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Motor Vehicle Safety: Issues for Congress

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SUMMARY

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Bill Canis
Specialist in Industrial Organization and Business

Motor Vehicle Safety: Issues for Congress

Vehicle safety may be a significant issue as Congress considers a replacement for the current authorization of surface transportation programs, the Fixing America's Surface Transportation Act (FAST Act; P.L. 114-94), which expires at the end of FY2020. Responsibility for motor vehicle safety lies with the National Highway Traffic Safety Administration (NHTSA) within the U.S. Department of Transportation (DOT). The agency's performance has been controversial, in part because of its handling of the largest-ever recall, involving more than 63 million Takata airbags; since the recall was ordered in 2015, nearly 16 million potentially defective airbags have not been replaced. NHTSA has been without a Senate-confirmed administrator since 2017.

Under federal law, NHTSA has the power to promulgate standards for cars and light trucks. The combination of new vehicle designs, greater vehicle automation, and federal standards—including those for seat belts, airbags, hood and door latches, and children's car seats—has contributed to a reduction in the fatality rate by 80% over the past six decades. NHTSA does not approve vehicles before they are manufactured, but may order or encourage a vehicle or parts manufacturer to recall products that violate its standards.

Among the vehicle safety issues Congress may address in the reauthorization process are the following:

- **Recall compliance rates.** According to NHTSA researchers, the combined annual completion rate for all automakers subject to a recall between 2010 and 2014 was 67%, meaning that many vehicles with safety defects remain on the road. Congress may want to consider additions or modifications to 2015 reforms that brought rental car fleets under federal recall requirements and introduced new methods to contact consumers about pending recalls.
- **Defect investigations.** The DOT Inspector General identified problems at NHTSA's Office of Defects Investigation in 2015 and 2018. Although recommendations to improve its management of defects investigations appear to have been implemented, the Trump Administration has sought to reduce spending on vehicle safety and investigations. Congress may want to examine whether the defect investigation process is adequate.
- **Pedestrian and bicyclist fatalities.** Vehicle crashes causing fatalities and injuries to pedestrians and bicyclists have reached a 30-year high. Congress may want to consider requirements that new vehicles include pedestrian crash mitigation systems, a technology already required in other countries.
- **Rear seat warnings.** Although Congress has previously called for NHTSA to require seat belt warnings in rear seats, that regulation has not been issued. In addition, Congress has twice previously called for NHTSA to develop a system to warn drivers about children inadvertently left unattended in the back seats of parked cars.
- **Driver privacy.** The FAST Act's driver privacy provisions apply only to data recorded just before a crash; similar protections do not apply to the large volumes of data collected and stored by vehicle computers during normal operations. In 2018, the Secretary of Transportation reported to Congress that requiring storage of data for a longer period prior to a crash would be appropriate. Congress has not addressed broader questions concerning the ownership and use of data collected aboard vehicles.
- **Tires.** Congress has previously required a NHTSA database for tire recalls, electronic identification on all new tires, and an update to tire pressure monitoring standards, but regulations have not been issued.
- **Unique vehicles.** Stretch limousines, amphibious passenger vehicles—called duck boats—and low-volume replica vehicles have unique configurations and safety issues that Congress may want to address.

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Introduction

Congress enacted the first vehicle safety legislation even before the U.S. Department of Transportation (DOT) and its vehicle-safety arm, the National Highway Traffic Safety Administration (NHTSA), were established more than 50 years ago. Since then, Congress has delegated major regulatory responsibility to NHTSA while also directing it to give priority to certain safety actions, such as mandating seat belt warning systems for the back seats of passenger cars.[1] In recent years, the periodic reauthorization of surface transportation programs has included significant sections on motor vehicle safety. The Fixing America's Surface Transportation (FAST) Act,[2] passed in 2015, included new initiatives to improve vehicle safety; some congressional mandates made in that law have not been completed. Legislation to reauthorize surface transportation programs beyond the end of FY2020 is currently under discussion in Congress.

Responsibility for highway safety is divided between state and federal governments. While the states manage driver and vehicle licensing, establish and enforce traffic laws, and build and maintain highways, the federal government regulates the design of motor vehicles. NHTSA, an agency within DOT, issues Federal Motor Vehicle Safety Standards (FMVSS) and requires manufacturers to recall and repair defects in vehicles that fail to meet those standards.

NHTSA's enforcement of some of its vehicle safety standards is controversial, with its oversight of recalls of passenger cars with defective airbags now in its fourth year. The airbag recall, the largest on record, has come in for sharp criticism in Congress. In addition, NHTSA has taken on responsibility for overseeing the development and testing of autonomous vehicles, even as Congress has not agreed on legislation that would provide it new regulatory tools.[3] The agency has not had a permanent administrator confirmed by the Senate since January 2017. This report examines NHTSA's role overseeing vehicle design and regulation and highlights issues for Congress in the context of reauthorization.

Origins of Federal Motor Vehicle Safety Regulation

In the early decades of the automobile, U.S. vehicles were lightly regulated by a combination of state and private-sector standards. National regulation was generally not seen as appropriate; in the early 1900s, according to two historians of auto safety, it was widely believed that "the only useful and politically acceptable action Congress might take was to help the states and localities construct more and better roads."[4] The Society of Automotive Engineers (SAE), a professional association founded in 1905, became the primary source of vehicle safety standards for many decades. State governments often used SAE recommendations to set their own standards for vehicle brakes, headlamps, and windshield wipers.

[1] Congress directed NHTSA to develop regulations that would require rear seat belt alerts in the Moving Ahead for Progress in the 21st Century Act of 2012 (MAP-21; P.L. 112-141).

[2] P.L. 114-94.

[3] For a discussion of the issues associated with highly automated vehicles, see CRS Report R45985, *Issues in Autonomous Vehicle Testing and Deployment*, by Bill Canis.

[4] Jerry Mashaw and David Harfst, *The Struggle for Auto Safety* (Cambridge, MA: Harvard University Press, 1990), pp. 30-31.

A rising number of highway deaths prompted a new interest in vehicle safety: between 1962 and 1964, Congress passed three safety bills into law, including a seat belt regulation.[5] The new laws were only a precursor to broader federal regulation. Two publications also spurred interest in a greater federal role. Ralph Nader's 1965 book, *Unsafe at Any Speed: The Designed-in Dangers of the American Automobile*, argued that cars were unnecessarily unsafe and that the auto industry should be regulated by a federal agency.[6] Also influential was *Accidental Death and Disability: The Neglected Disease of Modern Society*, a National Academy of Sciences report that documented the impact of accidental injuries, including those by motor vehicles.[7]

Comprehensive vehicle safety legislation was passed in the form of the National Traffic and Motor Vehicle Safety Act of 1966.[8] As approved unanimously by both houses of Congress and signed by President Lyndon B. Johnson, the legislation had two parts:

1. The Highway Safety Act of 1966 mandated that each state put in place a highway safety program in accordance with federal standards to improve driver performance, accident records systems, and traffic control.
2. The National Traffic and Motor Vehicle Safety Act of 1966 directed the Secretary of Commerce (later changed to the Secretary of Transportation when that agency was established in 1967) to issue safety standards for all motor vehicles beginning in January 1967. A National Traffic Safety Agency was established to carry out the provisions of the new law; it was renamed the National Highway Traffic Safety Administration (NHTSA) in 1970.[9]

Since its establishment, NHTSA has issued dozens of safety standards,[10] including regulations affecting windshield wipers, hood latches, tires, brakes, seat belts, and airbags.[11] Proposing, finalizing, or revising a NHTSA safety regulation can take many years, pursuant to the Administrative Procedure Act of 1946 (APA).

NHTSA does not verify in advance that motor vehicles and parts comply with its standards. Instead, the law requires self-certification: "[a] manufacturer or distributor of a motor vehicle or motor vehicle equipment shall certify to the distributor or dealer at delivery that the vehicle or equipment complies with applicable motor vehicle safety standards prescribed under this chapter.... Certification of a vehicle must be shown by a label or tag permanently fixed to the

[5] P.L. 87-637 required hydraulic brake fluid used in motor vehicles to meet certain standards established by the Secretary of Commerce; P.L. 88-201 required the Secretary of Commerce to promulgate safety standards for seat belts; and P.L. 88-514 required vehicle manufacturers to meet certain minimum safety standards for vehicles sold to the General Services Administration (GSA) for the federal fleet.

[6] Ralph Nader, *Unsafe at Any Speed: The Designed-in Dangers of the American Automobile* (New York: Grossman, 1965).

[7] National Academy of Sciences and National Research Council, *Accidental Death and Disability: The Neglected Disease of Modern Society*, 1966, at https://www.ems.gov/pdf/1997-Reproduction-AccidentalDeathDisability.pdf.

[8] P.L. 89-563. When he signed the law, President Johnson cited the 50,000 people killed on U.S. highways as the biggest cause of death and injury among young Americans. The White House, "Remarks of the President at Signing of the Highway Safety Act and the Traffic Safety Act," press release, September 9, 1966, cited in *National Traffic and Motor Vehicle Safety Act of 1966, Legislative History*, vol. 1, p. 31, published by NHTSA in 1985.

[9] Highway Safety Act of 1970, P.L. 91-605.

[10] The authority for issuing standards is found in 49 U.S.C. §30111.

[11] See https://www.nhtsa.gov/staticfiles/rulemaking/pdf/FMVSS-QuickRefGuide-HS811439.pdf.

vehicle.... ”[12] The self-certification label is affixed to the driver door jamb in all vehicles sold in the United States.

Manufacturers are responsible for testing their vehicles and are liable for recalls and penalties if they are later found not to meet FMVSS. After a new model goes on sale, NHTSA buys a sampling from dealers and tests the vehicles at its own facilities to determine whether they comply. It also receives consumer complaints about safety-related problems with vehicles. If NHTSA determines there is noncompliance with its standards, it can encourage the manufacturer to recall the model to correct the problem, or it can order a recall.[13] NHTSA maintains a comprehensive database about motor vehicle crashes to inform proposed standards and to identify vehicles potentially requiring recall.[14]

Estimates of Effects of Federal Safety Standards

A NHTSA study estimated that passenger vehicle safety technologies associated with FMVSS saved 613,501 lives between 1960 and 2012.[15] The study evaluated the effects of 31 motor vehicle technologies mandated by NHTSA, including front disc brakes, electronic stability control, seat belts, airbags, and side door beams.[16] It estimated that, taking account of rising vehicle miles traveled (VMT), the risk of a fatality in 2012 was 56% lower than in 1960, based on evaluation of the effectiveness of specific technologies in reducing occupant fatalities.[17]

The NHTSA report found seat belts, introduced in the late 1960s, to have been responsible for more than half of all the lives saved, 329,715, and that their effectiveness rose sharply after NHTSA required installation of combined lap and shoulder belts in place of simple lap belts in 1974.[18] However, the study also highlighted the importance of other measures in addition to federal vehicle safety regulation: it estimated that the number of lives saved annually by seat belts rose from 800 to 6,000 after many states allowed police to issue tickets if a driver or passengers were not wearing seat belts. Every state but New Hampshire has enacted laws requiring seat belt use.[19]

The full benefits of new federal safety standards may take many years to be felt. The passenger vehicle fleet turns over slowly: the average age of light vehicles on the road in 2019 was 11.8

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[12] P.L. 89-563, 49 U.S.C. §30115.

