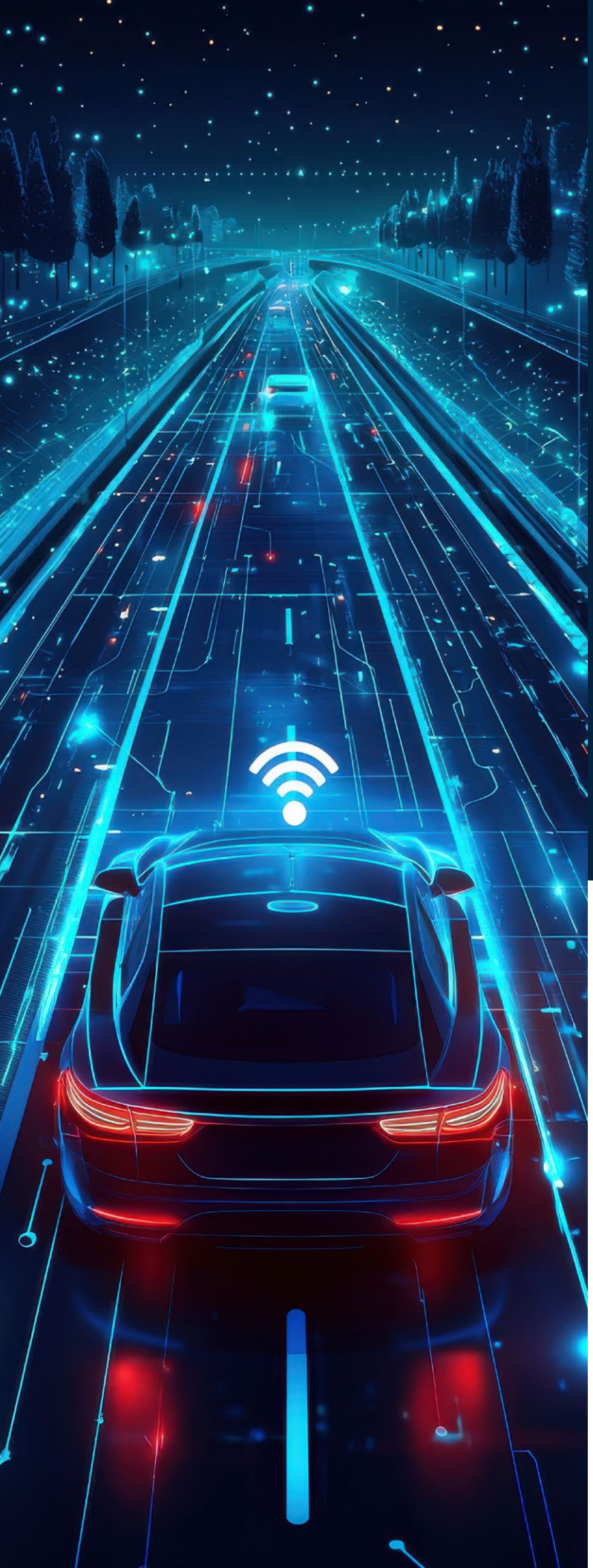


NAMIC® ADVOCACY

AUTONOMOUS VEHICLE TECHNOLOGY AND THE INSURANCE IMPACT

BRETT ODOM
Policy Vice President,
Auto & Alternative Vehicles

NAMIC ISSUE ANALYSIS

NAMIC® ADVOCACY

PRIMARY AUTHOR INFO

BRETT ODOM

Brett Odom is the policy vice president for auto and alternative vehicles at NAMIC. Odom advises NAMIC members on all legislative and regulatory proposes pertaining to automobile insurance and related risk-based pricing concepts.

Odom entered the insurance industry in 1996. Although he has experience in multiple lines of insurance, including life/health, his primary focus has been auto claims. Odom brings to NAMIC considerable experience in the auto insurance industry, stemming from a variety of leadership roles at Federated Mutual, Indiana Farmers Mutual, and The Hartford Insurance Group. Prior to joining NAMIC in early 2025, he worked at Amerisure Mutual Insurance, spearheading the commercial auto physical damage operation.

Odom earned his bachelor's degree in insurance and risk management from Indiana State University and his MBA from Indiana Wesleyan University.

