Autonomous trucking could usher in a new age of fast, inexpensive and convenient transportation, with impacts reverberating far beyond the confines of the trucking industry. As members of the workforce, public policy proponents, technology strategists and business leaders grapple with the technological, economic and cultural fall-out of self-driving trucks, what happens next could serve as a template for other fields influenced by AI.

By Desmond Dickerson
Robots promise immense power to improve long-haul trucking and the associated business supply chains, by increasing the speed, safety, efficiency and cost of how goods are currently shipped, hauled and delivered. But at what cost?
Executive Summary

Efficiency. Technological prowess. Safety concerns. Public policy catch-up efforts. New jobs created; old jobs destroyed. In many respects, the future of autonomous trucking in the U.S. is the future of work, posing some of the biggest and most important business, technological, societal and ethical questions surrounding the world of automation, algorithms and artificial intelligence (AI).

Robots promise immense power to improve long-haul trucking and the associated business supply chains, by increasing the speed, safety, efficiency and cost of how goods are currently shipped, hauled and delivered in our increasingly algorithm-assisted world. That fun lamp you ordered on eBay? Busted. The blouse you rush-shipped for grandma’s birthday? Late. And for heaven’s sake, why is the one-day shipping option so expensive? Won’t clockwork, autonomous modes of delivery make all three of these issues better?

From the standpoint of the 1.9 million truck drivers in the U.S. today, a new scenario also seems to be emerging that - in the face of unceasing boredom on rote, repetitive, open-road routes - “removes the robot from the human,” freeing the next generation of drivers from the constraints and drudgery of point-A-to-point-B driving. This scenario is particularly positive given the driver shortage, currently estimated at 50,000.

But at what cost? What about the tragic death earlier this year of a pedestrian run over by an autonomous vehicle? And the potential for robo-trucks to be hacked? Massive job losses are another critical issue, as long-haul truck driving is the number-one job in many states, and most drivers have just a high school diploma and are the primary wage earners for their households. There’s also the fate of the wider halo of supporting workers at truck stops, diners and hotels. What would happen to them - and society - if they go unemployed?

Meanwhile, the burned-out, behind-schedule long-haul truck drivers plying the roadways of America settle in for yet another run across 2,000 miles of open road, wondering: Are we there yet?
Even as progress on developing autonomous vehicle technologies continues apace at breakneck speed, the answers to these very pressing questions – for the most part – have yet to be determined. But if AI is the great story of our time,⁵ addressing or harmonizing these issues is the prologue we desperately need to make the future of work, fundamentally, work.

As in most things related to technology, the unfolding scenario comes with positives and negatives. The year 2018 sees us on the cusp of an AI-based world in which no parent will ever again lose a beloved child due to a drunk driver. It also sees us on the brink of an era in which millions of middle-aged people will lose their job driving a truck and face grim prospects of ever making the same level of income again.⁶ For better or worse, the very definition of a “driver” is set to be upended, along with all associated professions.

In many respects, autonomous trucking represents a canary-in-the-coal-mine for jobs in other industries, posing a good opportunity for business leaders, technology strategists and public policy proponents to assess how to successfully manage the transition. To help leaders navigate the road ahead, Cognizant’s Center for the Future of Work set out to study the factors enabling autonomous vehicle technology in the long-haul trucking sector and the impact its deployment will have. We’ve identified the following key insights for organizations in the path of trucking automation to consider:

- **Full implementation of automation technology in trucking could reduce operating costs and double productivity.** Total compensation for drivers accounts for three-quarters of the costs associated with ground shipping.⁷ If that cost factor were removed, the barrier to entry for nascent retailers would be lowered, and opportunities would expand for supply chain and business model innovations for industry leaders. Without the restrictions of human drivers for sleep and rest, AI-powered trucks could travel twice as far per day, adding much more value to the supply chain of perishable and high-turnover goods.

