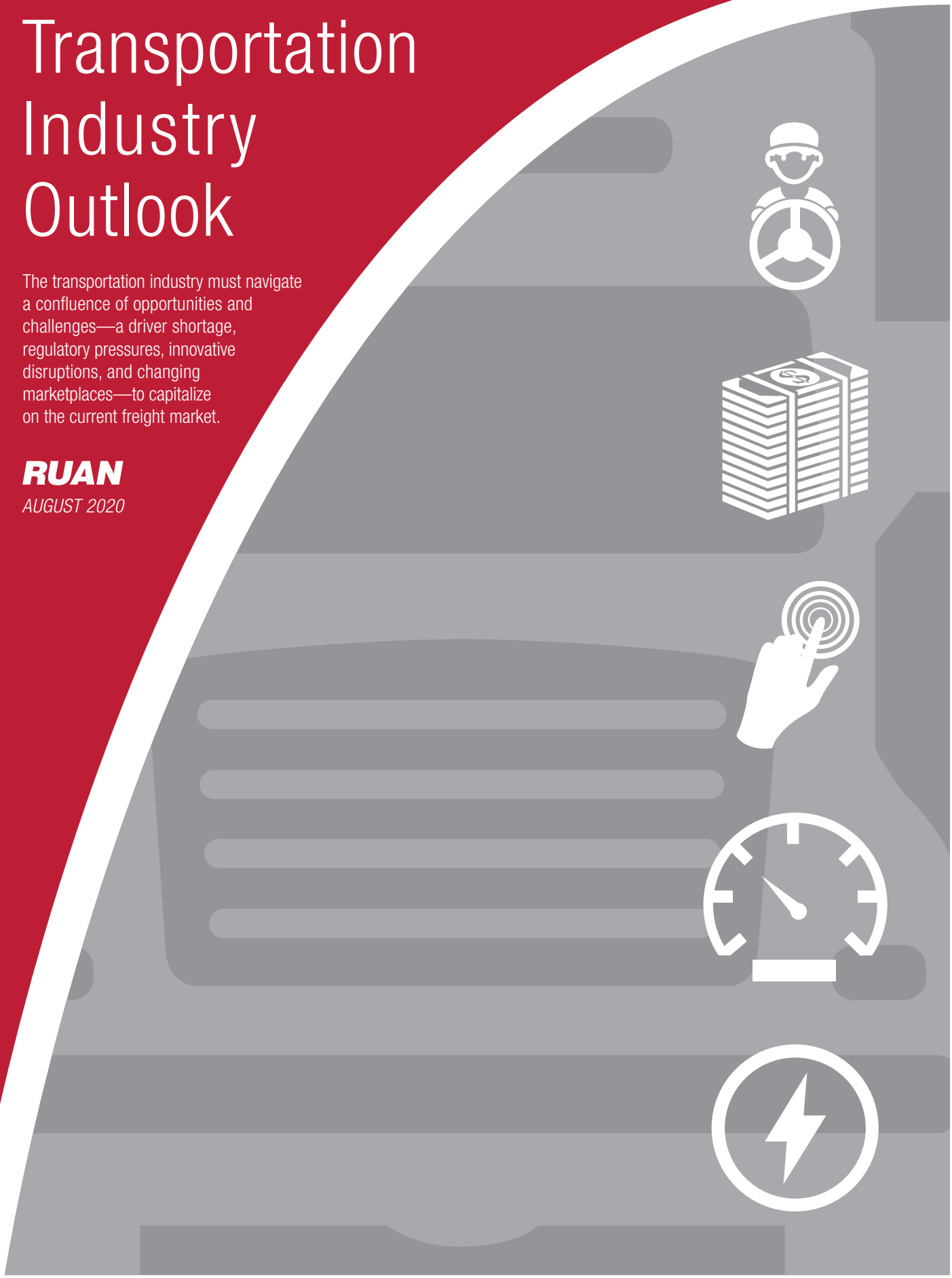
Transportation Industry Outlook

The transportation industry must navigate a confluence of opportunities and challenges—a driver shortage, regulatory pressures, innovative disruptions, and changing marketplaces—to capitalize on the current freight market.