For more information about this NAMIC Issue Analysis please visit namic.org or contact:

BRETT ODOM
bodom@namic.org
317.876.4294

The National Association of Mutual Insurance Companies consists of more than 1,300 member companies, including six of the top 10 property/casualty insurers in the United States. The association supports local and regional mutual insurance companies on main streets across America as well as many of the country's largest national insurers. NAMIC member companies write $383 billion in annual premiums and represent 61 percent of homeowners, 48 percent of automobile, and 25 percent of the business insurance markets.

TABLE OF CONTENTS

INTRODUCTION 2

EVOLUTION OF TECHNOLOGY 3

- Event Data Recorder Technology 3
- Advanced Driver Assistance Systems 4
- Automated Driver Systems 5
- The Frontier of Full Automation 6

PUBLIC RELIANCE ON AND ADOPTION OF TECHNOLOGY 6

REGULATORY LANDSCAPE 7

- Availability and Access to Data 8
- The Role of NHTSA and the Focus on Safety 8

INSURER PREPARATION AND CHALLENGES 9

- Data 9
- Underwriting 9
- Claims 9
- Cost of Repairs 10

CONCLUSION 10

INTRODUCTION

Automotive technology is advancing more quickly than ever and the functionality of vehicles on public roads is changing seemingly overnight. The first internal combustion engine motorized vehicles entered public roadways in the late 1800s. Since that time, technology has developed rapidly, making it so cars on the road today are a far cry from the first prototype. As vehicles have developed and new technology has been introduced, motor vehicle regulations have generally kept pace. When public roads surfaced as the common mode of transportation, rules of the road were simultaneously developed and put into place to limit roadway accidents and to protect the public. When vehicles became more sophisticated and speeds increased, the focus on vehicle safety also came along for the ride. Various organizations arose with the sole purpose of vehicle safety and the development of crash ratings and safety protocols by vehicle classification. However, we are now in a new era of risk in which the advent of autonomous vehicles has painted a new landscape without much in the way of legal or regulatory frameworks. The technology and use of these vehicles are already here, yet the body of regulatory work is well behind and scattered. While there is some level of a focus on safety, these efforts are concentrated on vehicle functionality and not on real-time, live environments and the multitude of scenarios that can be thrown at drivers currently operating on public roads.

From the perspective of insurance companies, the challenge can be even more concerning. Traditional auto underwriting practices have focused on private passenger and commercial vehicles, which for all intents and purposes have the same functionality. No matter the size, occupancy, or horsepower, these traditional vehicles have all had one common characteristic: a human driver in control of the vehicle. Now we are in a world where that may not always be the case, and for some vehicles, a computer could be making many important decisions regarding the operation of the vehicle. Future vehicles may not even include licensed drivers or the traditional equipment of steering wheels and foot pedals.

Underwriting practices have also heavily focused on driver behavior, accident history, and traffic offenses. These practices are heavily rooted in sound actuarial studies that link prior behavior to the likelihood of future accidents. This data is then used to help formulate risk and, ultimately, the rate to charge consumers. Additionally, claims processing is no longer what it used to be. Developments in current vehicle technology underscore the sophistication necessary in today's repair processes. The existence of and potential access to vehicle performance data paints a new picture for claims processes to ensure a fully comprehensive claims investigation.The infusion of artificial intelligence and other technology behind the wheel will complicate these challenges faced by the insurance industry in evaluating risk and when adjudicating claims.

