities)?

5. Does the use of the technology raise transparency-related concerns, either in how Axon communicates with members of the public or how police agencies engage with members of the public?

6. Does the use of the technology raise risks of directly or indirectly violating constitutional or other legal rights, including but not limited to: unlawful searches, unlawful seizures/arrests, excessive force, discovery/disclosure violations (such as Brady, Giglio, Rosario, etc.), or First Amendment concerns?

7. Are there other potential social costs that have not yet been considered, including but not limited to:

- Whether there might be a unique impact on any specific subgroup (e.g., children, LGBTQ communities, socioeconomically disadvantaged communities)?
- Whether there are historic considerations that may make particular communities distrustful of this technology?
- The potential for mission creep (either over time or in response to critical events)?
- The impact of how others in the industry will respond to Axon's precedent?
- Any global/international human rights impact?

References

- ¹ See BRAD SMITH & CAROL ANNE BROWNE, TOOLS AND WEAPONS: THE PROMISE AND THE PERIL OF THE DIGITAL AGE 211–30 (2019) (calling for government regulation and industry self-regulation to govern growth of A.I. technologies); Amanda Askeff, Miles Brundage & Gillian Hadfield, *The Role of Cooperation in Responsible AI Development*, OPEN A.I. (July 10, 2019), <https://arxiv.org/pdf/1907.04534.pdf> (arguing that “competitive pressures could incentivize AI companies to underinvest in ensuring their systems are safe, secure, and have a positive social impact”).
- ² See DEPT OF HOMELAND SEC., DHS EXHIBIT 300 PUB. RELEASE BY10 / CBP - LICENSE PLATE READER (LPR) 1 (2010), <https://web.archive.org/web/20110707053748/http://www.dhs.gov/xlibrary/assets/mgmt/e300-cbp-lpr2010.pdf> (“The initial vision for a license plate reading tool was developed by the U.S. Customs Service and was implemented in partnership with the Immigration and Naturalization Service through a contract beginning in 1998.”).
- ³ See KEITH GIERLACK ET AL., RAND, LICENSE PLATE READERS FOR LAW ENFORCEMENT 9 (2014) <https://www.ncjrs.gov/pdffiles1/nij/grants/247283.pdf> (reporting that between 83 and 91 percent of agencies use ALPRs to track auto theft).
- ⁴ See *id.* at 8. See also CYNTHIA LUM ET AL., THE RAPID DIFFUSION OF LICENSE PLATE READERS IN U.S. LAW ENFORCEMENT AGENCIES 10 (2016), <https://cebc.org/wp-content/lpr/LPR-National-Survey-Report-2016.pdf> (estimating 66% of agencies with 100 or more officers had ALPRs as of Dec 2016) [hereinafter “RAPID DIFFUSION OF LPRS”]; *Leonardo Expands ELSAG Automatic License Plate Recognition (ALPR) Solution with Advanced Computer Vision Software and Cloud-Based Storage*, LEONARDO (May 14, 2018), <https://www.leonardocompany.com/en/press-release-detail/-/detail/elsag-targhe> (stating it provides “ALPR solutions” to nearly 4,000 law enforcement customers in over 25 countries).
- ⁵ See, e.g., DIGITAL RECOGNITION NETWORK, <https://drndata.com/products/> (last visited Oct. 8, 2019).
- ⁶ See, e.g., FLOCK SAFETY, <https://www.flocksafety.com/product/flock-safety-faqs> (last visited Oct. 8, 2019).
- ⁷ See *Automated Number Plate Recognition (ANPR) System Market Size Overview by Rising Demands, Trends and Huge Business Opportunities 2019 to 2026*, NEWSSTONER (Sept. 23, 2019), <https://newsstoner.com/2019/09/23/automatic-number-plate-recognition-anpr-system-market-size-overview-by-rising-demands-trends-and-huge-bussiness-opportunities-2019-to-2026/>.
- ⁸ See, e.g., Julia Angwin & Jennifer Valentino-Devries, *New Tracking Frontier: Your License Plates*, WALL ST. J. (Sept. 29, 2012), <https://web.archive.org/web/20130124093854/http://online.wsj.com/article/SB10000872396390443995604578004723603576296.html> (noting that the U.S. Department of Homeland Security distributed more than \$50 million in federal grants to law-enforcement agencies between 2008 and 2012); RAPID DIFFUSION OF LPRS, *supra* note 4, at 5 (2016) (“Federal and state funding have played a key role in LPR adoption, as 40% of agencies using LPRS funded their initial purchases with federal grants and 21% did so with state funding.”); *LPD to Buy License Plate Reader with Grant Funds*, UNION-SUN J. (Aug. 16, 2017), https://www.lockportjournal.com/news/local_news/lpd-to-buy-license-plate-reader-with-grant-funds/article_b47afb60-48b7-5d6b-a6bd-9ed8b985d1c6.html (highlighting New York State grants for ALPR acquisition); *Vigilant Solutions – LPR Grant Assistance Program*, POLICE GRANTS HELP, <https://www.policegrantshelp.com/Vigilant-Solutions-LPR-Grant-Assistance/> (advertising free, customized grant help to purchase Vigilant ALPRs) (last visited Oct. 7, 2019).
- ⁹ See, e.g., Matt Hill, *The Advantages of SaaS AI-enabled Surveillance Compared to Traditional ALPRs*, SECURITY SALES INTEGRATION (July 8, 2019), <https://www.securitysales.com/surveillance/advantages-saas-ai-surveillance-alprs/>.
- ¹⁰ See Justin Rohrlch, *In Just Two Years, 9,000 of These Cameras Were Installed to Spy on Your Car*, QUARTZ (Feb. 5, 2019), <https://qz.com/1540488/in-just-two-years-9000-of-these-cameras-were-installed-to-spy-on-your-car/>. See also Josh Kaplan, *License Plate Readers Are Creeping Into Neighborhoods Across the Country*, SLATE (July 10, 2019), <https://slate.com/technology/2019/07/automatic-license-plate-readers-hoa-police-openalpr.html> (reporting that one private security company alone has deployed nearly 500 OpenALPR cameras, scanning nearly 1.5 million license plates per week).
- ¹¹ See CYNTHIA LUM ET AL., LICENSE PLATE RECOGNITION TECHNOLOGY (LPR): IMPACT EVALUATION AND COMMUNITY ASSESSMENT 67–69 (2010), http://www.cebc.org/wp-content/evidence-based-policing/LPR_FINAL.pdf (discussing connection of LPR data with a secondary data source and tertiary data mining) [hereinafter “LPR IMPACT EVALUATION”].
- ¹² See LPR IMPACT EVALUATION, *supra* note 11, at 66–71.
- ¹³ Dave Maass, *“No Cost” License Plate Readers are Turning Texas Police into Mobile Debt Collectors and Data Miners*, ELECTRONIC FRONTIER FOUND. (Jan. 26, 2016), <https://www.eff.org/deeplinks/2016/01/no-cost-license-plate-readers-are-turning-texas-police-mobile-debt-collectors-and> [hereinafter “*Mobile Debt Collectors*”].
- ¹⁴ See, e.g., *Platesearch™*, VIGILANT SOLUTIONS, <https://www.vigilantsolutions.com/products/license-plate-recognition-lpr/> (“In addition to access to our commercial data, agencies can choose to share with other law enforcement agencies to gain access to another 1.5B detections nationwide.”); See also Dave Maass & Beryl Lipton, *What We Learned*, MUCKROCK (Nov. 15, 2018), <https://www.muckrock.com/news/archives/2018/nov/15/alpr-what-we-learned/> (reporting that, of 200 agencies surveyed, only eight declined to share their ALPR data with Vigilant).
- ¹⁵ VaaS International Holdings is the parent company of both Vigilant Solutions and Digital Recognition Network (DRN). DRN boasts a database of 9 billion private scans, while Vigilant maintains an additional database of at least 1.5 billion law enforcement scans. See *Platesearch™*, *supra* note 14; Joseph Cox, *This Company Built a Private Surveillance Network. We Tracked Someone with It*, VICE: MOTHERBOARD (Sept. 17, 2019), https://www.vice.com/en_us/article/ne879z/i-tracked-someone-with-license-plate-readers-drn.