[13] NHTSA, *Motor Vehicle Safety Defects and Recalls: What Every Vehicle Owner Should Know*, at https://www-odi.nhtsa.dot.gov/recalls/documents/MVDefectsandRecalls.pdf.

[14] NHTSA’s data analysis and research are managed by its National Center for Statistics and Analysis (NCSA) and Office of Vehicle Safety Research, https://www.nhtsa.gov/research-data; NHTSA maintains the Fatality Analysis Reporting System (FARS), which records factors of fatal crashes such as location, time and circumstances of the crash, type of vehicle, passengers involved, and vehicles’ movements leading to the crash.

[15] The study evaluated technologies in cars, sport utility vehicles (SUVs), pickup trucks, minivans, and full-size vans. C. J. Kahane, *Lives Saved by Vehicle Safety Technologies and Associated Federal Motor Vehicle Safety Standards, 1960 to 2012*, NHTSA, DOT HS 812 069, January 2015.

[16] Side door beams are anti-intrusion bars that protect passengers from side impacts.

[17] C. J. Kahane, *Lives Saved by Vehicle Safety Technologies and Associated Federal Motor Vehicle Safety Standards, 1960 to 2012*, NHTSA, DOT HS 812 069, January 2015, p. xii.

[18] Centers for Disease Control and Prevention (CDC), *Injury Prevention & Control: Motor Vehicle Safety*, viewed March 9, 2017, at https://www.cdc.gov/motorvehiclesafety/calculator/factsheet/seatbelt.html.

[19] Other major technologies and the cumulative lives saved as identified in the NHTSA study were steering wheel assemblies (79,989), frontal airbags (42,856), door locks (42,135), and side impact protection (32,288). C. J. Kahane, *Lives Saved by Vehicle Safety Technologies and Associated Federal Motor Vehicle Safety Standards, 1960 to 2012*, NHTSA, DOT HS 812 069, January 2015.

years, compared with 8.9 years in 2000.[20] Although electronic stability control was introduced as standard equipment on one make of vehicle in 1998 and was subsequently adopted on some other makes, only 22% of light vehicles on the road were equipped with the technology in calendar year 2012. FMVSS required electronic stability control to be included in all new vehicles starting in model year 2012. The NHTSA study estimated that more than 1,362 lives may be saved annually when all vehicles on the road utilize the technology, but this will not occur for a couple of decades.

Several elements of traditional motor vehicle safety are being called into question by recent data, perspectives on earlier studies, and new technologies.

Safety goals have focused on making drivers and passengers safer inside vehicles, but recent increases in traffic deaths outside the vehicle—of pedestrians and bicyclists—have raised questions about the effectiveness of current highway safety policies and programs: in 2018, 34% of highway fatalities were of those outside of vehicles, an increase from 20% in 2000.[21]

An often-cited statistic that "the major factor in 94% of all fatal crashes is human error"[22] is sometimes interpreted incorrectly to mean that nearly all crashes are due to driver error. The extensive NHTSA survey from which these data are drawn—the National Motor Vehicle Crash Causation Survey (NMVCCS)—does not draw that conclusion. That study, authorized by Congress[23] to better understand events leading up to motor vehicle crashes and assist in developing and evaluating crash avoidance technologies, was conducted from 2005 to 2007, collecting and analyzing data and events from nearly 7,000 light vehicle crashes.[24] The researchers evaluated data elements related to drivers, vehicles, highways, and the surrounding environment of the crash sites, determining that of the crashes evaluated,

- 36% involved vehicles that were turning or crossing intersections;
- 22% involved a vehicle that ran off the edge of the road;
- 11% involved a vehicle that did not stay in the proper lane;
- 12% involved a stopped vehicle; and
- 9% resulted when a driver lost control of a vehicle.

In an important finding that qualifies the causes of vehicle crashes, the NHTSA researchers reported that the investigated accidents typically involve a causal chain of events that may be attributed to the driver (distraction or speeding), the vehicle (tires, brakes or other malfunctions), the roadway (poor design or wet road surfaces), or atmospheric conditions (rain, snow, sun glare).[25] In a 2015 NHTSA report further analyzing the NMVCCS data, researchers noted that a "critical reason" for the crashes in the survey "was assigned to the driver in an estimated 94% of

[20] Bureau of Transportation Statistics, *Average Age of Automobiles and Trucks in Operation in the United States*, at https://www.bts.gov/content/average-age-automobiles-and-trucks-operation-united-states.

[21] NHTSA, *Traffic Safety Facts 2000*, p. 18.

[22] Department of Transportation, *Automated Driving Systems 2.0: A vision for Safety*, Introductory Message by DOT Secretary Elaine Chao, September 2017, p. i, at https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/13069a-ads2.0_090617_v9a_tag.pdf.

[23] Section 2003(c), Safe, Accountable, Flexible, Efficient. Transportation Equity Act: A Legacy for Users (SAFETEA-LU; P.L. 109-59).

[24] Light vehicles include passenger cars, crossover vehicles, SUVs, and pickup trucks. NHTSA, *National Motor Vehicle Crash Causation Survey*, DOT HS 811 059, July 2008, at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811059.

[25] Ibid., p. 10.

the crashes,"[26] but that "the critical reason … is not intended to be interpreted as the cause of the crash.... "[27] The 2015 NHTSA report went further and stated that "in none of these cases was the assignment intended to blame the driver for causing the crash."[28]

This reading of the NMVCCS findings may call into question forecasts that fully autonomous vehicles could nearly eliminate fatalities, as NMVCCS findings would indicate that adverse weather conditions, malfunctioning vehicle parts, and poor highway design will remain factors in motor vehicle fatalities even when fully autonomous vehicles are in use in the future.[29]

Increase in Pedestrian and Bicyclist Deaths Linked to More SUVs

Despite safety improvements over past decades, many drivers, passengers, and pedestrians are killed annually in motor vehicle accidents: in 2018, 36,560 fatalities occurred on U.S. roads. The number of annual fatalities from motor vehicle accidents has declined by 28% since the first federal vehicle safety law was enacted in 1966. However, the downward trend was interrupted with fatality increases from 2015 and 2016, then declined slightly in 2017 and 2018. It is thought that possible explanations for the increase in fatalities included more driving because of lower gasoline prices, speeding, alcohol and drug-impaired driving, and driver distractions.[30]

When fatalities are viewed in the context of the expanded amount of driving that has taken place in the past 50 years, however, the fatality rate has dropped by nearly 80%, from 5.50 deaths per 100 million vehicle miles traveled (VMT) in 1966 to 1.13 deaths per 100 million VMT in 2018 (**Figure 1**).[31]

[26] NHTSA, *Critical Reasons for Crashes Investigated in the National Motor Vehicle Crash Causation Survey*, DOT HS 812 115, February 2015, https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115.

[27] Ibid.

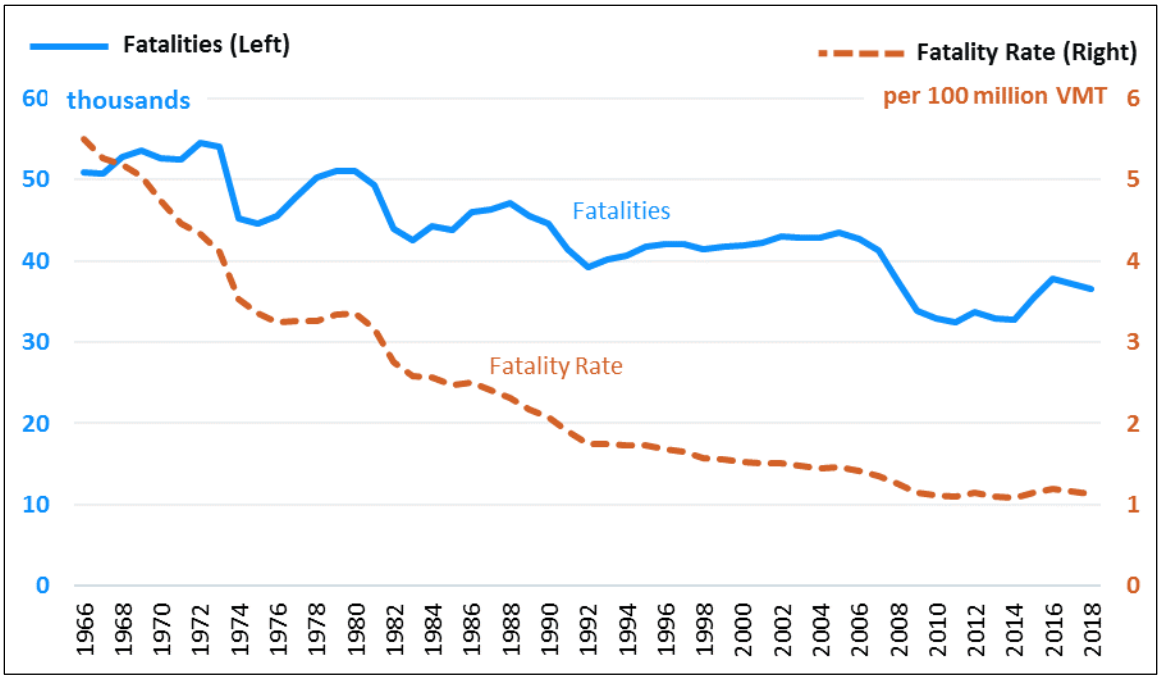
[28] Ibid.

[29] NHTSA is planning to develop a new crash causation survey to further examine the issues behind such accidents. U.S. Department of Transportation, *Fiscal Year 2021: National Highway Traffic Safety Administration*, p. 69, at https://www.transportation.gov/mission/budget/nhtsa-cj-fy-2021-estimates.

[30] Beckie Strum, "U.S. Traffic Fatalities Continued to Surge in First Half of 2016," *Wall Street Journal*, August 23, 2016, at https://www.wsj.com/articles/u-s-traffic-fatalities-continued-to-surge-in-first-half-of-2016-1471967127.