- **The future has already arrived for autonomous driving.** Think this is tomorrow’s issue, or “maybe someday”? Think again. Alphabet subsidiary Waymo, General Motors and several other competitors have successfully tested prototypes in the race to fully self-driving vehicles. First movers have leapt into the mainstream, with pilot programs in cities across the globe.

- **The jury is out on how many will be sent to the unemployment line.** Removing drivers from long-haul truck cabs may eliminate those jobs altogether or lead to more convenient local jobs through short-haul driving or remotely operating autonomous vehicles.

---

Autonomous trucking represents a canary-in-the-coal-mine for jobs in other industries, posing a good opportunity for business leaders, technology strategists and public policy proponents to assess how to successfully manage the transition.
• **Three-part harmony is urgently needed for state, local and federal policies, standards and regulations.** So far, cohesive public policy frameworks are trailing behind. Regulations focused on self-driving vehicles vary widely by jurisdiction, especially for freight hauling. We expect to see federal legislators partner with interdisciplinary teams to harmonize the concerns of the voting public and the business community to establish nationwide rules of the road.

• **Autonomous truck hacking is a matter of national security.** While this threat already exists for any vehicle that’s digitally enabled, connected trucks introduce even more vulnerabilities for widespread cyber-attacks, ranging from weaponizing the vehicles to disabling them to stifle economies. As a good highway warning sign might say: “Hacking on road ahead – proceed with caution.”

At the apex of The New Deal in 1936, F. Scott Fitzgerald wrote: “The test of a first-rate intelligence is the ability to hold two opposed ideas in the mind at the same time.” Similarly, it’s possible to be simultaneously impressed by the increasingly sophisticated technologies of autonomous trucking, and also deeply concerned about the ethics, risk and unintended societal repercussions involved. Amid this cognitive dissonance, one thing is for sure: Autonomous trucking will bring about the greatest change in American transportation since the advent of the Interstate Highway System under President Eisenhower. The fate of the industry is also likely to serve as a template for other fields as AI continues its inevitable progress.

Our report takes a clear-eyed view, weighing the gains in efficiency and anticipating the hazards ahead related to employment and safety. Consider it a primer for policy makers looking to make sense of it all while illuminating a strategic set of ethical guardrails for innovators racing to commercialize the technology.
THE FUTURE IS NOW (BUT ONLY WHEN THE WEATHER COOPERATES ...)
We’ve imagined cars that drive us around ever since Francis Houdina’s “phantom autos” of the 1920s. The radio-operated vehicles sparked wonderment, but it was the Grand Challenge of 2004, hosted by the Defense Advanced Research Projects Agency (DARPA), that truly launched the race to autonomous vehicles now shaping the future of transportation. Since the competition, automakers and tech innovators have combined radar, Lidar (a detection system that works on the principle of radar but uses light from a laser), cameras and advanced driver-assistance systems (ADAS) with onboard computers in pursuit of the lucrative first-mover advantage in the self-driving vehicle market.

Nearly 100 years since our first peek at autonomous autos, we’ve finally arrived at the precipice of fully self-driving vehicles. Much of this autonomous technology is currently available and undergoing tests for commercial use.

Business leaders examining the possible uses of the technology have quickly realized the many benefits of its application to the trucking industry. After all, much of the driving done by truckers takes place on straightforward highways, the easiest driving tasks for artificial intelligence to execute. Autonomous vehicle technology also joins 3-D printing and IoT as the forces most directly advancing supply chain management optimization. 3-D printing loosens geographic constraints by producing goods right where they are needed, and autonomous trucks reduce the time needed to deliver the raw materials needed for printing.

In addition to significant cost savings from eliminating driver pay, autonomous long-haul pay-loads can reach their destinations in approximately half the time of their human-driven counterparts (see Figure 1, next page). That means leafy greens from the West Coast could arrive in the southern U.S. twice as fast, adding to their shelf life and flavor while driving down costs. Even with government leaders prioritizing less rush-hour congestion over faster deliveries by sideling trucks for certain time frames, freight companies could still exceed the most efficient human drivers of today.
There’s debate on when self-driving technology will be ready for deployment to the masses, and what, exactly, “ready” looks like.