RUAN

AUGUST 2020



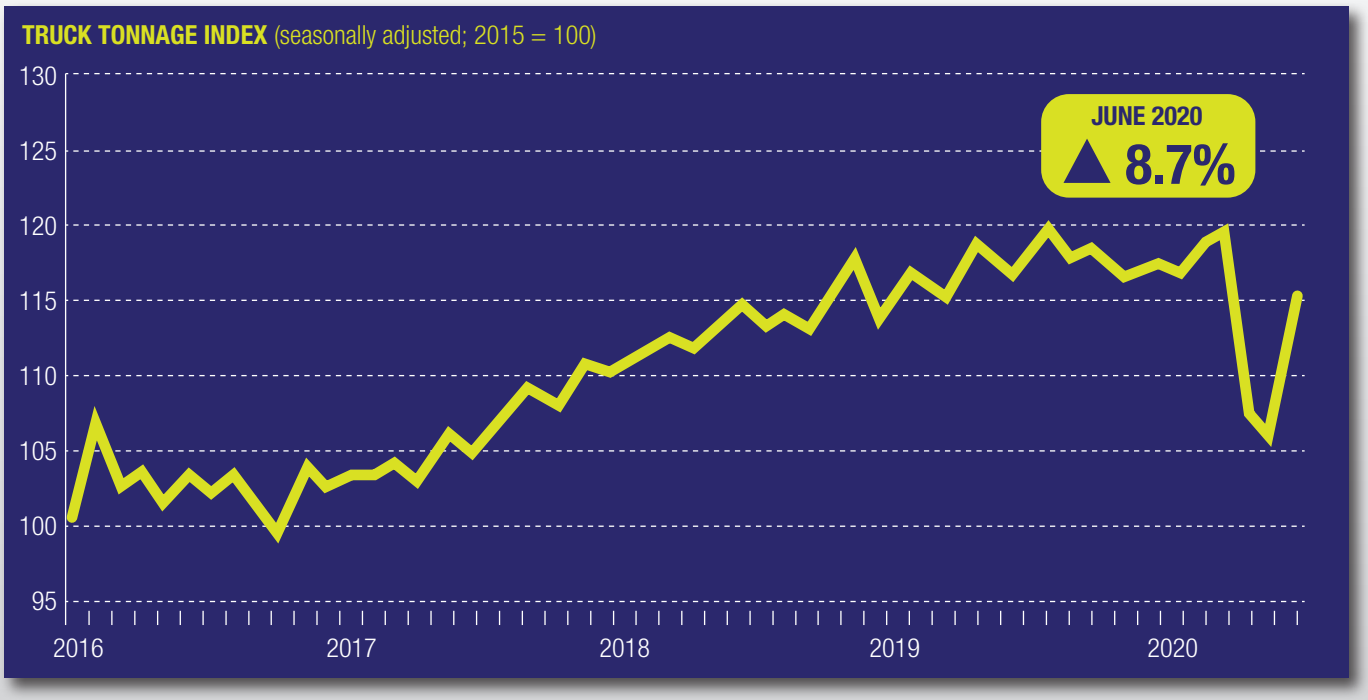
TRANSPORTATION INDUSTRY OUTLOOK

The transportation industry is vitally important to the global and American economy. According to the American Trucking Associations (ATA), overall freight tonnage will grow more than 25 percent by 2030 to 20.6 billion tons—with revenues increasing 53.8 percent to $1.6 trillion. Trucking will remain the dominant freight mode, hauling 68.8 percent of the total freight tonnage in 2030.

Despite its importance, trucking is not immune to ups and downs of the economy or, as we've seen in 2020, global pandemics. After 2018 saw record highs for freight demand and rates, demand softened in 2019 due in part to tariffs, manufacturing declines, trade wars, and recession fears. As we entered 2020, some economists agreed that the industry was stabilizing and nearing supply/demand equilibrium. Then came COVID-19, derailing any and all expectations and predictions economists had about the American economy and different sectors within it. Compounded by a presidential election and civil unrest, 2020 has been filled with uncertainty.

Demand for freight peaked in several verticals in mid-March as Americans prepared for stay-at-home orders due to COVID-19, including food, beverage, medical suppliers, and retail. Others like metals, food service, manufacturing, and automotive saw stark declines as the economy and production essentially shut down. Without demand for freight, carriers parked trucks and some were forced to reduce their workforces—just like businesses in almost every industry. In early May, the Morgan Stanley Truckload Freight Index, which broadly measures incremental truckload demand versus incremental truckload supply, experienced the lowest levels since 2016, with the flatbed segment seeing an all-time low on the index. Since states began to lift restrictions and the economy reopened, demand has slowly increased and is approaching 2019 levels. The rest of 2020 will likely see a slow economic recovery, rebounding from an estimated 33 percent reduction in gross domestic product (GDP) growth in the second quarter, as well as a peak unemployment rate of 14.7 percent in April 2020.

While the transportation industry will feel the impact of early 2020 for months to come, overall freight tonnage in the long-term should continue to increase with the U.S. population and slowly growing economy. As a result, more drivers and trucks could be necessary to move all the goods required by the American public. In addition to economic factors and spiking COVID-19 cases, transportation companies will contend with a driver shortage, regulatory pressures, and disruptors upending the industry, all of which demand decisive action for carriers to remain successful.