[31] Vehicles Miles Traveled is a transportation term that estimates the number of miles traveled by all vehicles nationally in a one-year period. In 1966, when the fatality rate was at 5.50 per 100 million VMT, the nation's total vehicle miles traveled were 925 billion. In 2018, when the fatality rate had dropped to 1.13 per million VMT, total miles traveled had risen to 3.2 trillion. NHTSA, *2018 Traffic Safety Facts*, DOT HS 812 826, October 2019, p. 2, at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812826.

Figure 1. Motor Vehicle Traffic Fatalities and Fatality Rates



Source: (NHTSA, Trends, Table 2, *Persons Killed and Fatality Rates*, 1966-2017, https://cdan.nhtsa.gov/tsftables/tsfar.htm#. Data for 2018 from NHTSA, *Traffic Safety Facts*, DOT HS 812 826, October 2019, p. 2.

Note: VMT refers to Vehicle Miles Traveled.

Among other major countries, U.S. traffic fatalities are higher than most other developed countries, but below the global average (see an excerpt from the 2018 World Health Organization (WHO) report in **Appendix A**). The WHO asserts that the development and enforcement of vehicle safety standards are important components of any country's strategy for reducing motor vehicle-related fatalities, yet only 40 countries—the United States is not among that group—have implemented most of the United Nations priority vehicle safety standards.[32] WHO data suggest that the developed countries with the lowest fatality rates are those that have adopted more of the UN vehicle standards.[33] According to the WHO, "Vehicle safety is increasingly critical to the prevention of crashes and has been shown to contribute to substantial reductions in the number of deaths and serious injuries on the roads. Features such as electronic stability control and advanced braking are examples of vehicle safety standards that can prevent a crash from occurring…"[34]

Nearly two-thirds of U.S. vehicle fatalities in 2018 were occupants of passenger cars and light trucks, with the remainder being occupants of large trucks, buses, or motorcycles; pedestrians; or bicyclists (**Figure 2**). Pedestrian and bicyclist fatalities rose 3.4% and 6.3%, respectively, in 2018

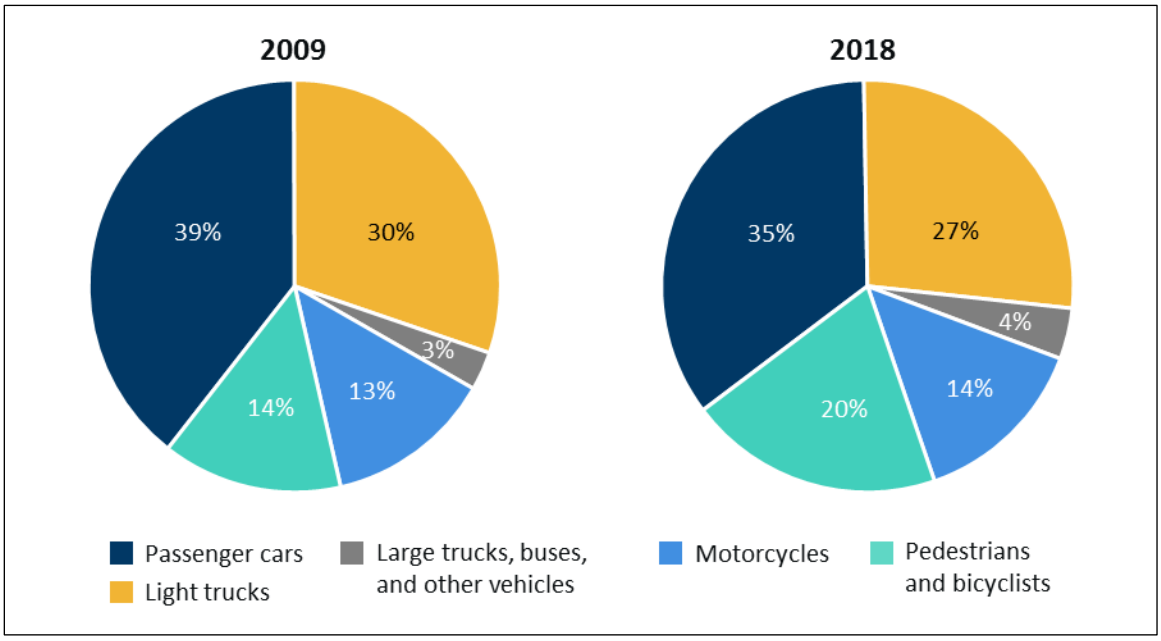
[32] The priority UN vehicle safety standards call for countries to establish rules on frontal and side impact protection; electronic stability control; pedestrian front protection; seat belts and anchorages; child restraints; and motorcycle antilock braking systems. The priorities are developed by the United Nations World Forum for Harmonization of Vehicle Regulations, part of the UN Economic Commission for Europe (UNECE); see https://www.unece.org/trans/main/wp29/meeting_docs_wp29.html.

[33] Among the countries with lower fatality rates that were shown to have adopted at least four of the UN vehicle standards were Australia, France, Germany, Japan, and the United Kingdom.

[34] World Health Organization, *Global Status Report on Road Safety*, 2018, p. 58, at https://www.who.int/publications-detail/global-status-report-on-road-safety-2018.

(when compared to 2017), reaching the highest levels since 1990.[35] The composition of vehicles on the road may be a factor in the increasing numbers of pedestrian and bicyclist deaths. U.S. vehicle buyers are increasingly opting for light trucks, a category that includes crossovers, sport-utility vehicles (SUVs), and pickup trucks; such vehicles accounted for 72% of light-vehicle sales in 2019, up from 50% in 2010.[36] The Governors Highway Safety Association has noted that the number of pedestrian fatalities involving SUVs increased 50% from 2013 to 2017, while the number involving passenger cars increased 30%.[37]

Figure 2. Fatality Composition



Source: NHTSA, *2018 Traffic Safety Facts*, DOT HS 812 826, October 2019, p. 2.

Notes: Light trucks include most crossovers, SUVs, and all pickup trucks.

An April 2020 report by the Government Accountability Office (GAO) sheds additional light on the role larger vehicles—in particular SUVs—may play in rising pedestrian fatalities.[38] GAO analyzed a decade of data (from 2008 through 2018) in three NHTSA crash and accident databases, finding that number of fatalities in accidents involving SUVs increased by 68% during the decade studied, the number involving light trucks by 25%, and the number involving passenger cars by 47%.[39] GAO found that there were more pedestrian fatalities involving SUVs because (1) more SUVs are on the road than in the past and (2) pedestrians struck by bigger vehicles with greater mass are more likely to experience serious injuries or fatalities.[40]

[35] In 2018, 6,283 pedestrians and 857 bicyclists were killed in motor vehicle-related accidents. Ibid., p. 3.

[36] Ward's Intelligence Data Center, *North America Vehicle Sales by Vehicle Type, 2000-2019*, viewed May 1, 2020.

[37] Governors Highway Safety Association, *Pedestrian Traffic Fatalities by State: 2018 Preliminary Data*, February 2019, p. 4.

[38] U.S. Government Accountability Office, *Pedestrian Safety*, GAO-20-419, April 23, 2020, https://www.gao.gov/products/GAO-20-419.

[39] Other factors contributing to the higher fatalities included older vehicles and higher vehicle speeds. Ibid., p. 13.

[40] Ibid., p. 16.

Technologies exist that could mitigate pedestrian fatalities. In evaluating data provided from 13 automakers, GAO found that 62% of new model year 2019 vehicles had some type of pedestrian crash mitigation system. GAO recommended that NHTSA (a) expand a current pilot program that collects data on the type and severity of pedestrian injuries; (b) include pedestrian safety tests in its 5-star safety rating program,[41] a step that could increase automaker use of those technologies on more vehicles; and (c) clarify its process for updating its safety ratings.[42]

A 2018 study by the Insurance Institute for Highway Safety (IIHS) also associated the greater number of SUVs on the road with increased pedestrian deaths and injuries. IIHS found that improving vehicle headlights and equipping more vehicles with pedestrian detection systems could reduce the number of pedestrian fatalities. It also recommended changing the front-end design of SUVs so they are less likely to strike pedestrians in the head or chest.[43] In a separate study, IIHS found that smaller vehicles have higher driver death rates, while drivers of some SUVs have the lowest death rates.[44]

Many Advanced Technologies Improve Vehicle Safety

In the past decade, the use of advanced driver assistance systems (ADAS) has improved vehicle safety and passenger mobility by warning drivers of potentially dangerous situations, such as another vehicle braking ahead of them, and in some instances, by taking control of the vehicle to prevent an accident. A *Consumer Reports* survey among drivers—with data on 72,000 vehicles—found that 57% reported that "at least one advanced driver assist feature in their vehicle had kept them from getting into a crash."[45]

IIHS and its affiliated Highway Loss Data Institute documented the effects of some crash avoidance technologies by comparing actual crashes of vehicles with and without ADAS. In the 2019 IIHS/HDLI study, the authors found that vehicles with forward collision warning experienced 27% fewer front-to-rear crashes, and when that technology was combined with automatic braking, 50% fewer crashes were experienced. Lane departure warning, blind spot detection, and rearview cameras each contributed to lower crash rates.[46]

Figure 3 shows many of the technologies currently used on passenger motor vehicles; some are based on NHTSA standards, such as airbags, tire pressure monitors, and rearview cameras, while others are not at this time. The technologies include the following:

- *Electronic stability control* limits wheel spinning during acceleration and keeps the vehicle on the driver's intended path.

[41] The 5-star safety rating program, formally known as the New Car Assessment Program (NCAP), has since 1978 provided consumers with information on each vehicle's safety performance based on a series of crash scenario tests conducted by NHTSA. NCAP was authorized by Congress in the Motor Vehicle Information and Cost Savings Act of 1973 (P.L. 92-513).

[42] U.S. Government Accountability Office, *Pedestrian Safety*, GAO-20-419, April 23, 2020, pp. 39-40.

[43] "On foot, at risk," IIHS *Status Report*, Vol. 53, No. 3, May 8, 2018, at https://www.iihs.org/api/datastoredocument/status-report/pdf/53/3.

[44] IIHS, *Driver death rates remain high among small cars*, May 28, 2020, at https://www.iihs.org/news/detail/driver-death-rates-remain-high-among-small-cars.

[45] Mike Monticello, *Car Safety Systems That Could Save Your Life*, *Consumer Reports*, June 25, 2019, at https://www.consumerreports.org/automotive-technology/car-safety-systems-that-could-save-your-life/.