Getting It There, Twice as Fast

While human drivers are limited to 11 hours of drive time per day due to safety regulations, automated vehicles have no such restrictions. At a pace of 50mph, autonomous trucks could cover 1,200 miles daily compared with 550 miles for a human-driven truck.

Massive bets placed by technology visionaries have accelerated the momentum. Just since 2017, investors have poured over $1 billion into self-driving and other trucking technologies,11 spurring companies to aggressively scale their autonomous operations following any major breakthroughs. Before Uber elected to focus exclusively on self-driving cars,12 its Otto acquisition made an unmanned beer run with Budweiser across Colorado.13 Embark upped the ante with an autonomous trip from Los Angeles, to Jacksonville, Fla.14

There’s debate, however, on when self-driving technology will be ready for deployment to the masses, and what, exactly, “ready” looks like. Google, Uber, Tesla and a myriad of car companies are all dash-
Ford plans to introduce a self-driving car by 2021. Audi expects to do the same a year earlier. They are flanked by TuSimple, Embark, Starsky and others striving for the same in the commercial truck driving market. Introduction of these vehicles hinges on government approval of their use beyond controlled testing applications.

The Society of Automotive Engineers (SAE) has established benchmarks for measuring vehicle autonomy levels, which range from 0 to 5 (see Figure 2). While the dynamic driving environment of busy city streets calls for SAE Level 5 autonomy for passenger vehicles, the mostly highway-based journeys of semi-trucks can benefit from less comprehensive levels of autonomy that are easier to program and deploy. With Level 3 autonomy, drivers can operate in platoons, and at Level 4, they can cede control to their truck as long as road conditions are dry with moderate weather. During this time, they could rest, eat or complete administrative tasks related to their work. Autonomous driving features also present a fail-safe for fatigued drivers, preventing them from harming themselves or others with lane and braking assistance.

The productivity boon for drivers would be immense. Autonomous vehicle technology would provide drivers with supplemental income opportunities (through teleworking from the truck cab) and would add labor hours to the job market of a magnitude never before experienced in such a short window. Those who opt not to take on additional work roles could reclaim some level of their personal life, whether by talking with friends on the phone or video-chatting with family during important events. Such advancements would go a long way toward increasing the desirability of a job category currently beset by massive worker shortfalls.

With Level 3 autonomy, drivers can operate in platoons, and at Level 4, they can cede control to their truck as long as road conditions are dry with moderate weather.
QUICK TAKE

Three Models of Autonomy

The race to autonomy consists of various approaches to implementing self-driving vehicle technology, all of which incorporate the need for human workers. The models that will likely become prevalent include:

- **The platoon leader:** Currently in use by driver-operated trucks, platoons consist of one lead driver with two or more trucks trailing behind. ADAS allow these trucks to travel closely together, increasing fuel economy through reduced drag. Peloton Technology and other companies currently using this method plan to eventually remove drivers from the trailing trucks, which would double or triple the long-haul capability of a single driver.17

- **The “bar pilot”:** This approach would remove drivers from the cab altogether for long-haul journeys. Using autonomous vehicle technology, Waymo and Embark plan to turn over the long-haul portion of trucking to their unmanned vehicles. The vehicles would meet traditional drivers at transfer hubs, who would handle more complex city driving (similar to today’s local bar pilots for ocean-going container ships).

- **The drone jockey:** Starsky and Sweden-based Einride aim to remove drivers from the cabs for even local routes through remote operation. Such an arrangement would allow drivers to control up to 10 trucks daily from a remote operation center (like remote drone pilots do today) without waiting for transfers of freight.
The impact of autonomous trucking will not solely be felt in the trucking industry; particularly in combination with advancements in intelligent transportation systems and smart cities, it will reverberate through all facets of commerce and extend to surrounding industries, urban planning and the social fabric of communities across the country. Consumers could reap massive benefits in convenience and savings, while cities could rethink their future design as traffic patterns shift and vehicle congestion abates. Such changes present both opportunities and obstacles for leaders to navigate in the future of freight.