¹⁶ See *Reduced Prices for License Plates Readers Attracts More Buyers*, HOMELAND SEC. NEWS WIRE (Jan. 24, 2012), <http://www.homelandsecuritynewswire.com/srlet20120124-reduced-prices-for-license-plates-readers-attracts-more-buyers>. See also LPR IMPACT EVALUATION, *supra* note 11, at 25 (reporting that the lack of outside funding available to purchase ALPRs, and cost of ALPRs were the first [43%] and third [29.9%] most cited reasons that law enforcement agencies had not yet implemented the technology); RAPID DIFFUSION OF LPRS, *supra* note 4, at Fig. 11 (indicating cost as number one hurdle keeping agencies from using ALPRs).

¹⁷ See *Fleet 2*, AXON, <https://www.axon.com/products/fleet-2> (last visited Oct. 14, 2019).

¹⁸ See Jon Schuppe, *Motorola, Known for Cellphones, Is Fast Becoming a Major Player in Government Surveillance and Artificial Intelligence*, NBC NEWS (Oct. 2, 2019), <https://www.nbcnews.com/news/us-news/motorola-company-known-cellphones-fast-becoming-major-player-government-surveillance-n1059551> (describing acquisition by Motorola Solutions of VaaS International Holdings, parent company to two industry leaders in ALPR systems, and WatchGuard Video, an industry leader in dashcams and a producer of body worn cameras); See also Press Release, Motorola Solutions, Motorola Solutions Acquires WatchGuard, Inc., Leader in Mobile Video for Public Safety (July 11, 2019), <https://newsroom.motorolasolutions.com/news/motorola-solutions-acquires-watchguard-inc-leader-in-mobile-video-for-public-safety.htm>; Press Release, Motorola Solutions, Motorola Solutions Acquires VaaS International Holdings, Leader in Data and Image Analytics for Vehicle Location (Jan. 7, 2019), <https://newsroom.motorolasolutions.com/news/motorola-solutions-acquires-vaas-international-holdings-leader-in-data-and-image-analytics-for-vehicle-location.htm>.

¹⁹ See, e.g., OHIO STATE HIGHWAY PATROL PLANNING SERVICES SECTION RESEARCH & DEVELOPMENT, AUTOMATIC PLATE READER TECHNOLOGY 11 (2005) (finding that the use of ALPRs significantly increased stolen vehicle recoveries and arrests compared to the previous year); IRWIN M. COHEN ET AL., A REPORT ON THE UTILITY OF THE AUTOMATED LICENSE PLATE RECOGNITION SYSTEM IN BRITISH COLUMBIA 15–17 (2007) (finding greater number of hits for uninsured, prohibited, unlicensed, or stolen vehicle drivers with use of LPRs); PA CONSULTING GROUP, DRIVING CRIME DOWN 125–30 (2004) (finding that ALPRs significantly enhanced the ability of officers to make arrests, particularly when officers were dedicated specifically to an ALPR unit).