[46] Institute for Highway Safety and Highway Loss Data Institute, *Real-world benefits of crash avoidance technologies*, June 2019, at https://www.iihs.org/media/259e5bbd-f859-42a7-bd54-3888f7a2d3ef/e9boUQ/Topics/ADVANCED%20DRIVER%20ASSISTANCE/IIHS-real-world-CA-benefits.pdf.

- *Automatic emergency braking* detects a sudden effort to stop the vehicle, automatically applying the brakes to prevent an imminent crash.
- *Seat belt pretensioners* employ a sensor to detect abrupt deceleration of an impending accident, forcing a concealed piston to quickly remove any slack in front-seat seat belts to hold drivers and passengers firmly in their seats, thereby providing maximum airbag protection.
- *Forward collision warning* uses cameras, radar, and lasers to search for cars ahead of a vehicle and alerts drivers if a crash may be imminent, using audible signals or a vibrating driver's seat to alert the driver. A similar system is available to detect pedestrians in a vehicle's path.
- *Blind spot warning* devices are built into external side vehicle mirrors; using radar or cameras, they light up when a motorist seeks to change lanes and another vehicle is in the driver's blind spot.
- *Lane departure warning* systems monitor roadway lane markings and send audible or vibrating signals to the driver if the vehicle leaves the lane, unless a turn signal is activated. Research has indicated that drivers who fall asleep, suffer a medical emergency or black out from drug or alcohol use are most likely to leave intended lanes.[47]
- *Adaptive lighting* is a safety system designed for the driver to see better at night without affecting other drivers, using a camera under the rearview mirror to detect oncoming traffic and curves in the road, automatically adjusting headlights. FMVSS do not allow adaptive headlights.

Since there are no universal standards for some of these technologies, they may have different names among manufacturers and different capabilities. *Consumer Reports* has suggested that automakers, regulators, and safety groups develop an "accurate naming convention" so that consumers will better understand what these relatively new systems do.[48]

Many of these newer ADAS technologies are not mandated by Congress or NHTSA; they often appear first on luxury vehicles because of their high initial costs. NHTSA's position has been that to develop standards for rapidly changing technologies could impede innovation and result ultimately in outmoded standards, which could then take years to revise. Delays in issuing or updating standards can be caused by opposition to some of the proposals by industry or consumers or by inaction by regulators. In addition, the lengthy period for standard setting is affected by the requirements of the Administrative Procedures Act of 1946, which ensures that a proposed rulemaking is publicized in the *Federal Register*, that public comments are evaluated by the regulatory agency, and then that decisions that are made are clearly explained in another *Federal Register* notice.

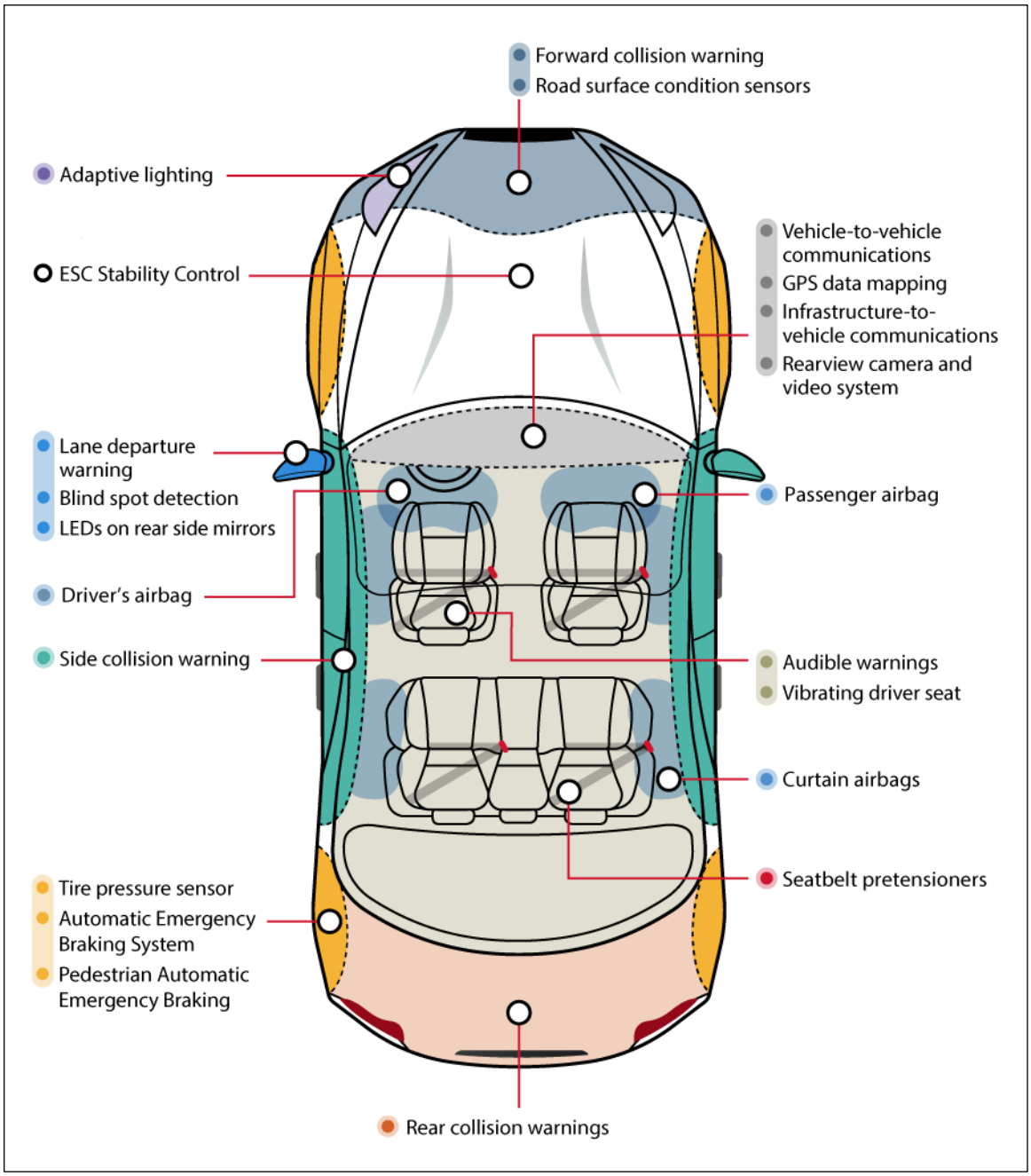
To speed the application of one new technology, NHTSA developed a voluntary agreement with 20 automakers in 2016 to install automatic emergency braking systems on nearly all new passenger vehicles by 2022, a pace of application that NHTSA's then-administrator said could not have been met with a traditional standards-setting regulation. Under the agreement,

[47] IIHS, *Drivers who drift from lane and crash often dozing or ill*, September 1, 2016, at https://www.iihs.org/news/detail/drivers-who-drift-from-lane-and-crash-often-dozing-or-ill.

[48] David Friedman, Jake Fisher, and Kelly Funkhouser, et al., "A Consumer Reports Initiative to End Confusion About Advanced Driver Assistance Systems," *Consumer Reports*, October 25, 2018, at https://advocacy.consumerreports.org/research/advanced-driver-assistance-systems-standard-nomenclature/.

automakers report annually on their progress: the latest reporting period (for 2019) showed that 12 manufacturers had equipped more than 75% of their vehicles with the systems.

Figure 3. Advanced Vehicle Technologies



Source: CRS.

With more than 260 million vehicles on U.S. roads, the life-saving value of new technologies will be limited until most cars in use, not just new ones, are equipped with them. The Highway Loss Data Institute reported in 2019 that "carmakers are making vehicles more crashworthy about 3

times faster today than they did in the mid-1990s, but those improvements and new safety features still take decades to filter into most vehicles on the road."[49]

Vehicle Recalls and Defects

In addition to promulgating and enforcing vehicle safety standards, NHTSA investigates vehicle defects that affect safety. NHTSA's Office of Defects Investigation (ODI) initiates defect investigations and reviews complaints of alleged defects from vehicle owners, automakers, and other sources. There are several routes a potential recall complaint can take:

- **Denial.** When NHTSA's analysis of petitions calling for defect investigations leads the agency to decide not to proceed, it publicizes the reasons for the denial in the *Federal Register*.
- **Further review.** If NHTSA opens an investigation of alleged safety-related defects, the investigation concludes with either a recommendation that the manufacturer recall the vehicle or a determination that there is no safety-related defect.

If a safety defect is confirmed by NHTSA, the manufacturer may initiate a recall; if it fails to do so, NHTSA can initiate a recall itself. In addition to the NHTSA investigative process, manufacturers conduct their own internal investigations; if a manufacturer finds that a vehicle or component does not comply with a federal safety standard, it may issue its own recall to correct a safety defect before accidents are reported. Of the 966 recalls issued in 2019, 57 were issued by manufacturers influenced by a NHTSA finding, and 909 were issued based on a manufacturer's finding alone.[50] The law establishing the motor vehicle safety program requires that a manufacturer of a defective vehicle or component notify the vehicle owner and fix the defect without charge.[51]

How Consumers Can Report Defects and Check on Recalls

Increasing the reporting of defects and enabling consumers to know about current recalls is an important part of NHTSA's public education program to ensure that more vehicles that need repairs are actually fixed. Vehicle owners and buyers often want to know how to check on recalls or how to report defects. NHTSA encourages car owners to report vehicle defects, as knowledge of what consumers are experiencing is one way a recall may be determined. Consumers can report defects by **telephone** toll-free (1-888-327-4236 or 1-800-424-9393; a Spanish-speaking line is available at 1-800-424-9153); on the website http://www.safercar.gov, using the "select a complaint" feature; or by **U.S. mail**:

U.S. Department of Transportation
NHTSA, Office of Defects Investigation (NVS-210)
1200 New jersey Avenue, SE
Washington, DC 20590

Consumers can also check on whether their vehicles have been subject to a recall by visiting http://www.nhtsa.gov/recalls and using the 17-character Vehicle Identification Number (VIN) that is unique to each car. A VIN can be found in the lower left of the car's windshield (on the driver's side), and on the driver's side door jamb near the seat; it is also located on a state vehicle registration card.