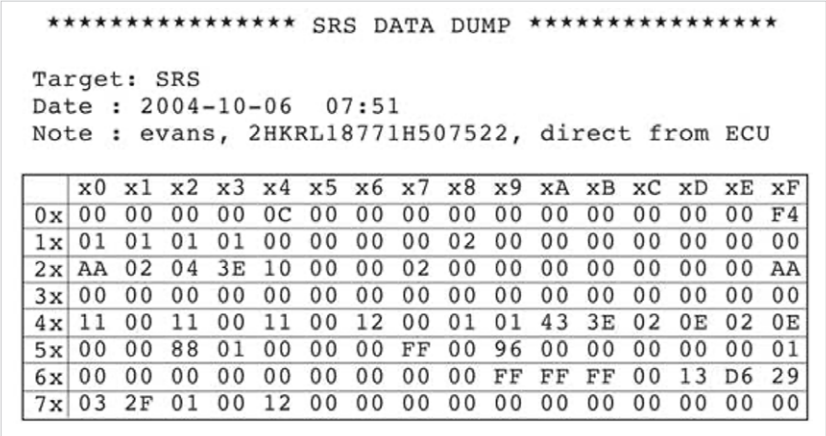
EVOLUTION OF TECHNOLOGY

EVENT DATA RECORDER TECHNOLOGY

One of the first developments in vehicle technology dates back to the 1950s when airbags were installed in limited makes/models to mitigate occupant injuries in an accident. Throughout subsequent years, many revisions of the basic technology were introduced, along with the development of different types of airbags and placement options. By the 1970s, the technology was widely accepted commercially and became a common option in Ford and General Motors vehicles. However, it was not until the 1990s that airbags became a relatively standard feature for most major vehicle manufacturers.[1]

Around that same time, manufacturers wanted to better understand the various factors that can trigger airbag deployment and track the technology's performance across the industry. To aid in this effort, event data recorder technology was introduced and these "black boxes" were placed inside the vehicle alongside the airbags. EDR technology was designed to capture vehicle operation factors such as vehicle speed at the time of the impact and application of the braking system before the impact, among other pre-crash attributes. One of the biggest challenges around the use of any form of vehicle technology today is in capturing and obtaining access to reliable vehicle performance data. Such was the case with EDR, in which the data could not be translated by the average consumer. In fact, the output of EDR data was produced in a hexadecimal form, as illustrated in Figure 1. In addition to the difficulty of translating the output of this data, it was susceptible to misinterpretation and was often not admissible when attempting to objectively analyze accident causation.[2]

Figure 1.



```
***************** SRS DATA DUMP *****************

Target: SRS
Date : 2004-10-06  07:51
Note : evans, 2HKRL18771H507522, direct from ECU
```

	x0	x1	x2	x3	x4	x5	x6	x7	x8	x9	xA	xB	xC	xD	xE	xF
0x	00	00	00	00	0C	00	00	00	00	00	00	00	00	00	00	F4
1x	01	01	01	01	00	00	00	00	02	00	00	00	00	00	00	00
2x	AA	02	04	3E	10	00	00	02	00	00	00	00	00	00	00	AA
3x	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
4x	11	00	11	00	11	00	12	00	01	01	43	3E	02	0E	02	0E
5x	00	00	88	01	00	00	00	FF	00	96	00	00	00	00	00	01
6x	00	00	00	00	00	00	00	00	00	FF	FF	FF	00	13	D6	29
7x	03	2F	01	00	12	00	00	00	00	00	00	00	00	00	00	00

Another argument around EDR pertained to the ownership of the data itself. The Driver Privacy Act of 2015 was introduced to provide guidance that the data is owned by the owner or lessee of the vehicle. This is a framework of law that can be used as a lens to view the issues with recent technologies and the data they produce.[3]

[1] Bellis, Mary. "The History of Airbags." ThoughtCo, May. 5, 2025, thoughtco.com/history-of-airbags-1991232
[2] Dell'Osso, Daniel. "Beware the Black Box." Plaintiff Magazine – July 2013, https://plaintiffmagazine.com/recent-issues/item/beware-the-black-box; July 2013
[3] https://www.congress.gov/bill/114th-congress/senate-bill/766

ADVANCED DRIVER ASSISTANCE SYSTEMS

While it seems as though advanced driver assistance systems and related pieces of technology have only been around the past few years, the earliest forms of ADAS trace back to the late 1970s in the form of anti-lock braking systems, followed by traction control and electronic stability control technologies. While they pale in comparison to the sophistication of today's ADAS, these technologies became the basic prototype to explore this technology further. By the early 1990s, ADAS would begin to surface in the form of backup cameras, night vision, and blind-spot detection. It is said that nearly 35 percent of the vehicles on the road today use some form of ADAS.[4]

Given the prevalence of ADAS in current vehicles, manufacturers classify the various systems based on the level of autonomy involved, or the level of driver interaction required. As shown in Figure 2, these capabilities range from basic facilitation of braking and lane control to full automation in which the computer is in control of the vehicle. Private passenger automobiles have not yet reached the Level 5 criteria. In fact, only a few manufacturers have produced automobiles that have attained Level 3. But the technology is rapidly progressing, and we will see Level 4 and Level 5 technologies in the near future.