At the same time, the advent of autonomous trucking forces us to reckon with the end of the truck-driving career as we know it. To say it’s a cause for concern is an understatement. If preventative measures are not taken, more than half of the states in the country stand to face a job market collapse equivalent to the implosion of mining communities across coal country. It’s incumbent on workers, employers and government leaders to collaborate now on re-skilling programs and displacement plans before the situation becomes dire. Currently, that’s not happening to any meaningful extent.

Not that the loss of long-haul will spell the end of the trucker altogether. With proper planning and workforce education, opportunities exist for more jobs, with improved conditions, in the industry. Trucking jobs will remain, but they’ll look very different from the “Convoy across the U.S.A.” archetype of yesteryear. Even as long-haul trucking diminishes, for example, local driving jobs will be more plentiful than ever, as self-driving technologies reduce the overall cost of transporting goods, which in turn could spur consumer demand and thus trucking volume. Short-haul routes often take place in busy city corridors, which requires complex navigation of bustling surface streets. Even moderately experienced drivers struggle within those parameters, so the threat of automation for such work remains a country mile away in terms of concern.

The transition of long-haul drivers to short-haul assignments serves as a remedy to the growing worker shortage within the trucking industry. Displaced long-haul drivers could maintain some of their wages (likely reduced due to shorter hours), and freight companies would retain the institutional job knowledge of a seasoned workforce. Additionally, the shorter hours, local assignments and less sedentary workday make these roles much more attractive for new entrants to the truck driver labor market. Other job opportunities could emerge from the need to execute all the tasks that drivers now do but that self-driving trucks could not (see Figure 3, next page).

Shippers must find new ways to protect unmanned cargo from theft, for example, and trucks will still need to refuel on trips across the country. Without drivers present, support workers in the field become paramount to ensure the vehicle remains in working order with maintenance checkups. Changing tires on the road is another routine task that drivers do but is impossible for autonomous trucks. All of these job tasks present opportunities for innovation within the industry and job roles to help maintain the truck fleet of the future.
New Supporting Roles

The increasingly complex supply chain will require skilled workers to manage the dynamic and agile network. While these roles may not function as replacements for displaced truck drivers, they do offer a glimpse at some of the jobs of the future in support of the trucking industry:

- **Ethical sourcing manager:** The nature of freight transfer hubs will result in stakeholders with sometimes competing expectations. They’ll need to turn a profit for the businesses using them while reducing traffic for citizens funding them via the government, all with minimal impact to surrounding communities and ecosystems. Factoring in waste and energy management further complicates the picture. Ethical sourcing managers will be needed to balance all of the competing factors while advocating for the most equitable and inclusive solutions.

- **Cyber city analyst:** With growing data demands from autonomous vehicles, intelligent transport systems and the city infrastructure that supports them, there will be an increased need for data analysis to optimize activity and protect against system failures. Cyber city analysts will ensure that unmanned autonomous trucks remain outside of congested city corridors and coordinate their drop-offs with human drivers for efficient freight delivery throughout metropolitan regions.

- **Man-machine teaming manager:** The future of work will be based on how well companies blend and extend the abilities of humans and machines by making them collaborative. The collaboration of automated vehicles and humans in trucking exemplifies this new paradigm. Whereas dispatchers of the past successfully managed the personalities and temperaments of their drivers, the work ahead calls for the ability to identify when those same workers are better served handing off duties to machine collaborators.
Interconnected Impacts

Taking drivers off the road also has immediate consequences for the communities they support in their journeys across America. The gas stations, truck stops, hotels and diners that have come to rely on economic influx from truckers must alter their business models as they brace for less foot traffic. Similar disruptions occurred when the highway system bypassed towns and completely upended their economic models. The cities along Route 66 are prime examples. Some remain windswept ghost towns to this day. Without the influx of cash brought by truckers looking to rest and refuel, small town workers at diners and rest stops will be faced with the prospect of long-term unemployment or relocation for new work. Massive movements of these populations alter political structures and allocations of resources as districts shrink or grow in accordance.