²⁰ See, e.g., Jason Potts, *Research in Brief: Assessing the Effectiveness of Automatic License Plate Readers*, POLICE CHIEF 14–15 (Mar. 2018), <https://www.theiacp.org/sites/default/files/2018-08/March%202018%20RIB.pdf> (finding that, in a trial, cars equipped with ALPRs “showed a 140% greater ability to detect stolen cars” than cars without ALPRs).

²¹ See Cynthia Lum et al., *Understanding the Limits of Technology’s Impact on Police Effectiveness*, 20 POLICE Q. 135, 136 (2017). See generally, BRUCE TAYLOR ET AL., COMBATTING AUTO THEFT IN ARIZONA (2011) (detailing randomized experiment in Mesa, Arizona that found a small auto theft squad was much more likely to detect and recover stolen vehicles and make arrests when using ALPRs).

²² See ACLU, YOU ARE BEING TRACKED: HOW LICENSE PLATE READERS ARE BEING USED TO RECORD AMERICANS’ MOVEMENTS 13–15 (July 2013), <https://www.aclu.org/files/assets/071613-aclu-alprreport-opt-v05.pdf> (“Of the 1,691,031 plates scanned by the Minnesota State Patrol from 2009–2011, just 852 citations were issued and 131 arrests were made. That is 0.05 percent of plate reads.” (internal citations omitted)) [hereinafter “YOU ARE BEING TRACKED”].

²³ See, e.g., *7 Cases Solved Thanks to ALPR Data*, POLICEONE (June 12, 2018), <https://www.policeone.com/police-products/traffic-enforcement/license-plate-readers/articles/7-cases-solved-thanks-to-alpr-data-doayALt3VGwqCIN5/> (reporting several instances where queries of historical ALPR data helped to solve serious crimes).

²⁴ See DAVID J. ROBERTS & MEGHANN CASANOVA, AUTOMATED LICENSE PLATE RECOGNITION SYSTEMS 22–23 (Aug. 2012), <https://www.ncjrs.gov/pdffiles1/nij/grants/239604.pdf> (finding that although only 25% of agencies initially acquired ALPRs for general investigations, 70% reported doing so in practice).

²⁵ See *Automated License Plate Readers: State Statutes*, NAT’L CONF. ST. LEGISLATURES (Mar. 15, 2019), <http://www.ncsl.org/research/telecommunications-and-information-technology/state-statutes-regulating-the-use-of-automated-license-plate-readers-alpr-or-alpr-data.aspx>. See also *infra* Part IV.

²⁶ See, e.g., TAYLOR ET AL., *supra* note 21, at 34–40; LPR IMPACT EVALUATION, *supra* note 11, at 5–7.

²⁷ See, e.g., HANI S. MAHMASSANI ET AL., CHICAGO RED LIGHT CAMERA ENFORCEMENT 43–44 (Mar. 2017) (showing red light cameras significantly reduce fatal crashes and that this effect is persistent over time); FEDERAL HIGHWAY ADMINISTRATION, U.S. DEPT OF TRANSPORT., SAFETY EVALUATION OF RED-LIGHT CAMERAS 5–6 (Apr. 2005) (finding small but significant overall benefit of red light cameras, concluding that because rear-end crashes are generally less severe and lower cost, they do not offset the positive effects of the cameras).

²⁸ These findings come from a single study of small towns in Massachusetts, and it is unclear if these results would hold under different circumstances. See Michael D. Makowsky & Thomas Stratmann, *More Tickets, Fewer Accidents: How Cash-Strapped Towns Make for Safer Roads*, 54 J.L. & ECON. 863–88 (2011).

²⁹ The literature and research on this subject are vast. See *Whren v. United States*, 517 U.S. 806 (1996) (declaring that any traffic offense committed by a driver was a legitimate basis for a stop, even if that offense was pretextual); *Heien v. North Carolina*, 135 S. Ct. 530 (2014) (holding that an officer's reasonable mistake of the law can provide the individualized suspicion necessary for a legitimate traffic stop); Ken Armstrong, *How the Supreme Court Made it Legal for Cops to Pull You Over for Just About Anything*, THE MARSHALL PROJECT (Aug. 3, 2015), <https://www.themarshallproject.org/2015/08/03/how-the-supreme-court-made-it-legal-for-cops-to-pull-you-over-for-just-about-anything> (reporting on the expanded discretion police can exercise in performing pretextual stops, even when the pretext is not a legal justification for a stop); See also, e.g., FRANK R. BAUMGARTNER, *SUSPECT CITIZENS* 77 (2018) (finding—based on the study of 20 million traffic stops in North Carolina—“strong, consistent, and powerful evidence that black and white drivers face dramatically different odds of being pulled over,” and noting that, in conservative estimate, black drivers were 63% more likely to be pulled over than whites); EMMA PIERSON, ET AL., *A LARGE-SCALE ANALYSIS OF RACIAL DISPARITIES IN POLICE STOPS ACROSS THE UNITED STATES* 3–5 (2019), <https://5harad.com/papers/100M-stops.pdf> (finding—based on the study of nearly 100 million stops from 21 state patrol agencies and 29 municipal police departments—that black drivers were more likely to be stopped during daylight hours, when their race was more readily apparent, than at night, and that in all cases they experienced higher rates of stops than white drivers under similar circumstances).