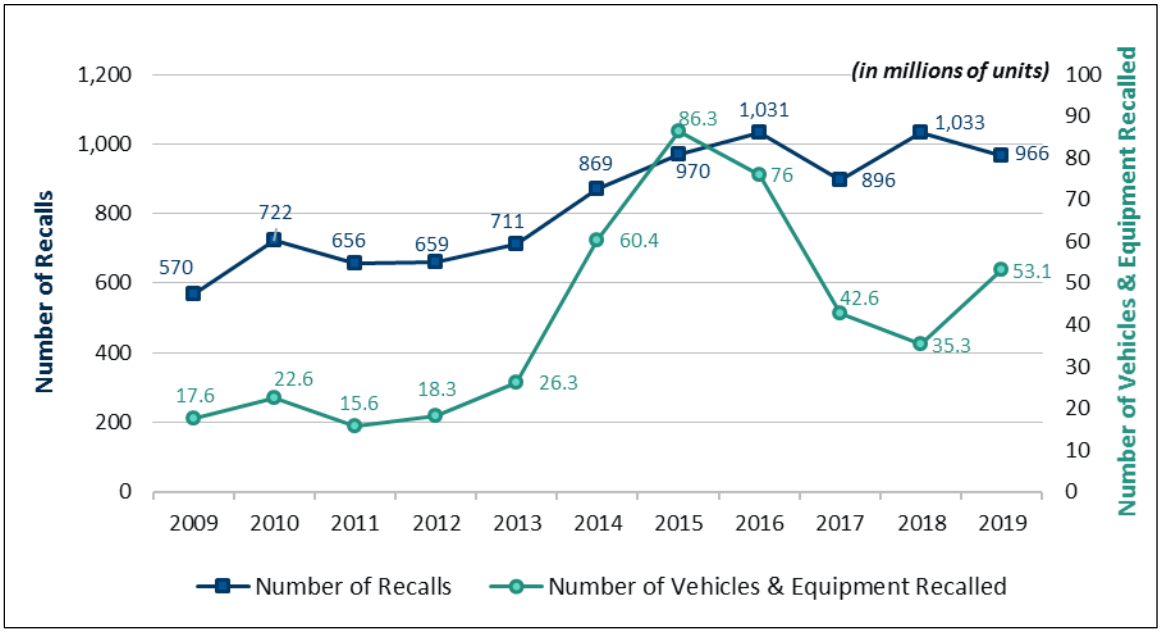
[49] "Automakers accelerate push to make vehicles safer," *Status Report*, December 16, 2019, pp. 4-5, at https://www.iihs.org/api/datastoredocument/status-report/pdf/54/7.

[50] NHTSA, *2016 Annual Recall Report*.

[51] Remedies for Defects and Compliance, 49 U.S.C. §30120.

The annual number of recall actions rose 81% between 2009 and 2016, but has fluctuated in a narrow range since 2016. The number of vehicles and items of equipment recalled rose steeply between 2013 and 2015, but then fell through 2018. (**Figure 4**). There are several reasons the number of recalls is higher than in earlier years, including stricter laws, larger fines, delayed detection by NHTSA of vehicle problems, and several recent high-visibility cases affecting millions of vehicles.

Figure 4. Motor Vehicle and Equipment Recalls



Source: NHTSA, 2019 Annual Recall Report, covering years 2000-2019.

Notes: Data include recalls of motor vehicles, motor vehicle parts, tires, and child safety seats. Nearly all of the recalls in 2019 were of vehicles—39 million—and parts—14 million.

Takata Airbag Recall

The spike in the number of vehicles and equipment recalled from 2013 to 2017 is due in large part to the recall of more than 63 million defective airbags manufactured by parts supplier Takata, making it the largest-ever automotive recall.[52] To date there have been 16 confirmed deaths and more than 220 injuries attributable to Takata airbag defects.[53] In 2014, NHTSA opened a formal investigation into defective airbags that, when deployed in a crash, could shower metal fragments into front-seat vehicle occupants, often with fatal consequences. In 2015, Takata and NHTSA entered into a consent order requiring Takata to submit a plan to maximize recall completion rates.[54] During its investigation, NHTSA found that Takata had not notified it of defects in a timely or accurate way. Takata agreed to retain, at its expense, an independent monitor to assess compliance with the consent order. In addition, the U.S. Department of Justice took legal action

[52] NHTSA, Takata Recall Spotlight, https://www.nhtsa.gov/equipment/takata-recall-spotlight, viewed on May 7, 2020.

[53] Independent Monitor of Takata and the Coordinated Remedy Program, *Update on the State of the Takata Airbag Recalls*, January 23, 2020, p. 31, at http://www.takatamonitor.org/.

[54] NHTSA Consent Order In re: EA 15-001 Air Bag Inflator Rupture, November 2, 2015, https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/nhtsa-consentorder-takata.pdf.

against Takata, leading to Takata pleading guilty in 2017 to criminal charges and agreeing to a $1 billion settlement.[55]

Although millions of airbags have been replaced since the defect was detected, an estimated 15.9 million vehicles with the recalled airbags remain on the road.[56] A separate group of 10 million Takata airbags was recalled in 2019,[57] of which NHTSA estimates about 1% may have a defect.[58] The airbags in this recall were used to replace those recalled earlier, NHTSA having deemed the replacements safer than the originals. Now, many motorists will have to return to their dealers for a second airbag replacement.[59] The independent monitor reported in January 2020 that

> the Takata recalls, now in their fourth year, continue to pose new and unprecedented challenges.... Many of the remaining vehicles in the field are older and inherently more difficult to reach. Affected vehicle manufacturers have learned that, at this stage in the Takata recalls when repairs have exceeded 60%, over half of remaining vehicle owner contact information based on registration data, can be incorrect.[60]

Other Major 2019 Recalls

Aside from the Takata recalls, the 10 largest in 2019, several of which involved defective software or electronic components, were[61]

- 3.5 million Cadillac, Chevrolet, and GMC SUVs and pickup trucks, model years 2014-2018, recalled for a faulty vacuum pump that required reprograming of the electronic brake control module;
- 1.3 million Subaru cars and SUVs, model years 2008-2017, requiring a new brake light switch to replace one prone to malfunction;
- 1.2 million Nissan and Infiniti cars and trucks, model years 2018-2019, requiring a software update to ensure that their backup cameras worked properly;
- 1.2 million Ford Explorers, model years 2011-2017, requiring replacement of part of the rear suspension so that the rear wheels remain pointed in the right direction;
- 928,000 Toyota, Scion, and Lexus vehicles, model years 2003-2017, requiring airbag assembly replacements;

[55] U.S. Department of Justice, "Takata Corporation Pleads Guilty, Sentenced to Pay $1 Billion in Criminal Penalties for Air Bag Scheme," press release, February 27, 2017, https://www.justice.gov/opa/pr/takata-corporation-pleads-guilty-sentenced-pay-1-billion-criminal-penalties-airbag-scheme.

[56] Independent Monitor of Takata and the Coordinated Remedy Program, *Update on the State of the Takata Airbag Recalls*, January 23, 2020, p. 1.

[57] NHTSA, "More Takata Air Bags Recalled," https://www.nhtsa.gov/recalls/takata-air-bags-nadi, viewed on June 5, 2020.

[58] NHTSA, *Defect Information Report for Driver and Passenger Side Airbag Inflators*, January 2, 2020, at https://static.nhtsa.gov/odi/rcl/2020/RMISC-20E001-4050.pdf.

[59] Colin Beresford, "10 Million More Takata Airbags Recalled from 14 Automakers," *Car And Driver*, January 8, 2020, https://www.caranddriver.com/news/a30446627/takata-airbags-recall-10-million/.

[60] The report of the Independent Monitor discusses novel ways in which manufacturers have attempted to increase the rate of compliance. Independent Monitor of Takata and the Coordinated Remedy Program, *Update on the State of the Takata Airbag Recalls*, January 23, 2020, p. 1.

[61] Patrick Masterson, "The 10 Biggest Recalls in 2019," cars.com, January 14, 2020, at https://www.cars.com/articles/the-10-biggest-recalls-in-2019-416480.

- 863,000 Chrysler, Dodge, and Jeep vehicles, model years 2011-2016, with faulty catalytic converters, affecting their emission controls;
- 693,100 Ram pickup trucks, model years 2013-2014, requiring new tailgate latches;
- 679,000 Volkswagen vehicles, model years 2011-2019, needing new ignition switches and circuit boards;
- 662,100 Volkswagen Passat and Atlas vehicles, model years 2012-2020, missing a headlight component; and
- 638,000 Chevrolet and GMC SUVs and pickup trucks, model years 2014-2018, recalled because of a faulty electronic brake control module that affected the driver's ability to steer.

A recent private study concluded that a significant trend has been the increase in software defects, noting that "with the emergence of advanced driver assistance systems, connected vehicles, vehicle-to-vehicle, and vehicle-to-infrastructure communication, this will be an important area for manufacturers and suppliers to focus on.... "[62]

Inspector General Report on Recall Process

The Department of Transportation Office of the Inspector General (OIG) was required by the FAST Act to audit NHTSA's recall process based on its handling of the Takata airbag recall. Its 2018 report, which included six recommendations,[63] found that NHTSA's recall process had a number of shortcomings. Specifically, the OIG found that NHTSA's monitoring process for light vehicle recalls did not ensure that remedies were fully reported and that it did not verify recall completion rates or notify manufacturers of missing information, making it difficult to assess the adequacy of a manufacturer's recall campaign. The OIG later said NHTSA had addressed its recommendations.[64]

In a separate report, issued in 2015, the OIG criticized NHTSA's methods of collecting vehicle safety data and reviewing complaints, recommending 17 improvements.[65] In the FAST Act, Congress conditioned the agency's funding authorization on the resolution of the 17 OIG recommendations.[66] The OIG notified Congress on September 30, 2016, that NHTSA had addressed the 17 issues raised in its report.

Recall Completion Rates

Vehicle owners do not always bring their vehicles to a dealer when a recall is announced, resulting in many unrepaired vehicles on the road with safety-related defects. Consumers may not

[62] Stout Risius Ross LLC, *2019 Automotive Defect & Recall Report*, October 14, 2019, pp. 18-19, at https://www.stout.com/en/insights/report/2019-automotive-defect-and-recall-report.

[63] DOT Office of Inspector General, *NHTSA's Management of Light Passenger Vehicle Recalls Lacks Adequate Processes and Oversight*, ST2018062, July 18, 2018, pp. 27-28, at https://www.oig.dot.gov/sites/default/files/NHTSA%20Auto%20Recalls%20Final%20Report%5E07-18-18.pdf.

[64] CRS conversation and email with Office of Inspector General at DOT.

[65] DOT Office of Inspector General, *Inadequate Data and Analysis Undermine NHTSA's Efforts to Identify and Investigate Vehicle Safety Concerns*, ST-2015-063, June 18, 2015, at https://www.oig.dot.gov/sites/default/files/NHTSA%20Safety-Related%20Vehicle%20Defects%20-%20Final%20Report%5E6-18-15.pdf.