A likely landing point for these populations are the areas surrounding the transport hubs where freight will be handed off between humans and their autonomous counterparts, as well as the remote operation facilities where automated trucks will be commandeered. These sites on the outskirts of cities will be the result of collaboration between local governments, logistics operations and the companies reliant on them to move their goods across the country.
GETTING READY
TO GET READY:
NATIONAL
REGULATION IS
URGENTLY NEEDED
Successful tests in real traffic situations illustrate that the technology is progressing toward readiness. What remains to be seen is how government and policy will shape the conversation - and most importantly, "when."

A recent policy report released by the Department of Transportation outlines rules for autonomous vehicles, covering how data should be shared with federal regulators, guidelines for manufacturing and sales of vehicles, and privacy protections for passengers. The guidelines serve less as law and more as a framework for local legislators to follow - a canvas and palette for lawmakers to paint a picture of safety and opportunity based on their own geography's particular needs, landforms, weather patterns and other factors (who knew you couldn’t drive on a playground in Dublin, Georgia?).

This approach of using enforceable "standards" can actually work better than statutory laws, which can struggle to keep up with the pace of innovation in technology. Consider the U.S. Federal Trade Commission, which is empowered with the very wide mandate to pursue instances of unfair or deceptive trade practices. Rather than out-and-out laws, which may become obsolete quickly due to fast technology changes, the commission uses standards, as these have a longer shelf life.

At the same time, the patchwork of local regulations can complicate the picture for the interstate operations of the trucking industry. This is due to the fact that regulations that change from state to state or by region are problematic for truckers traveling across the country. While 21 states plus Washington, D.C., have passed legislation for autonomous vehicles, the remaining states have yet to take any action. Such interstate inconsistencies could endanger public safety as drivers adjust to autonomous vehicle behaviors that change across state lines.

Conspicuously absent from SELF DRIVE are provisions for commercial vehicles, despite the fact that trucking accounts for 10% of highway miles driven and 60% of tonnage shipped across the country.

Further, while some large cities have the resources and human capital to advise on self-driving vehicle laws, many smaller communities simply are not equipped to do the same. Unified federal legislative action is needed to bridge the bricolage of autonomous vehicle laws across the nation.

Lawmakers in the House of Representatives have attempted to build upon the DoT policy by approving the SELF DRIVE Act in September 2017. The bill provides guidance for automakers on how many vehicles they can test, affirms the safety assessments of the National Highway Traffic Safety Administration to determine vehicles' eligibility for consumer use, codifies rules for access to safety data, and outlines provisions for public education programs.

Conspicuously absent from SELF DRIVE are provisions for commercial vehicles, despite the fact that trucking accounts for 10% of highway miles driven and 60% of tonnage shipped across the country. Trucking unions have actively lobbied to exclude commercial vehicles from the legislation in hopes of staving off a perceived threat to employment in the trucking industry.
The Lawmaker’s Roadmap

Lawmakers are facing pressure from various factions, including constituents, automakers and labor unions, to shape autonomous vehicle policy. To ensure the future of work is successful for everyone, this is no time for stakeholders driving public policy to take a back seat. Here are the imperative policy issues to resolve:

• **Don’t let SELF DRIVE self-destruct:** The SELF DRIVE Act is good, but it doesn’t offer a policy prescription for the new roles, skills and jobs that are likely to bubble up as a consequence of autonomous trucking. Nor does it address state and federal budgeting (as well as investment from the private sector, such as the American Trucking Association and leading drayage companies) to fund the transition retraining for new industry roles.

• **Knowledge is the power-train for the policymaker:** Many lawmakers lack the subject matter expertise to assess how laws will shape or hinder autonomous trucking. Given the gravity of the matter, lawmakers would do well to seek out independent research from university scholars, dedicated technology staff within the DoT, emergent technology innovators, concerned commuters - and yes, unions - to think through the policy ramifications and advise on ways to implement rules that benefit all citizens.