Figure 2.

Level 0: Zero autonomy. The vehicle is piloted solely by the human driver and has no ADAS capability.

Level 1: Currently the most common. Vehicles at Level 1 carry ADAS features such as automatic emergency braking and lane keep assist.

Level 2: Partial automation. The driver is still responsible for maintaining safety, although the vehicle can maintain control on straight roads such as highways for brief moments.

Level 3: Conditional automation. The vehicle can maintain full control under specific conditions such as freeway driving and undertake tasks such as normal acceleration, braking, and steering input.

Level 4: Near-total automation. Level 4 allows the vehicle to perform all the automated functions outlined in Level 3, along with undertaking functions such as navigating construction zones, avoiding sudden obstacles, and operating turn signals. The driver does not need to interfere, although the vehicle will prompt the driver to control the car if necessary. Some vehicles have been retrofitted with Level 4 autonomy and are currently involved in ride-sharing services.

Level 5: Full automation. The driver is now a passenger. The vehicle controls itself without any need for human interference. Currently, no vehicle is capable of Level 5 automation.

[4] Nelson, Matt. "The History and Rise of Advanced Driver-Assistance Systems (ADAS)." https://carbuzz.com/the-rise-of-advanced-driver-assistance-systems-adas/; June 2, 2024.

AUTOMATED DRIVER SYSTEMS

Automated driver systems differ from ADAS in one primary respect – convenience versus overtaking control. With the introduction of ADS, cars are moving away from a system that just assists the human driver in these tasks to technology taking full control over them. The responsibilities of steering, accelerating, and braking are all covered by the ADS system in place of human intervention. As ADAS technology was the catalyst with partial control of the vehicle, ADS encompasses operation of the vehicle without any human intervention. This is hands-free technology in which there is a driver in the vehicle, but the nexus of ADS is that human intervention is not needed and the technology will safely operate the vehicle.

The developments in these ADS and ADAS technologies are unquestionably valuable in reducing accidents. Regardless of the type of technology in today's vehicles, these systems are resulting in fewer and less severe accidents. Data compiled by the Insurance Institute for Highway Safety/Highway Loss Data Institute in a July 2023 study reflects reductions in accidents specific to the type of technology involved – see Figure 3.[5]

Figure 3.

Automatic Emergency Braking		
↓	50%	Front-to-rear crashes
↓	56%	Front-to-rear crashes with injuries
↓	14%	Claim rates for damage to other vehicles
↓	24%	Claim rates for injuries to people in other vehicles
↓	41%	Large truck front-to-rear crashes
Automatic Emergency Braking with Pedestrian Detection		
↓	27%	Pedestrian crashes
↓	30%	Pedestrian injury crashes
Lane Departure Warning		
↓	11%	Single-vehicle, sideswipe and head-on crashes
↓	21%	Injury crashes of the same types

Blind Spot Detection		
↓	14%	Lane-change crashes
↓	23%	Lane-change crashes with injuries
↓	7%	Claim rates for damage to other vehicles
↓	8%	Claim rates for injuries to people in other vehicles
Rear Automatic Braking		
↓	78%	Backing crashes (when combined with rearview camera and parking sensors)
↓	9%	Claim rates for damage to the insured vehicles
↓	29%	Claim rates for damage to other vehicles
Rearview Cameras		
↓	17%	Backing crashes
Rear Cross-Traffic Alert		
↓	22%	Backing crashes

[5] https://www.iihs.org/media/290e24fd-a8ab-4f07-9d92-737b909a4b5e/HvQHjw/Topics/ADVANCED%20DRIVER%20ASSISTANCE/IIHS-HLDI-CA-benefits.pdf

THE FRONTIER OF FULL AUTOMATION

Fully autonomous, driverless vehicles are not available to the public just yet, but the technology is here and developing. Vehicles that drive themselves are only available right now as part of ridesharing, freight, or delivery services and are not available to consumers for purchase. Companies such as Waymo, Aurora, Tesla, and Zoox are leading the path toward fully autonomous transportation of goods and people. Industry research experts contend that it will not be long before the use of this technology steps away from the commercial front and is readily available and common in most personal vehicles across the country.