³⁰ See NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *Characteristics of Law Enforcement Officers' Fatalities in Motor Vehicle Crashes* 22 (2011) (finding that, from 1982–2008, “inattentive/careless driving [talking, eating, car phone, etc.]” accounted for 29 law enforcement officer crash fatalities, while “failure to keep in proper lane or running off the road” accounted for 225 fatalities, speeding accounted for 220 fatalities, and high-speed chases resulted in 69 fatalities).

³¹ See Chief Joel F. Shults, *How ALPR Data Drives Intelligence and Policing*, POLICE ONE (May 3, 2018), <https://www.policeone.com/police-products/traffic-enforcement/license-plate-readers/articles/473999006-How-ALPR-data-drives-intelligence-led-policing/> (“ALPR results, triangulated with other statistical data, can reveal patterns of activity associated with criminal events that analysts can use to establish probabilities of crimes and their locations.”); See also Elizabeth E. Joh, *The New Surveillance Discretion: Automated Suspicion, Big Data, and Policing*, 10 HARV. L. & POL. REV. 15, 23 (2016) (noting that ALPR geo-fencing may be used to track “suspicious” vehicle patterns and behaviors).

³² See, e.g., ROBERTS & CASANOVA, *supra* note 24, at 23 (highlighting a case study in which a single officer equipped with an ALPR device for only 96 hours over the course of a month was able to read 48,101 plates, leading to 255 traffic citations, the identification of 26 drivers with suspended licenses, 16 vehicle emission violators, 4 stolen and 1 expired license plate, and 3 arrests).

³³ See, e.g., PRESIDENT'S TASK FORCE ON 21ST CENTURY POLICING, FINAL REPORT OF THE PRESIDENT'S TASK FORCE ON 21ST CENTURY POLICING 9–18 (2015), <https://cops.usdoj.gov/RIC/Publications/cops-p311-pub.pdf> (“Pillar 1: Building Trust & Legitimacy”).

³⁴ See GIERLACK ET AL, *supra* note 3, at 50 (explaining that for some agencies that use ALPRs for traffic enforcement, alerts were so frequent—as much as every few seconds—that officers were forced either to ignore the alerts or turn off alerts for expired registrations and suspended licenses).

³⁵ Dave Maass & Jeremy Gillula, ELECTRONIC FRONTIER FOUND, *What You Can Learn From Oakland's Raw ALPR Data* (Jan. 21, 2015), <https://www.eff.org/deeplinks/2015/01/what-we-learned-oakland-raw-alpr-data> (finding ALPR scans were also far more likely to occur in lower-income neighborhoods).

³⁶ See, e.g., MARIO SALAS & ANGELA CIOLFI, *DRIVEN BY DOLLARS: A STATE-BY-STATE ANALYSIS OF DRIVER'S LICENSE SUSPENSION LAWS FOR FAILURE TO PAY COURT DEBT* 2, 14–15 (2017) (finding that 43 states suspend driver's licenses for failure to pay a court debt); See also Brandon Garrett, *When the Police Come for Your Driver's License*, AM. CONSERVATIVE (Apr. 9, 2019), <https://tinyurl.com/y5qr6bpl> (finding nearly one in seven adult drivers in North Carolina has had their licenses suspended for a reason unrelated to driving).

³⁷ See, e.g., Samar Khurshid, *NYPD Continues to Move Away from Criminal Penalties for Low-Level Offenses, but Racial Disparities Remain*, GOTHAM GAZETTE (Sept. 4, 2019), <https://www.gothamgazette.com/city/8768-nypd-fewer-criminal-penalties-for-low-level-offenses-racial-differences-remain> (reporting that—following the adoption of new guidelines—although the NYPD issued 90% fewer criminal summonses for low-level offenses over the previous year, 91% of those issued were to people of color).

³⁸ See, e.g., William Farrell, *Predominately Black Neighborhoods in D.C. Bear the Brunt of Automated Traffic Enforcement*, D.C. POL'Y CTR. (June 28, 2018), <https://www.dcpolicycenter.org/publications/predominately-black-neighborhoods-in-d-c-bear-the-brunt-of-automated-traffic-enforcement/> (finding that there were more speed and red light cameras placed—and therefore more citations issued—in predominantly Black neighborhoods than in White or mixed-race neighborhoods, despite equal incidence of car crashes).

³⁹ See, e.g., YOU ARE BEING TRACKED, *supra* note 22, at 13–15.

⁴⁰ See, e.g., *Automatic License Plate Recognition (ALPR)*, MOTOROLA SOLUTIONS, <https://www.creativecom.com/public-safety/alpr.htm> (last accessed Sep. 25, 2019).

⁴¹ See, e.g., U.S. DEP'T OF JUST., *INVESTIGATION OF THE FERGUSON POLICE DEPARTMENT* 4–5 (Mar. 2015) (summarizing findings of racial disparities, including several measures relating to fines and fees enforcement) [hereinafter “FERGUSON REPORT”]; Kathryn Zickuhr, *Applying a Racial Equity Lens to Fines and Fees in the District of Columbia*, D.C. POL'Y CTR. (Apr. 22, 2019), <https://www.dcpolicycenter.org/publications/racial-equity-fines-fees/> (finding that unpaid fines from traffic tickets in Washington D.C. are doubled after 30 days; are sent to collections after 90 days, where a 20% surcharge is added; and that ultimately low-income drivers “may be forced to choose between losing their source of income and driving with an expired license—increasing the likelihood that they could face additional debt or even imprisonment”).