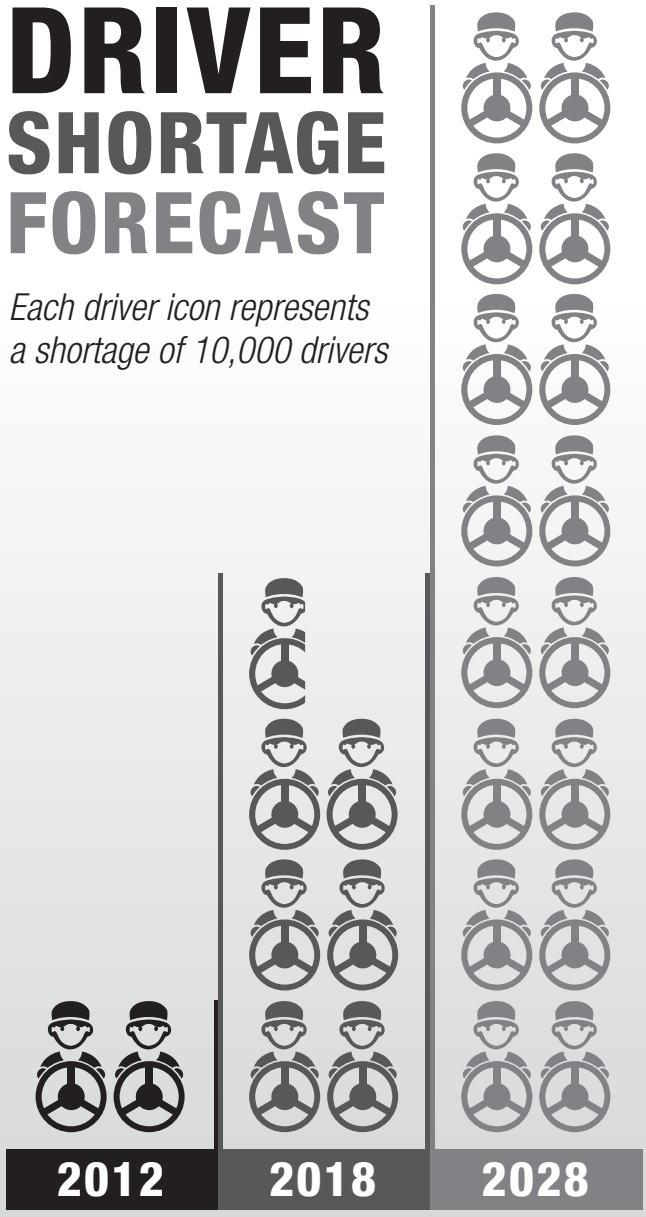
TRANSPORTATION INDUSTRY OUTLOOK

DRIVER SHORTAGE

The U.S. professional truck driver shortage hit a high of 60,800 drivers at the end of 2018, up from 50,700 in 2017, according to the ATA. The shortage improved slightly throughout 2019 due to lower demand for freight and in 2020 due to the economic shutdown associated with COVID-19. Unless there is a significant downturn in the economy in the long run, the American Trucking Associations suggests that the industry could be short just over 100,000 drivers in five years and 160,000 drivers in 2028. To keep pace with retiring drivers and economic growth, the industry will need to hire 1.1 million new truck drivers over the next decade—an average of 110,000 per year. To fill these seats with qualified, safe drivers, the industry must make some changes.

Several underlying factors are contributing to the truck driver shortage, including competition within the industry and from other industries; driver qualifications and requirements; a low national unemployment rate (pre-COVID-19) meant not many people were searching for jobs; trucking regulations that tighten capacity; costly time delays at shipper locations and along America's deteriorating infrastructure; and difficulty attracting young people to the industry since one cannot acquire a commercial driver's license (CDL) until age 21. Alarmingly, an American Transportation Research Institute (ATRI) study found that 55.5 percent of truck drivers are age 45 and older, and less than 5 percent are in the 20- to 24-year-old age bracket. For younger generations, trucking is perceived to be labor intensive with low pay and poor hours that do not allow for work-life balance.

An ATA workforce development committee was formed to work with federal and state officials to find solutions to these issues. The committee is encouraging the development of robust apprenticeship programs to engage workers before they can officially qualify for an interstate CDL at 21. Outreach to veterans and historically underrepresented communities like women—who currently make up only 7 percent of the commercial driving workforce—will be critical as well. Congress has been presented bills that would reduce the minimum age for an interstate CDL to 18 years, and the Federal Motor Carrier Safety Administration (FMCSA) has accepted comments on whether it should propose a pilot program allowing under-21 drivers to operate heavy-duty trucks interstate. The ATA and other state trucking associations are also actively engaged in a public relations campaign to position truck drivers as safe, family-oriented professionals who play a critical role in our nation's economy and the lives of every consumer.