The organizations that offer fully autonomous, driverless vehicles are reliant on technology known as V2V and V2I communications — vehicle-to-vehicle and vehicle-to-infrastructure, respectively. This technology allows driverless vehicles to communicate with one another through a cellular network in which data is transmitted. It is aimed at increasing safety wherein one vehicle can communicate with another about a given situation or roadway hazard. The National Highway Transportation Safety Administration has stated that V2V/V2I technology could help to avoid roughly 600,000 accidents and save 1,300 lives annually.[6]

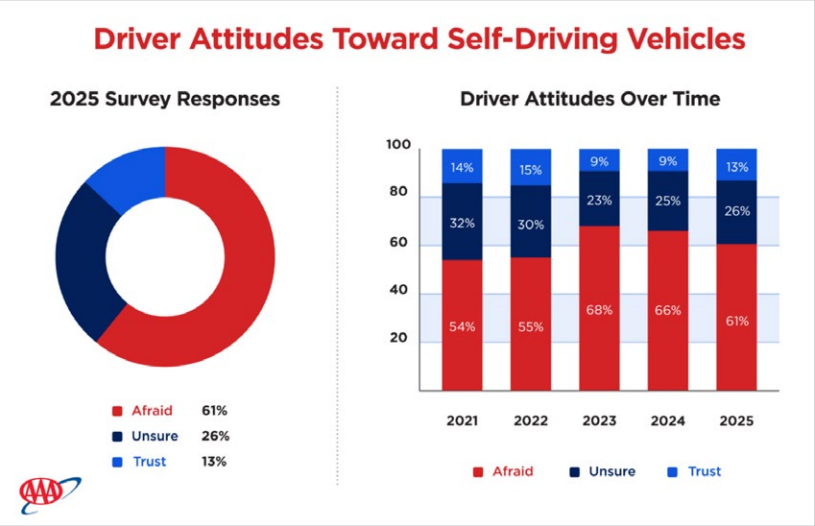
PUBLIC RELIANCE ON AND ADOPTION OF TECHNOLOGY

A perceived problem with these developments in technology is that consumers will become too comfortable with it and, instead of coupling the technology with their own attentiveness, they will begin to trust AI completely and literally let go of the wheel. Humans inherently have limits of concentration and the ability to remain steadfast at tasks that they perceive as boring or unattractive. Although data clearly shows a reduction in the number of accidents and the severity of those that do occur, accidents are still happening and will continue to happen. Could this technology actually be driving the wrong outcome and allowing accidents that would have been avoided had a human intervened?

Factors to consider are the public's confidence in and acceptance of automotive technology. The public's excitement is fairly high regarding specific convenience features available today. A recent study by AAA found that 64 percent of drivers favor assisted braking systems, and 59 percent would prefer lane control assistance in their next vehicle purchase.[6] But in terms of continuing down the path of the classification system, manufacturers remain far from winning consumers' approval. As we navigate toward full autonomy, the public may not be ready to step into this territory just yet. Figure 4 illustrates that the public's trust with AV technology is low and has remained at lower levels the past few years.

[6] Moye, Brittany, "AAA: Fear in Self-Driving Vehicles Persists." https://newsroom.aaa.com/2025/02/aaa-fear-in-self-driving-vehicles-persists; February 25th, 2025.

Figure 4.



REGULATORY LANDSCAPE

The developments around automotive technology have not happened overnight. Progress has taken place over the past several decades, and it is moving toward full autonomy. However, a standard regulatory body of law is nowhere to be found around the use of these vehicles. More challenging is that even if laws are implemented, the technology is moving too fast for the laws to catch up. IIHS-HLDI has indicated that as of April 2025, 34 states have implemented requirements for the deployment and testing of highly automated vehicles.[7] These requirements closely mirror existing laws when establishing responsibility for accidents but do not account for the unique abilities of autonomous vehicles.