⁴² Mike Maciag, *Addicted to Fines: Small Towns in Much of the Country are Dangerously Dependent on Punitive Fines and Fees*, GOVERNING (Sept. 2019), <https://www.governing.com/topics/finance/gov-addicted-to-fines.html>.

⁴³ See S.B. 5, 98th Gen. Assemb., Reg. Sess., at 5 (Mo. 2015), available at <https://www.senate.mo.gov/15info/pdf-bill/tat/SB5.pdf>; FERGUSON REPORT, *supra* note 41, at 2. The Ferguson Police Department practice of citing residents with as many municipal infractions as possible to incur the maximum amount of fines and fees has since become the prototypical example of “fines and fees” policing. See generally Jessica Brand, *How Fines and Fees Criminalize Poverty: Explained*, APPEAL (July 16, 2018), <https://theappeal.org/fines-and-fees-explained-bf4e05d188bf/>.

⁴⁴ See *Mobile Debt Collectors*, *supra* note 13; see also, e.g., George Joseph, *What Are License-Plate Readers Good For?*, CITY LAB (Aug. 5, 2016), <https://www.citylab.com/equity/2016/08/what-are-license-plate-readers-good-for/492083/> (reporting that ALPRs have been used for fines and fees policing in at least three Texas communities); Eric Markowitz, *Pay This Fee, Or Go to Jail*, INT’L BUS. TIMES (Feb. 3, 2016), <https://www.ibtimes.com/pay-fee-or-go-jail-how-license-plate-scanner-vigilant-solutions-makes-money-texas-2290835> (reporting that New York City has used ALPRs to send nearly 35,000 parking summonses in 2011, and that in the first 12 hours of use of ALPRs in New Haven, Connecticut police identified 119 vehicles with unpaid parking violations, generating \$40,000 in city fines paid); cf. Office of the Assistant Sec’y Research & Tech., Dep’t of Transp., *In Arizona, an Automatic License Plate Recognition (ALPR) System Has an Estimated Benefit-to-Cost Ratio of 9.6 Due to Improved Vehicle Registration and Insurance Compliance*, INTELLIGENT TRANS. SYSTEMS PROG. OFF. (June 2008), <https://www.itsbenefits.its.dot.gov/ITS/benecost.nsf/ID/20746487B947B3358525797C006528CF?OpenDocument&Query=BMeasure> (suggesting that the implementation of ALPRs for use in registration enforcement in Arizona could generate “15,557,500 recovered in registration fees and \$18,459,907 in fines”).

⁴⁵ See Potts, *supra* note 20, at 14–15 (finding that, in a trial, 35% of all mobile ALPR “hits” were misreads, with 37% for fixed readers).

⁴⁶ See, e.g., Cyrus Farivar, *Due to License Plate Reader Error, Cop Approaches Innocent Man, Weapon in Hand*, ARS TECHNICA (Apr. 23, 2014), <https://arstechnica.com/tech-policy/2014/04/due-to-license-plate-reader-error-cop-approaches-innocent-man-weapon-in-hand/> (detailing an instance in which an ALPR misread a “7” for a “2” and improperly alerted the officer that the vehicle was stolen, leading the officer to approach the vehicle with a drawn gun); Kade Crockford, *San Francisco Woman Pulled Out of Car at Gunpoint Because of License Plate Reader Error*, ACLU (May 13, 2014), <https://www.aclu.org/blog/privacy-technology/location-tracking/san-francisco-woman-pulled-out-car-gunpoint-because> (citing example of San Francisco woman who was made to exit her car, kneel, and was handcuffed as multiple officers held her at gunpoint—one with a shotgun—when an ALPR misread her plate and listed her car as stolen).

⁴⁷ See, e.g., Lisa Fernandez, *Privacy Advocate Sues CoCo Sheriff’s Deputies After License Plate Readers Target His Car Stolen* (Feb. 19, 2019), <https://www.ktvu.com/news/privacy-advocate-sues-coco-sheriffs-deputies-after-license-plate-readers-target-his-car-stolen> (reporting that an Oakland man and his brother were detained at gunpoint when an ALPR reported their rental car as stolen.—although the car had been recovered by the rental company four months prior, the ALPR provider’s database had not been updated).

⁴⁸ For example, in both *Herring v. United States*, and *Arizona v. Evans*, the police searched the defendants’ vehicles, and arrested them for contraband, on the basis of erroneous warrants which resulted from clerical errors. See *Herring v. United States*, 555 U.S. 135, 155 (2009) (Ginsburg, J., dissenting) (noting that “[e]lectronic databases form the nervous system of contemporary criminal justice,” and that “inaccuracies in expansive, interconnected collections of electronic information raise grave concerns for individual liberty.”); *Arizona v. Evans*, 514 U.S. 1 (1995) (Stevens, J., dissenting) (“The offense to the dignity of the citizen who is arrested, handcuffed, and searched on a public street simply because some bureaucrat has failed to maintain an accurate computer data base strikes me as . . . outrageous.”); see also, e.g., Jack Leonard, *ID Errors Put Hundreds in County Jail*, L.A. TIMES (Dec. 25, 2011), <https://www.latimes.com/archives/la-xpm-2011-dec-25-la-me-wrong-id-20111225-story.html> (reporting that in Los Angeles, hundreds of people were wrongly imprisoned due either to errors in warrant databases, or mistakes made by police while executing a warrant); Wayne J. Pitts, *From the Benches and Trenches: Dealing With Outstanding Warrants for Deceased Individuals*, 30 JUST. SYS. J. 219 (2009) (“A number of data-reliability problems in the warrant database soon became apparent as there were examples of illogical birth dates. Similarly, Social Security numbers were often inverted, missing, incomplete, or otherwise inaccurate. There were also problems with misspellings, different spellings, or both of names listed in the warrant database.”).