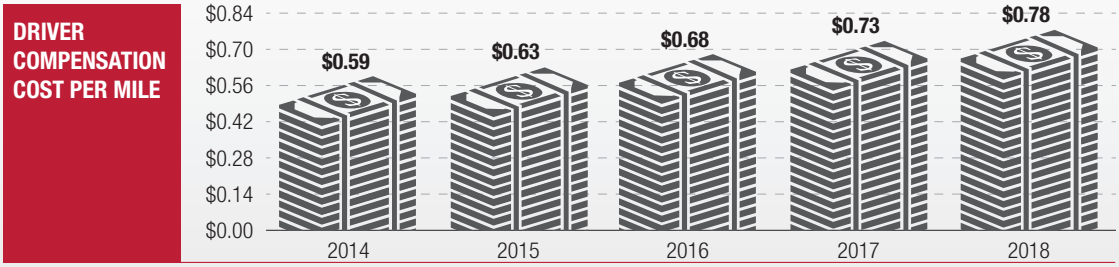
TRANSPORTATION INDUSTRY OUTLOOK

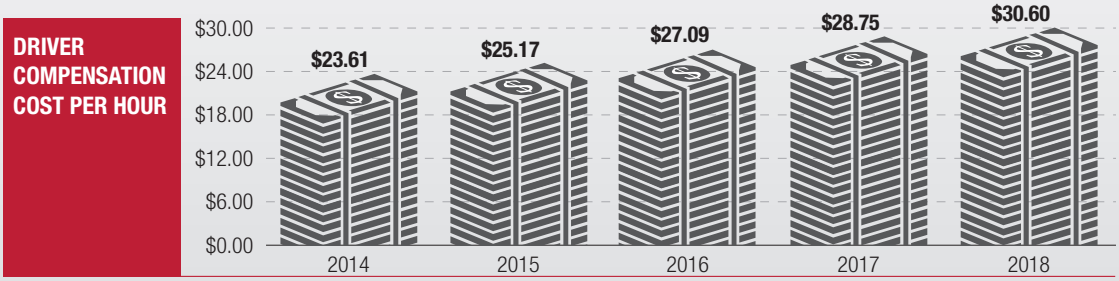
DRIVER PAY AND RATES

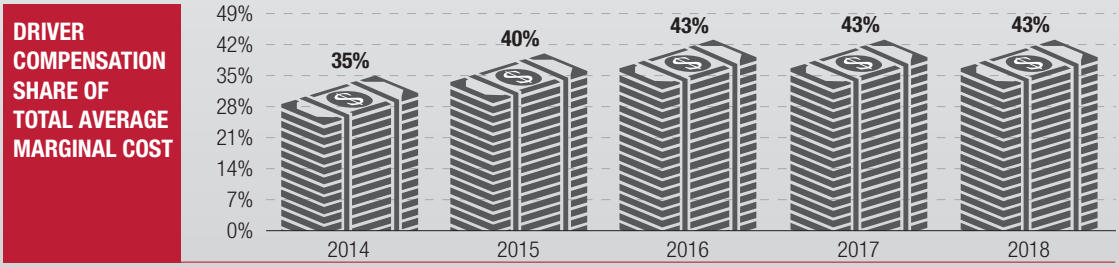
To combat the driver shortage, carriers have increased pay and provided sign-on or transition bonuses to attract new drivers, as well as offered performance-based bonuses to retain existing drivers. In 2018, driver wages and benefits topped carriers' cost-per-mile spending for the fourth consecutive year, according to data released in November 2019 by ATRI. Carrier costs on the whole climbed to $1.82 a mile, a 7.7 percent increase from 2017, with spending on driver wages and benefits accounting for 43 percent of carriers' average marginal cost. The National Transportation Institute expected driver wages to increase just over 7 percent in 2019 following a 10 percent increase in 2018. It remains to be seen how COVID-19 has impacted driver wages in 2020. Overall, driver wage hikes are behind the pace of the growth in the minimum wage and do not make up for the shortfall when adjusted for inflation.

Generally, before carriers can offer their drivers higher pay and bonuses, they must secure rate increases from customers, both in contractual relationships and in the spot market. Rates increased to all-time highs in 2018; according to Commercial Carrier Journal's Top 250 rankings report, year-over-year revenue growth of the carriers that disclosed revenue for the last two years was 9.9 percent. However, rates stabilized in 2019 amid a slower growing economy and excess capacity. Rates in 2020 were not immune to the impact of COVID-19. The Cass truckload index, which tracks contract rates minus fuel surcharges, saw rates fall in each of the first four months of 2020 at the fastest pace in a decade. In April 2020, spot market rates sunk to their lowest level in three years before recovering in May. Experts predict trucking rates and volumes may not reach 2019 levels until the fourth quarter of 2020 or 2021 as the economy recovers and capacity exits the market due to regulatory pressures, higher fuel prices, and increasing insurance rates in light of nuclear verdicts. Already in 2018, truck insurance premiums increased 12 percent as part of the industry's average marginal costs, and fuel costs went up 17.7 percent, according to ATRI.

The tables below show the results of ATRI's 2019 "Analysis of the Operational Costs of Trucking" report.







TRANSPORTATION INDUSTRY OUTLOOK

REGULATIONS

President Trump's administration has been marked by a reduction in the number of proposed regulations actively being pursued by the Department of Transportation, and a split Congress has contributed to regulatory stagnation. However, trucking is highly regulated, and several regulations—or changes to existing regulations—will come into play over the next few years.

Hours-of-Service Flexibility

Nearly nine months after proposing five changes to the hours-of-service (HOS) rules that govern when and for how long professional truck drivers may work, the Federal Motor Carrier Safety Administration issued on May 14, 2020, a final rulemaking that was met largely with praise by the transportation industry. The federal HOS rules were last updated in 2013, and the industry has sought flexibility that would allow truck drivers to make driving decisions based on fatigue, weather, congestion, etc. The final rule adopts four of the five proposed changes made in 2019. The new rule does not increase a driver's daily driving time or working limit, but rather allows the driver flexibility to determine how those hours are spent. The rule goes into effect September 29, 2020.

First, the 30-minute break rule, which requires a break after no more than eight hours of consecutive driving, can now be satisfied by the on-duty/not driving status, rather than off-duty status. Therefore, drivers could use fueling time or waiting to load/unload as the 30-minute break.

Second, drivers will now be allowed to split their required 10 hours off duty into two periods: an 8/2 split, or a 7/3 split, with neither period counting against the driver's 14-hour driving window. Under the current rules, drivers must be off-duty or in a sleeper berth for 10 consecutive hours before driving again after completing a 14-hour workday.

These two changes largely satisfy the industry's call for flexibility. Currently, many drivers feel that the 30-minute break rule is unnecessary or forces them to break at inconvenient or unnecessary times, especially when several drivers spend on-duty time not driving. Adjusting the sleeper berth, proponents argue, will allow drivers the flexibility to decide when to get the rest they need. Many drivers argue they do not need 10 consecutive hours of rest to drive safely—now they will be allowed to split the break into two rest periods.