At the pace that technology is developing, IIHS-HLDI experts say Level 5 fully autonomous vehicles will be widely available on our public roads by 2040. Currently, there is no collective body of law that governs the operation of AVs, training or licensing for operators, and the necessary negligence laws to determine culpability in the event of an accident. Many states do not even require that a licensed driver be in the vehicle when occupying a Level 4 or Level 5 vehicle.[7] Manufacturers have no mandated testing requirements or safety specifications that they must universally adhere to, and the race to develop and patent the technology seems to outweigh the concern over safety. A well-founded fear is that manufacturers are developing technology that fails to consider to some degree personal or public safety as a paramount concern. Many have gone so far as to require the consumer to execute a hold harmless agreement at the time of purchase.

[7] Wolfe, Daniel. Highly Automated Vehicles: Laws and Regulations By State. IIHS-HLDI, April 2025.

AVAILABILITY AND ACCESS TO DATA

A complex challenge exists around the ownership created from the utilization of various pieces of technology inside the vehicle. It is estimated that a typical AV generates and captures up to four terabytes of data every day.[8] This data is essential for the continuous assessment of the vehicle's surroundings so it can identify objects and assist with decision making. This is another area where there is no a legal or regulatory body of work that helps govern usage data, location data, or data emitted from the various sensors throughout the vehicle. As a result, questions loom about whether access to this data belongs to the owner, the operator, the vehicle manufacturer, or even the government. AV manufacturers want the data so they can continue to make safety improvements and map out coordinates for future vehicle travel. Most AV drivers or owners contend that they own the data as it is produced by their operation of a vehicle, and that it is a data privacy protection issue to provide it to third parties without their consent. If data ownership is to be with the owner, how can they access and decipher it? Who can they share the data with? Can insurers gain access to the data and should they be allowed to use it in their operations?

While the insurance landscape is constantly filled with questions around underwriting criteria and how and what insurers should be allowed to include in the process, it is universally accepted that prior driving history and practices should be primary factors. Policyholders showing evidence of their responsible and safe driving would be further advanced by their insurers being able to access AV data, likely resulting in lower premiums.

THE ROLE OF NHTSA AND THE FOCUS ON SAFETY

The National Highway Traffic Safety Administration's primary mission is minimizing public roadway accidents, and in 2021 began a program around early warning reporting data from AV manufacturers. This reporting requirement was placed on manufacturers to report to NHTSA certain incidents stemming from the use of this technology for the sole purpose of identifying trends and making technological changes as necessary. These efforts have concentrated on reporting incidents by those involved in the operation, primarily placing these requirements on vehicle manufacturers. NHTSA is gathering data for analysis and this is a is a positive step forward — the challenge lies in what to do with the data from a regulatory perspective. NHTSA will continue to issue guidance documents that can help navigate the path to laws and regulations, but these are only guidelines that manufacturers are recommended to follow.[9]

[8] https://patentpc.com/blog/self-driving-cars-and-data-privacy-how-much-do-avs-know-about-you-consumer-data-stats
[9] https://www.nhtsa.gov/laws-regulations/guidance-documents

INSURER PREPARATION AND CHALLENGES

Changes in the insurance industry are constant and the whirlwind of technological advancements in the automotive repairs industry is no exception. It is reasonable to anticipate that these advancements will impact insurer operations, and it is prudent for insurers to act now to get ahead of the changes. Many insurers are launching various initiatives aimed solely at gaining as much information as possible about these changes ahead of time to ensure the customer experience is not impacted and that the financial effects on their organization are contained.

Full vehicle autonomy is not yet here, but the data necessary to make important decisions around underwriting operations and claims best practices are out there. In the ever-competitive insurance landscape, insurers are in tune with these technological developments and are actively evaluating the need for changes within their auto books of business.

DATA

What can insurers do now to help establish ownership of the data, to gain access to it, and to incorporate these findings into their business practices? If an insurer can gain access, decisions must be made about the resources needed to interpret the data and make it useful.

UNDERWRITING

nsurers are closely examining the impact that technological developments will have on their underwriting practices to ensure that all known risks are pulled into their processes. On the commercial side, many companies employ composite rating practices in which entire fleets of vehicles are broadly brushed to establish the risk level and the premium charged. If vehicles in that fleet have high levels of automation or are entirely autonomous, this could give pause and perhaps prompt insurers to assess these risks individually. These risks include the vulnerability of these vehicles to be in an accident and cause resulting injury or property damage. These risks pose significant challenges with the cost of repairs.