⁴⁹ See, e.g., *Home Page*, TURO, <https://turo.com/en-us> (“Discover the world’s largest car sharing marketplace.”) (last visited Oct. 9, 2019); Ankita Bhutani & Pallavi Bhardwaj, *Carsharing Market Size by Model, Growth Potential, Competitive Market Share & Forecast 2018–2024*, GLOBAL MARKETING INSIGHTS, <https://www.gminsights.com/industry-analysis/carsharing-market> (forecasting that the car-sharing market is expected to grow to \$12 billion by 2024) (last updated July 2019).

⁵⁰ See Cox, *supra* note 15.

⁵¹ *Id.*

⁵² “[T]he retrospective quality of the data here gives police access to a category of information otherwise unknowable. In the past, attempts to reconstruct a person’s movements were limited by a dearth of records and the frailties of recollection. With access to [cell-site location information], the Government can now travel back in time to retrace a person’s whereabouts Critically. . . this newfound tracking capacity runs against everyone. Unlike with the GPS device in *Jones*, police need not even know in advance whether they want to follow a particular individual, or when.” *Carpenter v. United States*, 138 S. Ct. 2206, 2218 (2018); see also *United States v. Jones*, 565 U.S. 400, 415 (2012) (Sotomayor, J., concurring) (“[Location] monitoring generates a precise, comprehensive record of a person’s public movements that reflects a wealth of detail about her familial, political, professional, religious, and sexual associations.”).

⁵³ See *Carpenter v. United States*, 138 S. Ct. 2206, 2221 (2018) (holding that the government must generally obtain a warrant prior to searching historical cell-site location information records).

⁵⁴ See, e.g., Adam Goldman & Matt Apuzzo, *With Cameras, Informants, NYPD Eyed Mosques*, ASSOCIATED PRESS (Feb. 23, 2012), <https://www.ap.org/ap-in-the-news/2012/with-cameras-informants-nypd-eyed-mosques> (discussing NYPD tracking all of the vehicles outside of particular mosques); Brian M. Rosenthal, *Anti-Abortion Activists Adopt a New Tactic: Tracking License Plates*, HOUS. CHRON. (Aug. 13, 2014), <https://www.houstonchronicle.com/news/politics/texas/article/Anti-abortion-activists-adopt-a-new-tactic-5687420.php> (reporting on the safety risks and privacy risks experienced by people entering abortion clinics whose license plates are tracked by anti-abortion activists). See generally Linda M. Merola & Cynthia Lum, *Predicting Public Support for the Use of License Plate Recognition Technology by Police*, 15 POLICE PRAC. & RES. 373, 375 (2014) (noting concern that “widespread LPR use might lead individuals to suppress unpopular, unconventional, or embarrassing actions even if these acts are not illegal”).

⁵⁵ See Sadie Gurman, *AP: Across US, Police Officers Abuse Confidential Databases*, ASSOCIATED PRESS (Sept. 28, 2016), <https://apnews.com/699236946e3140659fff8a2362e16f43>; Michael Powell et al., *Lt. Stowe’s Sudden Fall From Grace*, WASH. POST (Nov. 30, 1997), <https://www.washingtonpost.com/archive/politics/1997/11/30/lt-stowes-sudden-fall-from-grace/a6ac37f2-57d2-47fb-b6da-0f8f6a45dde8/> (reporting on officer who pleaded guilty to using an ALPR database to blackmail married men who parked outside a gay club).

⁵⁶ Cooper Quintin & Dave Maass, *License Plate Readers Exposed! How Public Safety Agencies Responded to Major Vulnerabilities in Vehicle Surveillance Tech*, ELECTRONIC FRONTIER FOUND. (Oct. 28, 2015), <https://www.eff.org/deeplinks/2015/10/license-plate-readers-exposed-how-public-safety-agencies-responded-massive>; see also Kenneth Lipp, *License to Connive: Boston Still Track Vehicles, Lies About It, and Leaves Sensitive Resident Data Exposed Online*, DIG BOS. (Sept. 8, 2015), <https://digboston.com/license-to-connive-boston-still-tracks-vehicles-lies-about-it-and-leaves-sensitive-resident-data-exposed-online/> (reporting that the City of Boston was hosting nearly 1 million license plate scans dating back three years in a freely-accessible server).

⁵⁷ See Zack Whittaker, *Police License Plate Readers Are Still Exposed on the Internet*, TECH CRUNCH (Jan. 22, 2019), <https://techcrunch.com/2019/01/22/police-alpr-license-plate-readers-accessible-internet/>.

⁵⁸ See, e.g., RAPID DIFFUSION OF LPRS, *supra* note 4, at Fig. 8 (indicating that over 30% of agencies surveyed had LPRs regularly access information about “vehicles related to documented gang members”); Mark Harris, *If You Drive in Los Angeles, the Cops Can Track Your Every Move*, WIRED (Nov. 13, 2018), <https://www.wired.com/story/drive-los-angeles-police-track-every-move/> (reporting that the LAPD cross-referenced historical ALPR data against a gang database to obtain a search warrant connected to a murder).