[66] P.L. 114-94, §§24101 and 24102.

open a recall notice in the mail, find it difficult to schedule a free repair, think the recall is not important enough for a response, or may have sold the vehicle. Sometimes, as with the Takata airbag recall, the manufacturer does not have enough repair parts available at the time recall notices are sent out, and vehicle owners may lose interest during an extended delay. A goal of the FAST Act was to increase the number of vehicles repaired through the recall process.

The FAST Act required NHTSA to conduct an analysis of vehicle recall completion rates and submit a report to Congress. NHTSA completed that review, based on recalls issued between 2010 and 2014, and submitted its report in May 2017.[67] NHTSA evaluated *annual completion rates* rather than *average completion rates* because the former reflects the number of vehicles affected.[68] NHTSA researchers found that the combined annual completion rate for all automakers subject to a recall in those years was 67%, "meaning that 67% of all vehicles recalled were remedied."[69] Individual automakers' results varied, with Tesla having the highest annual completion rate, 100%, in 2010 and Mercedes-Benz having the lowest, 33%, in 2011. Results for major automakers are shown in **Table B-1**.

The NHTSA report's findings are relevant to congressional efforts to boost recall completion rates:

- *The older the vehicle on the date of a recall, the less likely the defect will be repaired.* Cars one to three years old at the time of recall had a repair average of 80%, while cars more than six years old had a 56% rate. NHTSA speculated that owners of newer cars still under warranty may be more inclined to return them to the dealer for a recall.[70] This observation appears in other recent recall studies.[71]
- *Vehicle parts recall completions differ by type of components.* It appears that vehicle owners are more likely to respond to recalls for certain types of parts, such as tires, powertrain, and seat belts (all above 70% completion) than to lighting and suspension recalls (under 60%).
- *Larger recalls underperform smaller recalls.* NHTSA compared the *average* completion rate—81% for the major automakers—with the *annual* completion rate for the same group, which was 67%. The researchers concluded that "recalls that cover more vehicles are underperforming compared to smaller recalls; otherwise the unweighted average would more closely resemble the percentage of vehicles actually remedied."[72]

To the extent that recalls deal with software issues in a vehicle, novel remedies available for that category may facilitate higher recall completion rates. Software remedies could include over-the-air solutions that are pushed out to all vehicle owners over wireless networks; alternatively,

[67] NHTSA, *Report to Congress: Vehicle Safety Recall Completion Rates Report*, May 2017, https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/13376-recall_completion_rates_rtc-tag_final.pdf.

[68] As an example, the report notes that BMW's 2014 *annual* completion rate was 42% because it fixed 42% of the vehicles it recalled that year. Its *average* completion rate was 87% because of several smaller recalls that year that had higher completion rates. One large BMW recall had a relatively low completion rate, bringing down the annual rate. Ibid., p. 6.

[69] Ibid., p. 11.

[70] Ibid., p. 13.

[71] Stout, Risius Ross LLC, *2019 Automotive Defect & Recall Report*, October 14, 2019, pp. 10-11.

[72] NHTSA, *Report to Congress: Vehicle Safety Recall Completion Rates Report*, May 2017, p. 12.

vehicle owners could download a software correction from a manufacturer's (or NHTSA's) website onto their vehicle's USB port.[73]

The 2015 FAST Act and Unresolved Issues

Major Safety Provisions

Congress last addressed vehicle safety as part of the most recent surface transportation reauthorization, the FAST Act of 2015. Among the safety provisions it included were the following:

- **Recall compliance for rental cars and new notice requirement for auto dealers.** The FAST Act required rental car companies for the first time to repair vehicles subject to recalls before renting, leasing, or selling them. Motor vehicle dealers were also required to notify vehicle owners when there is an open recall on a vehicle brought in for servicing.
- **Types of consumer communications.** The FAST Act requires NHTSA to issue a rule requiring manufacturers to use email, social media, and targeted online campaigns to notify vehicle owners of recalls, in addition to first-class mail.[74] The law required DOT to initiate a two-year pilot grant program with six states to evaluate the feasibility of using states' motor vehicle registration process to inform consumers of open recalls on their vehicles.
- **Recall compliance period.** Previous law required that a defect triggering a recall be repaired free of charge for up to 10 years after a recall; the FAST Act extended this protection to 15 years.
- **Driver privacy.** The Driver Privacy Act of 2015, included in the FAST Act, specifies that data retained by an event data recorder (EDR) is the property of the vehicle owner. EDRs capture data about the driver and the vehicle, such as seat belt use and speed, in the five seconds before a crash. The Driver Privacy Act does not address the ownership of data collected in a vehicle at other times.
- **Improved databases.** NHTSA was directed to revise its existing crash investigation database to include specific information about child restraint systems utilized at the time of vehicle crashes. In addition, it was required to establish a publicly searchable database of tire recalls.
- **Civil penalties.** With the goal of encouraging automakers to more readily disclose potential defects that could lead to a recall, the statutory civil penalty cap for each violation of the law was raised from a maximum of $35 million to $105 million.[75]
- **Whistleblower incentives.** The FAST Act included the Motor Vehicle Safety Whistleblower Act, which provides financial rewards to employees of motor

[73] Stout Risius Ross LLC, *2019 Automotive Defect & Recall Report*, October 14, 2019, p. 65.

[74] A Notice of Proposed Rulemaking was issued in 2016; a comment period ended in October 2016. No final rule has been issued. Department of Transportation, *Report on DOT Significant Rulemakings*, February 2020, p. 68, at https://www.transportation.gov/regulations/report-on-significant-rulemakings.

[75] NHTSA, "Notice of Increase in Civil Penalty for Violations of National Traffic and Motor Vehicle Safety Act," 81 *Federal Register* 15413, March 22, 2016.

vehicle and parts manufacturers, contractors, and automobile dealers who report vehicle defects to NHTSA. The law directed NHTSA to issue regulations implementing the whistleblower process by 2017, but no Notice of Proposed Rulemaking has been issued.[76]

Unresolved Safety Issues

Recent surface transportation laws—the Moving Ahead for Progress in the 21st Century Act of 2012 (MAP-21)[77] and the FAST Act—have directed NHTSA to study and report on safety-related issues, while requiring the agency to begin rulemakings on others. Many of these issues remain unresolved (unless otherwise noted).

- **Recalls.** DOT's inspector general was required to conduct an audit of vehicle recall management.[78] NHTSA was required to assess the effectiveness of the rental car recall process, report on the findings of the state motor vehicle pilot, and evaluate the feasibility of requiring installation of a technical system in new cars that would alert motorists to open recalls.
- **Crash data recordings.** A report was required assessing how long an event data recorder (EDR) should capture data preceding a crash, with an ensuing regulation to establish a revised data recording period.[79] NHTSA began a rulemaking in 2018 to update the current pre-crash recording duration.
- **Child occupant crash data.** A report analyzing these data was required.
- **NHTSA agenda.** NHTSA is required to submit annually a report that details its projected priorities and initiatives for the year ahead.[80]
- **Tire identification.** A feasibility study was required about providing electronic identification of vehicle tires.

Among the new rulemakings required in the FAST Act:

- **Motor vehicle tires.** NHTSA was required to update the existing standard for tire pressure monitoring; promulgate a new rule for tire fuel efficiency performance, and initiate a rulemaking to require independent tire sellers—not affiliated with a manufacturer—to maintain records of tire purchasers. Of these three required rulemakings, NHTSA has said only that it is considering issuing a rule for the fuel efficiency performance standard.
- **Manufacturers' safety records.** Automakers had been required to retain information on their vehicles' safety records for five years; the FAST Act doubled the holding period to 10 years to account for defects or safety issues that develop

[76] Office of Management and Budget, *Office of Information and Regulatory Affairs*, Agency Rule List, Department of Transportation, November 20, 2019, at https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201910&RIN=2127-AL85.

[77] P.L. 112-141.

[78] Completed in 2018.

[79] Secretary of Transportation Elaine Chao submitted a report to congressional committees on September 21, 2018, showing that the current five-second minimum recording requirement does not capture all steps that a driver takes to avoid a crash, and suggests that a 20-second recording prior to a crash would provide better data for analysis. This report is not available on the NHTSA website.

[80] The most recent report on NHTSA's planned activities, for 2020, was issued on March 4, 2020; at https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/nhtsa_agenda_report_to_congress_03042020.pdf.

as vehicles age. NHTSA published a Notice of Proposed Rulemaking in May 2019 and forecasts a final rule by July 2020.[81]

- **Special rules for low-volume manufacturers.** DOT and the Environmental Protection Agency were required to establish, within a year of the enactment of the FAST Act, a separate regulatory process for limited-production vehicles that may not meet some federal safety and emission standards, such as replicas of older-model vehicles.[82] NHTSA issued a Notice of Proposed Rulemaking on January 7, 2020. The comment period closed on February 6, 2020, and NHTSA is reviewing the comments.[83]
- **Submission of corporate vehicle safety reports.** NHTSA was required to issue a final rule governing how companies involved in safety defect or compliance investigations will certify their submissions; a final rule was due one year after enactment. No rule has been issued.

Several rules mandated in MAP-21 also remain to be finalized:

- **Side impact crash protection and anchorage standards for child restraint systems.** NHTSA was required to finalize rules that would improve the protection of children using child restraint systems governed by FMVSS 213 and 225; statutory deadlines were 2014 and 2015, respectively. If NHTSA determined that it would not issue a revised anchorage standard, MAP-21 required a report to be submitted to Congress. Notices of Proposed Rulemakings were issued in 2014 for amending both standards, but final rules have not been issued. NHTSA has not submitted the report to Congress.[84]
- **Frontal impact tests.** A final rule to amend FMVSS 213 to improve simulation of children's rear seats in frontal crashes was required by 2016. A Notice of Proposed Rulemaking was issued in February 2020; a final rule has not been issued.
- **Rear seat belt warnings.** NHTSA was required to initiate a rulemaking to amend FMVSS 208 to require installation of a seat belt warning system for rear passengers, similar to what is now required for passengers in front seats. A final rule (or report if NHTSA chose not to pursue a rule) was required by 2015. An Advance Notice of Proposed Rulemaking was issued in May 2019, with a comment period that ended in November 2019. No final rule has been issued.[85]
- **Warning about unattended passengers.** MAP-21 suggested—did not require—that NHTSA evaluate ways in which drivers could be alerted to children or other unattended passengers in the back seats. When such research was not completed,

[81] Office of Management and Budget, *Office of Information and Regulatory Affairs*, Agency Rule List, Department of Transportation, November 20, 2019, at https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201910&RIN=2127-AL81.

[82] In January 2020, NHTSA issued a notice of proposed rulemaking for low-volume vehicle manufacturers. See https://www.federalregister.gov/documents/2020/01/07/2019-27211/replica-motor-vehicles-vehicle-identification-number-vin-requirements-manufacturer-identification.