Third, FMCSA will modify the adverse driving conditions exception by extending the maximum window during which driving is permitted by two hours. The current rule already permits two hours of additional driving time on the 11-hour clock, so this expands the 14-hour on-duty clock by two hours as well. The new rule allows the workday to be extended to as much as 16 hours in the case of adverse conditions such as extreme weather or congestion.

Fourth, the agency will change the short-haul exemption that is available to certain commercial drivers by lengthening the driver's maximum on-duty period from 12 to 14 hours and extending the distance limit within which the driver may operate from 100 air miles to 150 air miles.

FMCSA evaluated more than 8,000 comments from industry stakeholders regarding the proposed changes and sought to balance roadway safety with much-needed driver flexibility in the final rule. "This new final rule will improve safety for all motorists and increase flexibility for America's truckers," U.S. Transportation Secretary Elaine L. Chao said in a press conference. "This has been a deliberate and a careful process provided by the direct feedback we've had from truckers, carriers, safety advocates, law enforcement, and concerned residents and citizens. Each of these areas of reform are designed to add flexibility and regulatory savings for the motor carrier industry, which is critical for our nation's economic recovery."

National Drug and Alcohol Clearinghouse

Carriers are now required to report drivers' positive test results and refusals to test into a central Drug and Alcohol Clearinghouse. Employers must also access this database when looking to hire potential drivers—and to query the database annually for current drivers. The clearinghouse became operational on January 6, 2020. Mandatory use went into effect at that time, though FMCSA recently extented by three years the date for state driver's licensing agencies to comply fully with certain clearinghouse requirements. The extension allows FMCSA time to complete its work on a forthcoming rulemaking to address the states' use of driver-specific information from the clearinghouse, as well as develop the technology

platform through which states will electronically request and receive clearinghouse information.

The clearinghouse will likely cause capacity to tighten and worsen the driver shortage because truck drivers will no longer be able to hide positive drug and alcohol tests from potential employers. To accompany the initiation of the clearinghouse in 2020, the FMCSA is doubling the minimum annual percentage rate for random controlled substance testing for CMV drivers, from 25 percent to 50 percent, in response to rising positive drug-testing rates. As more and more states legalize recreational marijuana use—which federal rules strictly prohibit for CDL holders—a standardized clearinghouse will ensure visibility across the industry and remove impaired and unsafe drivers from their seats.

Electronic Logging Device Mandate

A mandate requiring electronic logging devices (ELD) for heavy-duty trucks went into effect December 18, 2017, with of goal of ensuring regulatory hours-of-service compliance and promoting safety. Since the initiation of the ELD mandate, the number of hours-of-service violations in the industry has dropped quite significantly. For instance, over the first two years of the mandate, the number of violations for driving beyond the 11-hour daily limit was down 54.6 percent. Still, some truck drivers remain resistant to complying with the mandate—more than 27,000 truck drivers received a violation for not having an ELD in fiscal year 2019, and 92 percent of those drivers were placed out of service.

As for improving safety, critics of the mandate claim that being "on the clock" has forced drivers to drive beyond speed limits; according to FMCSA data, speeding violations rose 7.8 percent in 2018. And overall, the number of truck-related fatalities on U.S. highways has been rising for several years, but miles traveled are climbing as well. At this point, the ELD mandate has not necessarily reduced highway deaths, but the increase in vehicles and miles traveled makes it difficult to correlate the mandate with the increase or to claim that the mandate has failed to achieve its goal of making highways safer.

For fleets using older electronic log systems that pre-dated the ELD rule, December 16, 2019, brought a key ELD mandate deadline. The initial rule allowed early adopters of electronic logs to continue using their existing systems, classified as automatic onboard recording devices (AOBRD), for two additional years. By December 16, 2019, those carriers running AOBRDs were required to update their systems to an ELD platform. Many large carriers were required to make this switch, which required additional training for office staff and professional drivers alike.

Entry-Level Driver Training Rule

The entry-level driver training (ELDT) final rule mandates certain minimum training requirements for those seeking to obtain a Class A or Class B commercial driver's license, or a hazardous materials, passenger, or school bus endorsement. The rule was set to go into effect in February 2020, but FMCSA delayed implementation by two years in December 2019. The final rule requires driver's license schools, as well as carriers with in-house CDL training programs, to self-certify in a Training Provider Registry and overhaul entry-level driver training courses to provide a curriculum that will be consistent across the country. Training providers wishing to provide ELDT will need to be listed on the Training Provider Registry, and drivers seeking a CDL or endorsement on or after that implementation date must complete the required training as set forth in the ELDT final rule.

According to *Commercial Carrier Journal*, the DOT currently only mandates four topics for CDL training providers: hours-of-service rules, driver qualification and disqualification, health and wellness, and whistleblower protection. The new rule will require schools and trainers to provide 31 specific theory courses as well as 19 behind-the-wheel (BTW) skills courses. Driver candidates will be required to have an 80 percent pass rate in theory courses and the ability to demonstrate proficiency in all 19 BTW skills required in order to pass. The stricter training requirements should have a positive impact on highway safety, but there's also potential to slow down the labor pipeline in an industry desperate for drivers.