• **Data is the new oil:** Autonomous vehicles can’t run without data. The myriad of vehicle sensors and onboard cameras gather vast amounts of data every moment of operation. The collection of this data at scale has significant surveillance implications. Where does the data live? Who can access it? How is it protected? These are key considerations that will ensure self-driving technology doesn’t become a *de facto* ubiquitous stakeout.

• **Learn from the past:** While the Interstate Highway System established convenient access to jobs, shops, entertainment and other amenities for many citizens, these infrastructure advancements were also detrimental to certain communities as new roads plowed through established neighborhoods or introduced noise pollution to tenements with traffic whizzing by windows. With knowledge of that destructive past, legislators must consider the human cost of new transportation paradigms and commit to equitable access for all.
SAFETY: THE LYNCHPIN FOR AUTONOMOUS TRUCKING’S LONG-TERM FUTURE
Safety (and its conjoined twin, liability) is likely the greatest of the unknown variables in the coming autonomous vehicle bonanza. Events like the Uber fatality are a shocking reminder of the stakes involved in the development of driverless vehicle technologies. All advances in progressively positive public sentiment screeched to a halt afterward.

The statistical relativity, though, is worth examining; nearly 1.3 million people globally die in road crashes each year\(^{25}\) compared with just a handful of glaring - and yes, tragic - examples due to autonomous technologies.\(^{26}\) However you look at it, too many people historically lose their lives due to auto accidents, and technology can likely provide a remedy to statistics like these.

Consider that the building block features of autonomous driving have already made our roads safer. Brake assist keeps distracted drivers from rear-ending other motorists. Lane departure warnings cut down on side-swiping collisions. And the myriad of cameras add more eyes to the road when two won’t do. These technologies are lauded by the public and augment the driving ability of safety-conscious truckers.

Having said that, who’s responsible if things go wrong? Is it the bot (specifically the autonomous platform coupled to sensors) or the driver? The trucking industry must address the safety of their drivers, fellow motorists and the potentially further reaching implications of cybersecurity before winning over the court of public opinion on deploying autonomous vehicles at scale. At present, truck drivers and their employers are liable when it comes to any infraction, damage or mayhem behind the wheel, which makes sense as 94% of auto accidents are the result of driver error.\(^{27}\) As we cede control to software and machines, however, does liability go right along with it? There are no easy answers. The issues of safety and liability are more likely to slow the spread of autonomous vehicles than any technology hiccups or setbacks.

Industry insiders are well aware that much work remains to raise the ability and awareness levels of AI to equal that of the average driver, and this is particularly the case in the trucking industry, where safety standards need to be even more stringent. Automated trucks must improve upon the most recent (2016) driver rating of 1.5 deaths per 100 million miles driven.\(^{28}\) Uber’s autonomous vehicles traveled a cumulative two million miles by December 2017. While one deadly crash is not enough for statistical significance, it is more than enough to mar the entire autonomous vehicle landscape with consumer distrust.
Learning Curve: It May Get Worse Before It Gets Better

With all the sensors and computing power on board, how does an autonomous vehicle crash in the first place? Like our own eyes, the tools these vehicles use to “see” can be blinded by environmental conditions, as well. If the sky is too bright or the roads too rainy, sensors struggle to accurately sense the world around them. Lidar units have already received criticism for lack of resilience given the rough and tumble nature of the open road. Manufacturers must continue to refine their mix of sensors while keeping costs low enough to reach mass markets.