[83] NHTSA, "Replica Motor Vehicles," 85 *Federal Register* 792-823, January 7, 2020.

[84]. Department of Transportation, *Report on DOT Significant Rulemakings*, February 2020, pp. 58 and 62, at https://www.transportation.gov/regulations/report-on-significant-rulemakings.

[85] Ibid, p. 64.

the FAST Act mandated that such research be undertaken. No rule has been issued.

- **Vehicle defect reporting.** A final rule was mandated by 2013 that would require auto manufacturers to place a sticker in the glove compartment or in another part of the vehicle that would instruct a vehicle owner on how to file a vehicle defect complaint with NHTSA. A Notice of Proposed Rulemaking was issued in 2016, but further action has not been taken.

In addition, the Energy Independence and Security Act of 2007[86] required the establishment of a national tire fuel efficiency consumer information program for motor vehicle replacement tires. In 2010, NHTSA published a final rule specifying the test procedures that would be used to rate tire performance,[87] but the consumer information part of the statutory requirement has not been fulfilled.

Unaddressed NTSB Recommendations

The National Transportation Safety Board (NTSB) is an independent federal agency that investigates all major transportation crashes.[88] After each investigation, it releases a detailed report, including probable cause of a crash and recommendations for federal policy changes, if appropriate. The NTSB has no authority to implement its recommendations.

Following are recent vehicle safety recommendations that have not been acted on by NHTSA or Congress.

Stretch Limousines

Stretch limousines are conventional vehicles purchased from motor vehicle manufacturers, and lengthened and repurposed by independent car body shops. Several have been involved in fatal crashes; the most recent stretch limousine crash investigated by NTSB occurred near Albany, NY, in October 2018, killing 20 people, including the 17 passengers, the driver, and 2 pedestrians.

In 2019, the NTSB recommended that NHTSA establish standards for seat belt use in stretch limousines, with requirements that passengers in such vehicles use lap/shoulder belts and that seating systems installed in such modified vehicles meet minimum performance standards "to ensure their integrity during a crash."[89] In 2014, after investigating a fatal accident involving a limousine van, NTSB recommended that NHTSA require such vehicles to provide a full-sized exit on one side of the passenger compartment and another emergency exit elsewhere should the full-sized exit be blocked in a crash.[90]

[86] P.L. 110-140, §111.

[87] NHTSA, "Tire Fuel Efficiency Consumer Information Program," 75 *Federal Register* 15893-15947, March 30, 2010.

[88] National Transportation Safety Board home page, https://www.ntsb.gov.

[89] NTSB also recommended that the New York State Department of Transportation ensure that seat belts are functional and accessible during regular state inspections. National Transportation Safety Board, *Safety Recommendation Report*, October 2, 2019, at https://www.ntsb.gov/investigations/Pages/HWY19MH001.aspx.

[90] Letter from Christopher Hart, Chairman, National Transportation Safety Board, to Marc Rosekind, Administrator, NHTSA, September 8, 2015, at https://www.ntsb.gov/safety/safety-recs/RecLetters/H-15-017.pdf.

Motorcycles

Among all motor vehicle users, motorcyclists have the highest risk of fatal injuries, which occur per mile traveled nearly 28 times more frequently than other vehicle fatalities.[91] While NTSB reported in 2018 that more than 90% of crashes it analyzed were due primarily to human error,[92] it has urged NHTSA to address the design of motorcycles, including[93]

- requiring motorcycles to meet performance standards for passenger vehicle crash warning systems;
- mandating that new motorcycles manufactured for on-road use come equipped with antilock braking systems; and
- developing standards for stability control systems for on-road motorcycles.

Amphibious Passenger Vehicles

Amphibious passenger vehicles (APVs), more widely known as duck boats, were originally built during World War II to deliver cargo from ships at sea directly to the shore, and often to evacuate injured military personnel. Today, they serve as tourist vehicles designed both to drive on roads and operate as boats in the water. They have multiple regulators because they

- serve as on-road passenger vehicles that must comply with certain federal motor vehicle standards established by NHTSA;
- are considered small passenger vessels, so the U.S. Coast Guard inspects them for seaworthiness and certifies their drivers as vessel captains;
- are commercial vehicles, so are subject to federal commercial vehicle regulations enforced by the Federal Motor Carrier Safety Administration. In addition, duck boat safety inspections are typically conducted by state agencies, and drivers must be certified by state officials as commercial vehicle drivers.

APVs have been involved in a number of accidents in recent years. Seventeen of 31 passengers died on a duck boat that sank in a storm on a lake near Branson, MO, in July 2018. In September 2015, a duck boat was involved in a crash with a commercial bus on a bridge in Seattle, killing five passengers. APV accidents occurred in Boston in 2016 and Philadelphia in 2010, and earlier incidents include a sinking with 13 fatalities in Arkansas in 1999. Among NTSB's recommendations were the following:[94]

- NHTSA should classify all APVs as non-over-the-road buses and make newly manufactured APVs subject to applicable federal motor vehicle safety standards in effect at the time of manufacture;

[91] NTSB, *Select Risk Factors Associated with Causes of Motorcycle Crashes*, NTSB/SR-18/01, September 11, 2018, p. ix, https://www.ntsb.gov/safety/safety-studies/Documents/SR1801.pdf.

[92] Ibid., p. 16.

[93] Ibid., p. 39; for a summary of the recommendations, see https://www.ntsb.gov/safety/safety-recs/RecLetters/H-18-029-038.pdf.

[94] NTSB, *Safety Recommendation Report, Improving Vessel Survivability*, MSR1901, November 6, 2019, at https://www.ntsb.gov/investigations/AccidentReports/Pages/MSR1901.aspx and NTSB, *Amphibious Passenger Vehicle DUCK 6 Lane Crossover with Motorcoach*, HAR1602, November 15, 2016, at https://www.ntsb.gov/news/events/Documents/Seattle-WA-DUKW-Abstract.pdf.

- NHTSA should separately adopt Coast Guard rules about cargo loads and passenger seating limits; and
- the Coast Guard should revise buoyancy standards for APVs so they remain afloat in the event of damage; address the safety implications of boat canopies and supports; and ensure that APV operators instruct passengers not to wear seat belts when the vehicle is operated in the water.

Tires

According to NTSB research, tire-related vehicle crashes were responsible for more than 700 fatalities in 2017.[95] NTSB has recommended that NHTSA be given statutory authority to require tire dealers to register all tires with NHTSA when they are purchased so buyers can be contacted more readily in the event of recalls, and that it post recall information such as tire identification numbers, brand, and models on its website.[96]

Pedestrian and Bicycle Safety Systems

NTSB has examined 15 crashes involving motor vehicles and pedestrians and issued a special report on its findings in 2018, its first major pedestrian investigation since the 1970s.[97] It issued a report on bicycle crashes involving motor vehicles in 2019.[98] NTSB found that improvements in vehicle systems could mitigate future collisions and their consequences; it recommended

- that NHTSA revise federal motor vehicle safety standards to allow adaptive headlight systems,[99] along with performance standards to ensure that headlights are correctly aimed and tested;
- that NHTSA develop performance tests and criteria for vehicle designs that could reduce vehicle-pedestrian injuries;[100] and
- expanding NHTSA's New Car Assessment Program to incorporate tests to evaluate a vehicle's ability to avoid crashes and reduce injuries with pedestrians and bicyclists,[101] a step some other countries have already taken.

Autonomous and Connected Driving Systems

While advanced driver assistance systems (ADAS) are available on many vehicles today, the motor vehicle industry and technology companies have been seeking to develop vehicles that may

[95] Latest data, https://www.nhtsa.gov/equipment/tires.

[96] NTSB, *Safety Recommendation*, H-15-27 through -35, November 12, 2015, https://www.ntsb.gov/safety/safety-recs/RecLetters/H-15-027-035.pdf. Establishing a tire recall database was required by Section 24335 of the FAST Act, but has not been implemented.

[97] NTSB, *Pedestrian Safety*, SIR-18/03, September 25, 2018, https://www.ntsb.gov/safety/safety-studies/Documents/SIR1803.pdf.

[98] NTSB, *Bicyclist Safety on US Roadways: Crash Risks and Countermeasures*, SS-19/01, November 5, 2019, https://www.ntsb.gov/safety/safety-studies/Documents/SS1901.pdf.

[99] Adaptive lighting provides better illumination for drivers as they turn corners; the headlights may be self-leveling; and they may also automatically switch between high- and low-beam headlights based on the detection of other vehicles ahead. NTSB, *Pedestrian Safety*, SIR-18/03, September 25, 2018, p. 18.

[100] Ibid., p. 42.

[101] NTSB, *Bicyclist Safety on US Roadways: Crash Risks and Countermeasures*, SS-19/01, November 5, 2019, p. x.

someday be fully automated, requiring little or no driver involvement. Such vehicles do not exist commercially now, and NHTSA's acting administrator has cautioned that

> all vehicles sold to the public today require a driver to be fully attentive and cognitively engaged in the driving at all times. This is true even if the car is equipped with any of the ADAS technologies currently on the market. While ADAS technologies are improving and enhancing safety, they are not self-driving. Misusing driver assistance systems by failing to maintain control of the operation of the vehicle at all times can result in serious and even deadly crashes.[102]

Increasing the autonomy of cars and trucks is generally seen as an effective way to reduce vehicle-related accidents that are caused by human error. Autonomous vehicles may someday have most of the technologies on board to operate independently without human engagement. Connected vehicles, which are on some roads today, instead use technologies to communicate with other vehicles and infrastructure around them, and with cloud-based servers. The connected vehicle safety technologies under development would require cars and trucks to communicate with each other (vehicle-to-vehicle, or V2V) and with their surroundings (vehicle-to-infrastructure, or V2I). V2V communication is expected to reduce the number of accidents by improving detection of oncoming vehicles and providing driver warnings. V2I communication is expected to help highway operators monitor and manage traffic and provide drivers with information such as weather and traffic conditions. Autonomous and connected vehicle technologies may merge in the future.

In the 115th Congress, the House of Representatives passed legislation[103] that would have provided new regulatory tools to NHTSA for the regulation of automated vehicles. That legislation was not brought up for a vote in the Senate due to controversies over possible preemption of state and local safety laws and the types of federal standards for driverless vehicles that would be permitted by the legislation.[104]

Separately, the development of autonomous vehicles may be affected by a pending Federal Communications Commission (FCC) rulemaking concerning use of radio frequencies that have been allocated exclusively for vehicle communications since 1999.[105] In December 2019, the FCC proposed to open this band of spectrum to certain other uses; it has been allocated exclusively for development of vehicle communications in 1999 and is known as the "safety band." DOT[106] and the auto industry[107] have continued to raise concerns with the FCC proposal.