Meal and Rest Break Provisions

Even though the trucking industry is regulated by federal HOS rules, some states have issued their own regulations that are often in conflict with the federal rules. In these states, plaintiffs' attorneys have used state regulation of trucking companies as the basis of expensive lawsuits related to meal and rest breaks and pay types. And many courts have sided with the states, especially in California.

In a major industry triumph, the FMCSA granted a petition by the American Trucking Associations to block California's rules in December 2018 in an effort to ensure consistent rules and promote safety. The ATA turned to the FMCSA after Congress failed for four years to restore the strength of the Federal Aviation Administration Authorization Act of 1994 (F4A)—the regulation that broadly preempted states from regulating interstate motor carriers. In May 2019, another industry victory came when a California court dismissed a driver's claims regarding the state's meal and rest break provisions, saying it does not have the authority to review the merits of the case. However, there will be many more challenges to the FMCSA's ruling as this continues to be a hot button issue.

Compliance Safety Accountability Overhaul

Compliance Safety Accountability (CSA) is the FMCSA's carrier scoring program designed to improve safety by identifying at-risk drivers. FMCSA conducts inspections and reviews crash reports and then measures the results using the Safety Measurement System (SMS). Each month, SMS measures a carrier's previous two years of violations and crash data to calculate a score in seven safety behavior areas called BASICs: unsafe driving, hours-of-service compliance, driver fitness, controlled substances and alcohol, vehicle maintenance, hazardous materials compliance, and crash indicator.

But the regulation has been under fire for a number of reasons since its inception in 2011—namely data quality, use of relative rankings between carriers, and enforcement and reporting inconsistencies between states. Congress ordered CSA scores to be removed from public view until a study could be conducted to identify issues, followed by the implementation of needed changes that better assess a carrier's safety performance. The National Academies of Science (NAS) completed the Congressionally mandated study on CSA in 2018 and recommended that the FMCSA rework CSA's Safety Measurement System and its underlying statistical model—so essentially rework the regulation from the ground up, according to *Commercial Carrier Journal*.

Following the NAS's recommendations, the FMCSA submitted in August 2018 a corrective action plan detailing CSA reforms to the DOT. FMCSA will replace the existing CSA SMS with a new scoring system; work to improve the quality of data used to score carriers; make it easier for carriers to understand and calculate their safety scores; and evaluate adding an absolute scoring system instead of relying only on relative scores that hinge on a comparison to a carrier's peers, according to *Commercial Carrier Journal*. In addition, FMCSA is working to correct one of the chief criticisms of the program—the lack of accounting for crash responsibility in scores.

Combating Nuclear Verdicts

The past decade has seen a significant uptick in the number of nuclear verdicts, where victims of incidents with large trucks receive a jury award above $10 million. In 2012 alone, five cases averaged a $22.5 million payout. Large jury awards of $1 million and above are also on the rise. An American Transportation Research Institute study found a 335 percent rise in the number of cases with a jury award over $1 million from 2012 to 2019.

Regardless of fault or the facts of the case, plaintiffs' attorneys often use emotional appeal to enrage jurors and force them to act with a sense of moral obligation. According to the American Trucking Associations, this tactic "compels the jury on a base level to render an outsized verdict in order to send a broader message that speaks to issues beyond the proximate cause of the particular accident under examination." These verdicts are generally awarded when incidents result in paralysis, brain damage, or death. In trial, plaintiffs' attorneys aim to prove that the carrier was negligent in some way, therefore resulting in the truck driver being involved in such an accident. While nuclear verdicts are rare, they garner much national media attention, tarnishing public perception of even the safest carriers.

The large payouts also pose a risk to the industry in the form of excess insurance rates—so far by as much as 10

percent as insurers try to cover and protect against such large losses. One reason plaintiffs' attorneys cite when requesting large payouts is to reflect real-world cost increases, according to FreightWaves. But ATRI's research found that from 2010 to 2018, the size of verdict awards grew 51.7 percent annually, while standard inflation only grew 1.7 percent and health care costs grew 2.9 percent.

To combat nuclear verdicts, the industry, led by the American Trucking Associations, is calling for tort reform. The ATA is focusing its efforts on those reforms most important to the trucking industry, like elimination of joint and several liability, caps on punitive damages, the recognition of collateral sources, and the admissibility of non-use of seat belts—where defense lawyers are unable to present evidence that a victim was not wearing a seat belt, contributing to his or her injuries. The ATA also works closely with state trucking associations to ensure that trucking industry interests are included in state tort reform efforts.

DISRUPTORS

In addition to the driver shortage and regulations contributing to a capacity crunch, carriers are contending with a changing marketplace. The rapid growth of e-commerce has completely changed how and when and for what price consumers want to receive their goods. Transportation companies must ensure that they help their customers meet the expectations of the final consumer of the products. That includes providing transparency and visibility to where a product is and when. COVID-19 precautions have shifted consumers to shopping online even more. In addition, carriers must attract new drivers to haul the freight in the first place—and younger generations have high technology expectations.

Many start-ups and tenured companies alike are creating everything from self-driving trucks to mobile technology systems that can wholly transform—or disrupt—the way business has been done in the past. They're revolutionizing ways that trucks operate and interact with the central office, as well as how shipments are booked, paid for, and tracked.