⁵⁹ See e.g., CITY OF CHICAGO OFFICE OF INSPECTOR GENERAL, REVIEW OF CHICAGO POLICE DEPARTMENT’S “GANG DATABASE” 2 (Apr. 2019), <https://igchicago.org/wp-content/uploads/2019/04/OIG-CPD-Gang-Database-Review.pdf> (concluding that “CPD’s gang information contains incomplete and contradictory data;” “CPD does not regularly review, correct, or purge inaccurate gang information; those with inaccurate designations have no opportunity to clear their name and mitigate the impact of incorrect or outdated gang designations;” and “CPD’s gang designations are permanent and inescapable”).

⁶⁰ See *National Crime Information Center (NCIC) — NCIC Files*, <https://www.fbi.gov/services/cjis/ncic> (showing that Immigration Violator File includes “[r]ecords on criminal aliens whom immigration authorities have deported and aliens with outstanding administrative warrants of removal”).

⁶¹ See, e.g., County of Sacramento, Change to Delegated Purchase Order DP81191041, Vigilant Contract 9 (June 2016), <https://www.documentcloud.org/documents/4618380-ITEM-4-Contract-No-DP81191041-FY-16-17.html#document/p9/a443654>.

⁶² See *Automatic Number Plate Recognition*, POLICE.UK, <https://www.police.uk/information-and-advice/automatic-number-plate-recognition/> (providing information on why police use ALPR, how it works, retention and storage policies, camera locations, and links to further information) (last visited Oct. 9, 2019). Many of the protections were put in place to comply with the European Convention on Human Rights, and supporting U.K. statutes such as the Data Protection Act 1998 (DPA) and the Regulation of Investigatory Powers Act 2000 (RIPA). See HOME OFFICE, THE USE OF ANPR BY LAW ENFORCEMENT AGENCIES 2 (2014), <https://www.npcc.police.uk/documents/The%20Use%20of%20ANPR%20by%20Law%20Enforcement%20Agencies.pdf>.

⁶³ See Julia M. Brooks, *Drawing the Lines: Regulation of Automatic License Plate Readers in Virginia*, 25 RICH. J.L. & TECH. 1, 19 (2019) (finding that only two bills addressing ALPRs have been introduced to Congress—both of which limited data retention to 30 days—though they perished in committee).

⁶⁴ 18 U.S.C. § 2721 et seq; see also Dave Maass, *Mystery Show Debunks License Plate Privacy “Myth”*, ELECTRONIC FRONTIER FOUND. (June 15, 2015), <https://www.eff.org/deeplinks/2015/06/mystery-show-podcast-debunks-license-plate-privacy-myth> (critiquing the Drivers Privacy Protection Act for its many exceptions and lack of meaningful protections).

⁶⁵ See *Automated License Plate Readers: State Statutes*, NAT’L CONF. ST. LEGISLATURES (Mar. 15, 2019), <http://www.ncsl.org/research/telecommunications-and-information-technology/state-statutes-regulating-the-use-of-automated-license-plate-readers-alpr-or-alpr-data.aspx> (listing 16 states with ALPR statutes). See also STATE OF FLA., CRIMINAL AND JUVENILE JUSTICE INFO. SYS. COUNCIL, GUIDELINES FOR THE USE OF AUTOMATED LICENSE PLATE READERS, <https://www.fdle.state.fl.us/CJIS/Documents/CJIS-Council-ALPR-Guidelines> (last visited Oct. 9, 2019) [hereinafter “FLORIDA CJIS GUIDELINES”]; N.Y. STATE DIV. CRIMINAL JUSTICE SERVS., SUGGESTED GUIDELINES: OPERATION OF LICENSE PLATE READY TECHNOLOGY (2011), <https://apps.criminaljustice.ny.gov/ofpa/pdfdocs/finalalprguidelines01272011a.pdf>.

⁶⁶ N.H. REV. STAT. ANN. § 261.75-b (VIII).

⁶⁷ ME. REV. STAT. ANN. § 2117-A(2) (21 days); MINN. STAT. ANN. § 13.824(3)(a) (60 days); CAL. VEH. CODE § 2413(b) (restricting California Highway Patrol scans to 60 days retention); N.C. GEN. STAT. § 20-183.32 (90 days); MONT. CODE ANN. § 46-5-118(1) (90 days); TENN. CODE § 55-10-302 (90 days).

⁶⁸ COLO. REV. STAT. § 24-72-113 (2014) (3 years); FLORIDA CJIS GUIDELINES, *supra* note 65, at 6(e) (3 years); GA. CODE § 35-1-22 (30 months); VT. STAT. ANN. tit. 23, § 1607(d)(2) (18 months). Agency policies similarly vary widely. See RAPID DIFFUSION OF LPRS, *supra* note 4, at Fig. 10 (showing wide range of retention periods in agency policies, with 17.6% indicating 1 month or less, and 15% indicating indefinite retention).

⁶⁹ *Neal v. Fairfax Cty. Police Dep't*, 295 Va. 334, 350 (Va. 2018).

⁷⁰ See, e.g., UTAH CODE ANN. § 41-6a-2003; N.C. GEN. STAT. § 20-183.31; VT. STAT. ANN. tit. 23, § 1607(a)(5). The better (but rarer) approach is to enumerate specific permissible uses. See, e.g., MONT. CODE ANN. § 46-5-117(2)(d)(v); NEB. REV. STAT. 60-3203(2); N.H. REV. STAT. ANN. §§ 261.75-b(V). But even these statutes do not strictly curtail enforcement of low-level offenses or limit enforcement overall.

⁷¹ See, e.g., GA. CODE § 35-1-22; N.C. GEN. STAT. § 20-183.31; MONT. CODE ANN. § 46-5-117(2)(d)(i); NEB. REV. STAT. § 60-3206(1).