CLAIMS

Claims practices need to be closely evaluated. From an investigation standpoint, the inclusion of available data may change the role of a claims adjuster. The evidence that should be regularly secured with every new claim assignment may change as well. Just as the adjuster will secure driver and witness statements, accident reports, scene photos, etc., the adjuster must begin looking to secure data from the vehicles involved to get a better understanding of what caused the accident. Questions arise quickly around who will provide the data — and at what cost, what limitations would be placed around the admissibility of this data, and how to protect data irrelevant to the investigation. Upon notification of a loss, the insurer possesses the responsibility for conducting a thorough investigation. If vehicle performance data becomes an acceptable tool for evaluating liability for an accident, insurers will want to make sure that they have cleared the roads necessary to obtain it. Insurers will also need to sort through questions about assessing liability when autonomous systems have been activated and the subrogation potential against the manufacturers when the data supports a technological malfunction.

Another related component around changes to claim protocols lies in reserving practices. This is unknown territory, but insurers will need to hone in on their loss experience and adjust quickly. Insurers should prepare to modify formula reserve practices to account for the rising costs found in both indemnity and expenses in the auto physical damage arena.

COST OF REPAIRS

Autonomous vehicles are highly sophisticated, and this complexity enters the picture when an accident and resulting damage occurs. A recent study by Claims Journal has illustrated that the total cost of repairs across the auto insurance industry has increased by 96.4 percent since 2009, with most of that increase happening just over the past five years.[10] This is a direct result of the technological developments taking place at record pace. Insurers handling claims involving only minor collision losses are now going to be faced with additional costs associated with recalibration and the repair or replacement of highly technical equipment perhaps not accounted for at the time of policy issuance. IIHS-HLDI estimates that multiple ADAS systems will be in at least 50 percent of the vehicles on the road in 2028.[11] Given the increase in the cost of repairs, insurers need to prepare to handle a larger volume of total loss vehicles. Many insurers are heavily dependent on a variety of transport, salvage, and auction vendors and may need to closely examine capacity of these organizations to account for this potential increase in demand.

Tangential challenges to the rising cost of repairs can quickly be found in the automotive repair industry itself. Even where insurers are prepared for the probable redefining of what constitutes a thorough, comprehensive liability investigation, there are other factors to consider around the repairability of vehicles equipped with autonomous features. Are local repair facilities prepared with the necessary equipment and knowledge for the calibration and diagnostics of sensors and cameras? These are important aspects to consider, particularly if an insurer has a direct repair program. These additional labor efforts will extend the length of repair times, and additional expenses incurred for related costs of rental expense, loss of use, storage fees, and other ancillary costs are likely to climb. The potential for a decline in customer satisfaction is embedded throughout, and claims organizations will need to ensure their customer service skills are at their sharpest. Unfortunately, the current focus in the autonomous world currently is on the technology and using it safely – the focus is not on the repairability of these vehicles – a huge increase in repair expenses and the time to repair awaits the insurer.

CONCLUSION

There is certainly no shortage of excitement and intrigue around AV Technology. Whether the technology entails rather simple features to merely make driving more comfortable or more advanced to where the technology is doing most of the driving, it is clear that these developments can be beneficial to the public. But there are more important safety and legal considerations that need to accompany the technology and work in tandem as these vehicles are unleashed into the public. This technology has entered insurers into a new era of risk. As noted, the technology has so far outpaced the insurance industry but insurers can take action to lessen the gap and proactively adopt practices to limit this risk.

[10] https://www.claimsjournal.com/news/national/2025/05/23/330640.htm
[11] https://www.iihs.org/topics/advanced-driver-assistance#deployment-of-highly-automated-vehicles

NAMIC

NATIONAL ASSOCIATION OF MUTUAL INSURANCE COMPANIES

3601 Vincennes Road | Indianapolis, IN 46268 | 317.875.5250
20 F Street, NW, Suite 510 | Washington, D.C. 20001 | 202.628.1558