Mobile Technology

Workers and customers now expect their business interactions to function like their personal interactions. Like all workers in other industries, truck drivers—particularly young drivers the industry is desperately trying to attract—are fluent in mobile tech use and expect high-functioning technology in the workplace. And shipper customers demand it. To remain competitive, trucking companies must adopt the latest mobile technologies, which can describe a system with mobile capabilities or that can push information to and from a mobile device.

While many trucking companies were early adopters of mobile technology, these legacy systems have become almost archaic after the rapid advancements in recent years. Unfortunately, many are strapped with "technical debt" from adopting early systems and have limited financial ability to move to the more advanced systems available. But to remain competitive, they must.

The ELD mandate helped carriers to adopt new technology. Many platforms that met the ELD mandate requirements are available on smart phones or tablets instead of the dash-mounted computers that some carriers adopted for logging and compliance prior to the mandate. For a population that's accustomed to the ease of use offered by mobile technology for personal needs, dash-mounted computers with chunky keyboards or touch screens that require large buttons or styluses are a hassle.

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What's more, drivers and office workers are often tasked with completing jobs or entering data in multiple and separate apps and programs. This context shifting is time consuming, inefficient, and frustrating. Modern mobile technology allows work to be completed within one unified, workflow-centric app that runs on common tablets and smart phones. The dynamic workflow

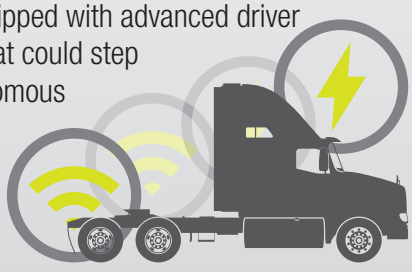
capabilities within mobile technologies ensure that data is captured in a uniform way, enforcing consistent and common practices across the company. Plus, workflow and accurate data can eliminate major driver headaches—like delays from handling paperwork, inefficient scheduling, confusing procedures, and recording detention time, to name a few.

Autonomous Trucks

Innovations to trucks themselves have major potential to disrupt the trucking industry as we know it. Start-ups and the largest truck builders alike are investing billions of dollars to develop trucks capable of driving themselves down America's freeways. A number of companies are already testing self-driving trucks with a safety driver in the cab.

Self-driving trucks could help companies reduce labor costs by extending the number of hours trucks are in operation and potentially cutting the number of drivers needed for interstate driving. Plus, some believe autonomous trucks have the potential to be safer—and could therefore reduce insurance premiums—because accidents are largely caused by human error. The industry agrees, however, that drivers will always be critical to navigate city streets for the first and last miles of trips. In fact, self-driving tech developers are positioning the technology as a partner to drivers rather than a job killer—productivity increases, but the job becomes more attractive to drivers. From exit to exit, drivers can perform other tasks, like ensuring data is captured accurately, while the truck runs on autopilot.

While the technology could soon be in place, the challenge is to get autonomous trucks on the road and making money. Several technical and regulatory hurdles to that future currently exist, but a growing number of trucks are already equipped with advanced driver assistance systems that could step in with alerts or autonomous braking and other controls when drivers are slow to react.



Electric Trucks

One of a trucking company's largest—and often most volatile—operating expenses is fuel, so Tesla's 2017 announcement about the launch of its electrically powered tractor-trailer could be a game changer. Many other truck manufacturers have entered the electric truck arena as well. A number of major carriers have already reserved Tesla semis, which cost $150,000 for a model with a 300-mile range per charge and $180,000 with a 500-mile range. Most diesel-powered tractors cost around $125,000, but Tesla predicts that the electric vehicle will pay for itself within two years thanks to savings in aerodynamics, reliability, and fuel. The vehicle boasts additional safety features, including wrap around windshields, cameras instead of rearview mirrors, and autonomous systems like automatic emergency braking, automatic lane keeping, and forward collision warning, according to Tesla. The widespread adoption of electric trucks will depend on how they perform in real-world situations, the availability of battery recharging facilities, and the training of workers to service electric vehicles.

Driver Monitoring

One way the industry is moving to combat accidents is through the use of driver monitoring tools. Electronic logging devices are a type of monitoring system, as they track and report speed, location, and driving status, not to mention where drivers stand within federal hours-of-service requirements. Trucks now widely come equipped with advanced driver assistance systems that use a combination of radar- and camera-based components, like following distance alerts and active braking, that could intercede on the driver's behalf to eliminate or greatly decrease a collision's severity. Any event triggered by the technology is reported to employers.

But more intrusive technologies are also being developed. Ball caps are being developed to measure brainwaves and give a fatigue rating, a critical factor for drivers as many accidents are caused in one way or another by the effects of fatigue. One company is developing a vest that could detect a driver's heart attack and stop the truck as a result. More common, road- and driver-facing dashboard cameras are used to record actions that can negatively affect safety—but also monitor slacking behavior or unauthorized stops. Some driver-facing cameras even monitor drivers' eyelids for signs of fatigue. Onboard video event recorder systems link into a truck's engine to record video clips before and after exception-based events such as speeding, forward collision warnings, harsh braking, lane departure alerts,

and collisions. Those videos may then be accessed for driver coaching or for litigation in the case of an accident. As nuclear verdicts become more prevalent, cameras can provide proof of what happened in an incident rather than depending on witness testimony.