⁷² CAL. CIV. CODE § 1798.29; see also NEB. REV. STAT. § 60-3206(2) (requiring agencies adopt “a privacy policy to ensure that captured plate data is not shared in violation of the Automatic License Plate Reader Privacy Act or any other law and conspicuously post the privacy policy on its Internet web site”).

⁷³ See Maass & Gillula, *supra* note 35.

⁷⁴ See, e.g., Kim Zetter, *Police Contract With Spy Tool Maker Prohibits Talking About Device's Use*, WIRED (Mar. 4, 2014), <https://www.wired.com/2014/03/harris-stingray-nda/> (reporting on required non-disclosure agreement in Harris Corporation contracts that barred police agencies from discussing their use of their cell-site simulators); Michael Price & Emily Hockett, *Palantir Contract Dispute Exposes NYPD's Lack of Transparency*, Brennan Center for Justice (Jul. 20, 2017), <https://www.brennancenter.org/our-work/analysis-opinion/palantir-contract-dispute-exposes-nypds-lack-transparency> (reporting that Palantir's contract with the NYPD allowed Palantir to “retain all rights” to data collected by the NYPD for law enforcement purposes); *Law Enforcement Archival Reporting Network – LEARN Hosted Database Use Agreement*, VIGILANT SOLUTIONS (2014), https://www.wired.com/wp-content/uploads/2014/04/LEARN_Hosted_Server_User_Agreement.pdf (prohibiting law enforcement from disclosing the contents of their contract or “to voluntarily provide ANY information, including interviews, related to LEARN products or its services to any member of the media” without express written consent from Vigilant).

⁷⁵ See *Printz v. United States*, 521 U.S. 989 (1997) (holding that Congress cannot commandeer state officers to enforce federal regulations); see also METROPOLITAN POLICE DEPARTMENT, EO-17-010, *Administrative Warrants in NCIC* (eff. March 24 2017), https://go.mpdconline.com/GO/EO_17_010.pdf (directing officers to ignore NCIC alerts solely for administrative removal warrants); *But* see TEX. S.B. 4 § 752.053 (Texas statute barring local law enforcement agencies or campus police forces from adopting, enforcing, or endorsing a policy which “prohibits or materially limits the enforcement of immigration laws.”).

⁷⁶ The federal NCIC, for example, “requires that records entered into the vehicles hot list be double checked by a second party to verify that the data entered matches that contained in an investigative file.” INT'L ASS'N OF POLICE CHIEFS, PRIVACY IMPACT ASSESSMENT REPORT FOR THE UTILIZATION OF LICENSE PLATE READERS 46 (Sept. 2009), https://www.theiacp.org/sites/default/files/all/k-m/LPR_Privacy_Impact_Assessment.pdf.

⁷⁷ The Supreme Court may soon address this issue at a matter of constitutional law. See *Kansas v. Glover*, Docket No. 18-556 (U.S.) (oral argument scheduled for November 4, 2019).

⁷⁸ See, e.g., HOME OFFICE, NATIONAL ANPR STANDARDS FOR POLICING AND LAW ENFORCEMENT ANPR 28–31 (Jan. 2019), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/806674/NASPLE_-_January_2019_.pdf (“9.3 Organisational and User Access to ANPR Data”); HOME OFFICE, NATIONAL STANDARDS FOR COMPLIANCE AND AUDIT OF LAW ENFORCEMENT ANPR 6–9 (Jul. 2019), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/814216/ANPR_Compliance_and_Audit_Standards_V1.1_July_2019.pdf (“8 Data Access and Management Standards Audit”).

⁷⁹ For the most part, federal courts have had little to say about ALPR use. Because license plates are in public view, federal law currently offers no protection under the Fourth Amendment, though there are some signs this may eventually change. In *Carpenter v. United States*, 138 S. Ct. 2206 (2018), the Supreme Court held that warrants are required for law enforcement inquiries about mobile phone location over seven days. This decision may bear upon the use of ALPRs for historical investigations. Indeed, there is a portion of the Board that believes that *Carpenter's* warrant requirement should be applied to ALPRs, and there is some other litigation in the offing. See, e.g., Brief for Electronic Frontier Foundation et al. as Amici Curiae Supporting Appellant, *United States v. Yang*, No. 18-10341 (9th Cir. 2019). Although not yet a settled legal question, building this into the design would be a productive step.

⁸⁰ See *supra* notes 56–57.

⁸¹ See Brooks, *supra* note 63, at 10–11 (“Billions of scans collected by private individuals, without any concern about the constitutionality of their actions, are accessible to the thousands of participating law enforcement agencies.”); Maass & Lipton, *supra* note 14 (“It’s unclear which policies and laws govern ALPR data when it crosses state boundaries. For example, a sheriff’s office in California may require officers to attach a case number to every search of ALPR data, whereas a police department in Georgia may not have similar requirements. Meanwhile, Georgia law requires ALPR data to be destroyed after 30 months, whereas other states may allow agencies to hold onto the data indefinitely.”).

⁸² Our First Report detailed how the Board operates. Our membership has evolved over time and our current members are listed on Axon’s website: <https://www.axon.com/info/ai-ethics>. In keeping with the disclosures made in our First Report, we note that the Policing Project at New York University School of Law, which staffs the Board, received \$30,000 from Axon in order to defray some of its expenses in staffing the Board’s ALPR work and preparing this report. More information on the Policing Project is available at www.policingproject.org.