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[102] U.S. Congress, Senate Committee on Commerce, Science, and Transportation, *Testimony of James C, Owens, Acting Administrator, NHTSA*, Highly Automated Vehicles: Federal Perspectives on the Deployment of Safety Technology, 116th Cong., 1st sess., November 20, 2019, p. 5.

[103] H.R. 3388, the SELF DRIVE Act.

[104] For a discussion of the issues associated with highly automated vehicles, see CRS Report R45985, *Issues in Autonomous Vehicle Testing and Deployment*, by Bill Canis.

[105] For a discussion of spectrum issues related to vehicle safety, see CRS In Focus IF11260, *Smart Cars and Trucks: Spectrum Use for Vehicle Safety*, by Bill Canis and Jill C. Gallagher.

[106] The National Telecommunications and Information Administration outlined DOT's concerns with regard to changing the safety band in a letter to the FCC. Letter from Charles Cooper, Associate Administrator for Spectrum Management, NTIA, to Marlene Dortch, Secretary, Federal Communications Commission, March 13, 2020, https://www.transportation.gov/content/safety-band.

[107] Alliance for Automotive Innovation, "Auto Industry Forms Consensus to Move Forward on Safety Spectrum Band Plan that Advances Lifesaving Technologies," press release, April 28, 2020, at https://www.autosinnovate.org/press-release/auto-industry-forms-consensus-to-move-forward-on-safety-spectrum-band-plan-that-advances-lifesaving-technologies.

In addition, the NTSB has recommended that NHTSA develop standards that could ensure safer operation of autonomous and connected vehicles, including (1) performance standards for forward collision avoidance systems,[108] (2) a standard to limit the use of Level 2 automated vehicle control systems[109] to conditions for which they were designed, and (3) a requirement that manufacturers report crashes involving misuse of Level 2 control systems.[110] It has also called for NHTSA to expand research and data collection to ensure that experience with pedestrians and bicyclists is incorporated into the deployment of connected vehicles.

NHTSA Vehicle Safety Funding Options

NHTSA's budget in recent years has had modest growth, as Trump Administration proposals to reduce some levels of spending have not been accepted by Congress. The largest parts of NHTSA's budget fund highway traffic safety grants and highway safety research and development. Most of the reductions recommended in FY2018-FY2021 have been in the third and smallest part of the NHTSA budget, the vehicle safety area, affecting all three components of NHTSA's Vehicle Safety operations: rulemaking, enforcement, and research and analysis (**Table 1**).

- The Vehicle Safety & Research budget develops test procedures and assesses the safety impact and risks of new technologies (such as ADAS), investigates crash survivability, and operates NHTSA's Vehicle Research and Test Center in Ohio.
- The rulemaking functions include informing consumers about vehicle safety and crashworthiness, managing NCAP testing, overseeing fuel economy standards, and updating current vehicle standards.
- Enforcement officials investigate safety-related defects, ensure that manufacturers complete recalls, and seek to expand recall notifications via text messaging and other new outreach methods. The Office of Defects Investigations (ODI) falls within the enforcement budget; for FY2021, the Trump Administration has proposed a budget of $12 million for defects investigations, compared to a $28 million appropriation in FY2020.[111]

[108] NTSB, *Safety Recommendation*, H-15-004-007, June 8, 2015, https://ntsb.gov/pages/Results.aspx?k=H-15-004. NHTSA has not issued a rule.

[109] NHTSA categorizes automated vehicles as Levels 0-5, a scale that reflects increasing levels of autonomy; currently, most automated vehicles are Level 2 or 3. NHTSA has not issued a rule.

[110] NTSB, *New Safety Recommendation*, H-17-037-043, September 12, 2017, http://www.ntsb.gov/safety/safety-recs/RecLetters/H-17-037-043.pdf. NHTSA has not issued a rule.

[111] U.S. Department of Transportation, *Fiscal Year 2021: National Highway Traffic Safety Administration*, p. 62, at https://www.transportation.gov/mission/budget/nhtsa-cj-fy-2021-estimates.

Table 1. NHTSA Vehicle Safety Budget

(dollars in millions)

	FY2018 Request	FY2018 Actual	FY2019 Request	FY2019 Enacted	FY2020 Request	FY2020 Enacted	FY2021 Request
Vehicle Safety Total	**$153**	**$179**	**$152**	**$190**	**$151**	**$194**	**$156**
Vehicle Safety Research & Analysis	34	40	38	49	33	48	33
Rulemaking	23	23	22	25	23	28	23
Enforcement	18	37	17	33	20	37	20
Administrative expenses	79	79	76	83	76	81	81

Sources: CRS, based on DOT Budget Estimates for FY2018-FY2021: https://www.transportation.gov/budget.

Notes: Appropriations derived from the general fund. Totals may not add due to rounding. "Enacted" refers to the amount of spending authorized in an appropriations act; "actual" refers to the amount available after adjustments such as rescissions and reprogramming, and is reported a year or two after the enactment of the appropriations.

The Administration's budget recommendations were opposed by numerous vehicle safety organizations, such as Advocates for Highway & Auto Safety and the Center for Auto Safety. Congress has not accepted the recommended reductions. For example, the Trump Administration requested $151 million for NHTSA's vehicle safety programs; the House-passed FY2020 appropriation[112] for them was $214 million; the Senate-passed appropriation[113] was $194 million; and the final enacted appropriation was $194 million.[114] In their reports on NHTSA's FY2020 funding, the House and Senate Appropriations Committees noted several areas of disagreement with the Administration over NHTSA's program execution, including the following:

- **Office of Defects Investigation.** The House committee called on ODI to "strengthen its collection and analysis of early warning data and vehicle defects and enhance defects investigations,"[115] as recommended by the OIG, and report to Congress in six months on implementation. The Senate committee expressed similar concerns and also required NHTSA to report to Congress within a year about additional analytical and modeling tools that could boost recall compliance rates.

[112] U.S. Congress, House Committee on Appropriations, Departments of Transportation, and Housing and Urban Development, and Related Agencies Appropriations Bill, 2020, report to accompany H.R. 3163, 116th Cong., 1st sess., June 6, 2019, H.Rept. 116-106, pp. 40-44 at https://appropriations.house.gov/sites/democrats.appropriations.house.gov/files/FY2020%20THUD%20Filed%20Report%20116-106.pdf.

[113] U.S. Congress, Senate Committee on Appropriations, Transportation, and Housing and Urban Development, and Related Agencies Appropriations Bill, 2020, report to accompany S. 2520, 116th Cong., 1st sess., September 19, 2019, S.Rept. 116-109, pp. 62-69, at https://www.appropriations.senate.gov/imo/media/doc/FY2020%20THUD%20Appropriations%20Act,%20Report%20116-109.pdf.

[114] Transportation, Housing and Urban Development, and related Agencies (THUD) Appropriations, FY 2020, P.L. 116-94.

[115] Ibid., p. 40.

- **Autonomous vehicles (AV) research.** The House committee said it is "concerned that the development of AVs is not receiving sufficient oversight from NHTSA."[116] The Senate committee directed NHTSA to develop goals for future federal standards that would ensure access to autonomous vehicles for persons with disabilities and report to Congress on its efforts.
- **Overdue rulemaking.** The committee report stated that the "committee is extremely concerned by NHTSA's lack of progress on critical rulemakings that the agency has been directed to complete in both the FAST Act and MAP-21."[117] The committee required NHTSA to submit a report to within six months of enactment with a timeline for completion of rules required by the FAST Act and MAP-21.
- **New Car Assessment Program (NCAP).** The House committee stated that it is "concerned that crashworthiness standards have not kept pace with technological advances" and that NHTSA should report to Congress on plans for updated standards that would also include ratings on pedestrian and bicyclist safety and ADAS.[118] The Senate committee also expressed concern over the nearly four-year delay in adding crash avoidance technologies to the NCAP ratings and directed NHTSA to report on its timeline for completing the rulemaking; it also encouraged NHTSA to include pedestrian and bicyclist safety ratings.
- **Tire efficiency.** The Senate committee noted that the FAST Act called for three new tire efficiency regulations and directed NHTSA to report within four months on its schedule to issue them.

[116] Ibid., pp. 40-41.

[117] Ibid., pp. 41-42.

[118] Ibid., p. 42.

Appendix A. Road Traffic Fatalities Abroad

The World Health Organization (WHO) tracks road traffic accidents and progress among 175 countries in improving enactment and enforcement of vehicle and pedestrian safety laws. The WHO report does not measure the fatality rate per 100 million vehicle miles traveled (VMT), as does the United States. Instead, WHO developed data from a variety of sources and used a measurement based on fatalities per 100,000 population. The following data show 2016 road traffic fatalities in selected countries.

Table A-1. Global Comparison of Road Traffic Fatalities

Selected Countries, for 2016

Country	Road Traffic Fatalities per 100,000 Population
Argentina	14.0
Australia	5.6
Brazil	19.7
Canada	5.8
China	18.2
France	5.5
Germany	4.1
India	22.6
Japan	4.1
Mexico	13.1
Russian Federation	18.0
South Korea	9.8
Saudi Arabia	28.8
South Africa	25.9
United Kingdom	3.1
United States	**12.4**
Global Average	18

Source: World Health Organization, *Global Status Report on Road Safety*, 2018, pp. 94-266, at https://www.who.int/publications-detail/global-status-report-on-road-safety-2018.

Appendix B. Recall Completion Rates

Table B-1. Annual Recall Completion Rates by Major Vehicle Manufacturer

Company	2010	2011	2012	2013	2014
	In Percent of Vehicles Recalled				
BMW of North America	82	54	77	79	42
Chrysler (FCA US)	76	77	51	54	69
Ford Motor Company	45	45	56	73	70
General Motors	73	93	78	82	66
Honda (American Honda Motor Co.)	69	78	59	73	72
Hyundai Motor America	95	60	70	63	70
Kia Motors America	88	61	59	67	75
Mercedes-Benz USA	92	33	90	59	69
Nissan North America	53	55	84	85	84
Subaru of America	91	76	72	58	55
Tesla Motors	100	-	-	89	99
Toyota Motor Engineering & Manufacturing	78	74	68	56	67
Volkswagen Group of America	79	95	93	89	80

Source: NHTSA, *Report to Congress: Vehicle Safety Recall Completion Rates Report*, May 2017, pp. 32-34, at https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/13376-recall_completion_rates_rtc-tag_final.pdf.

Author Information

Bill Canis
Specialist in Industrial Organization and Business

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