Drivers, who already feel closely monitored by regulators, employers, and their customers (who are demanding real-time data on loads to appease their own customers) are often bothered by the use of these additional monitoring technologies because their trucks serve as their offices—and homes for over-the-road drivers. Others like the idea of working for companies that value providing drivers the resources to stay safe and improve their skills. If the technology can help prevent accidents, provide coaching opportunities after near-misses, and save carriers money, more carriers will likely conclude that the intrusion is warranted.

Robotic Process Automation and Artificial Intelligence

Several technologies are currently helping to drive efficiencies and reduce human error in back offices. With the major influx of data sent and received on a daily and even hourly basis, it is difficult for employees to process, especially if they suffered a night of poor sleep, deal with frequent work interruptions, or are simply having a bad day. These real-life inconsistencies could have an impact on the consistency of work decisions that people make for their for customers—which could cause increased costs or delivery delays. But artificial intelligence (AI) enabled software doesn't have inconsistencies—it works as it was programmed to work, reducing errors while handling thousands of business situations. As a result, transportation companies are relying more and more on AI solutions for repetitive administrative tasks, which allows employees to focus on value-added tasks, like analysis, coaching, and customer service.

One key automation technology is natural image processing. The technology recognizes and pulls relevant information from documents like invoices or rate requests, alleviating the time-consuming and error-prone task of manual data entry. Natural image processing reduces paperwork and allows back office staff to focus more on analysis and optimization.

Another significant AI capability is predictive analysis, where computers can find patterns and reach decisions that are outside of a human's capacity to process. Computers can take data from one source and analyze it in context with data from several other sources—which is something the human brain doesn't have power to process, nor do most employees have the time available to try. Predictive analysis is especially compelling from a safety standpoint. Carriers could harness data from in-cab technology—like collision mitigation systems, dash cameras, and ELDs—to create algorithms related to safety, allowing them to determine which drivers are most likely to have a preventable accident or violation. The technology could also help support drivers currently on the road. For instance, if a driver has X number of lane departures in X minutes, an alert could be sent the driver's mobile application to see if he or she is okay. Data, in this case, would provide an extra layer of support to professional drivers.

Predictive analysis also has applicability in fleet maintenance. As computers on wheels, trucks produce a multitude of data. That data, if analyzed correctly, can be used to predict and then prevent breakdowns by notifying maintenance teams of necessary preventive maintenance before an issue arises. This technology could reduce downtime and potentially maintenance spend.

Augmented Reality

While augmented reality (AR) technology is still in the development phase, it holds significant opportunity for the transportation industry. AR, coupled with visual learning models, allows workers to perform simple tasks outside of their immediate areas of responsibility, reducing dependency. Consider a driver who breaks down on a highway. Using AR-enabled smart glasses and repair apps, the driver could assess and fix minor problems without a technician. Essentially, a less experienced person could complete a more sophisticated process by leveraging a wearable computer or mobile device.

In another application, heads-up displays can project relevant information on windshields, like driving speed, weather updates, and approaching road delays. The virtual instructions are superimposed on real objects as a driver travels down the road. AR could also help transform warehouse processes; some software is able

to recognize serial and barcode numbers, identify objects, and also help employees navigate the warehousing floor to expedite the picking process. This technology could reduce training time and costs, and it's virtually error free.

Internet of Things and Sensors

The Internet of Things (IoT) refers to a connected network of physical devices and vehicles, among other things, that are equipped with software, sensors, and wireless connectivity—meaning they can be monitored and controlled via the internet. IHS Markit predicts that the IoT will consist of 30.7 billion objects by 2020. In the world of trucking, these things include navigation systems, electronic logging devices, advanced driver assistance systems, and networks of Internet-enabled sensors that monitor everything from tire pressure and trailer temperature to fuel usage and maintenance needs. Sensors can be applied to trailers, pallets, and even trays, allowing for package-level visibility for operations managers and customers. And all of these things produce a vast amount of data that, if used properly, can help create fleet efficiencies and improve safety.

THE YEAR AHEAD

Trucking companies face a host of challenges in the marketplace: the COVID-19 pandemic, workforce concerns, major regulatory pressures, and economic uncertainty fueled by business shutdowns related to COVID-19, tariffs, trade wars, and a presidential election. But 2020 and beyond will see success for those able to navigate the driver shortage, industry regulations, innovative disruptions, and changing expectations of consumers.

RUAN RESPONSE TO COVID-19

Consistent with our Safety Focus and People First Guiding Principles, Ruan's business continuity team has been actively monitoring the Coronavirus disease situation. This team is meeting weekly to respond to and proactively plan for the effects of the virus. Our primary focus is to provide teams with the tools needed to help protect our most valuable resource—our people.

At this time, Ruan is following recommendations from the Center for Disease Control and Prevention (CDC). We have implemented a tiered, comprehensive Coronavirus Prevention and Preparedness communications plan, including written and verbal communications to team members regarding prevention and operational preparedness across the country.

Each operation has contingency plans developed in case they need to work through a capacity issue or team member absences, including allowing our team members to work remotely. Increased communications, frequent data sharing, and constant monitoring are important elements of each plan if so needed.

As always, Ruan is focused on the safe execution of our customers' business.