Even a perfectly functioning set of cameras and sensors can’t prevent every accident from happening; the former NHTSA Administrator Mark Rosekind has admitted that autonomous vehicles will result in fatalities. Just like their human counterparts, the algorithms aboard autonomous vehicles learn by doing. They start off like we all do, fresh from the DMV with a newly minted learner’s permit, hesitant behind the wheel, underprepared and likely over-confident in our driving abilities. The learning curve for these machines means motorists may endure the growing pains of collisions as the systems develop. In trucking, these algorithms are shared across entire fleets. As fleet sizes increase and driven miles multiply, the learning pace will grow exponentially. When one vehicle encounters a new experience, the entire fleet will learn from it. Imagine if your kids could pick up your driving advice this fastidiously. They may not ever need to learn to drive in the first place if the machines can learn fast enough.

Intrepid entrepreneurs have often shirked precaution to accelerate innovation in pursuit of profit. This notion has endured since at least the Roman Empire, with Publius Tacitus proclaiming, “The desire for safety stands against every great and noble enterprise.” Given the high level of public trust required for the autonomous vehicle industry to blossom, businesses in the industry should not stop innovating but need to be ready to pump their brakes to ensure safety and proceed with caution. If we’re smart, more innovation, coupled with “soft-landing” career transitions for truckers and others in the ecosystem, will help businesses and society be ready when autonomous trucks enter the track.
OF HACKERS AND HIJACKERS
Another big “what-if” hanging over the future of autonomous trucks is whether they can be hacked, both theoretically and actually. Imagine the following scenario: The engine throttles. Controls become unresponsive. Your tranquil podcast is replaced by heavy metal blaring out of the vehicle’s sound system. You’ve been hacked, with no way to reclaim control as you barrel down the highway.

But this isn’t science fiction or a passage from Stephen King’s killer-car novel, *Christine*. Ethical hackers like Charlie Miller and Chris Valasek have been commandeering vehicles since 2013. They’ve used a laptop computer to disable brakes and even control the steering wheel of a Jeep through the onboard diagnostics system, and advanced to being able to do the same thing remotely over the Internet. Miller and Valasek work with automakers to shore up security concerns related to cyber hacking of autonomous vehicles, but their exploits highlight the dangers inherent in the technology.

As vehicles become more technologically enabled and connected, more holes in the armor come to light. In the rush to turn cars into computers on wheels, auto makers have exposed their products (and the people inside them) to the same hacking risks faced by desktop or mobile computers.

What? Weapons on Wheels?
The threat of a “cyber-hijacked” vehicle could be enough for even early adopters to shy away from autonomous vehicles. Semi-trucks being commandeered and used as projectiles looms in the minds of many after attacks in major cities worldwide used a similar method.

Uploading the country’s national freight apparatus to the platforms of the new machines also exposes unforeseen risk to the supply chains of essential goods, as well. The specter of hackers controlling entire truck fleets of fuel, food or first aid supplies is a national security concern.

As breaches of valuable consumer data continue to prove, no digital system is ever completely safe from hackers, and these vulnerabilities are exacerbated when organizations fail to prioritize security and develop contingency plans. Leaders in the autonomous trucking ecosystem must equip themselves with intelligence and then incorporate that knowledge into strategic decision making. Cyber warfare is an ever evolving landscape, and mitigating the loss of reputation and revenue caused by breaches is well worth the time and resources invested.

As a matter of national security, protecting the transportation grid of the future will be akin to securing the nation’s power grids, water treatment facilities and nuclear plants. We foresee entirely new jobs resulting from these and other needs. Highway controllers, for example, will be one of the most in-demand roles of big municipalities by the end of the next decade. People in these full-time positions will monitor, regulate, plan and manipulate air and road space, monitoring and programming the automated AI platforms used for space management of autonomous vehicles and devices.
A NEW WAY FORWARD
Despite the challenges and concerns, a window of opportunity is emerging for forward-thinking businesses and leaders in the area of autonomous trucking. The progress made provides a vision of how the industry may develop, aided by AI-powered vehicles. The failures, meanwhile, show just how slim the margin for error will be for these vehicles and the toll paid when they do not function properly. Within that window exists a framework from which businesses reliant on freight transportation can begin working now to optimize the supply chain for the future.

Here are five rules of the road for leaders to stay in the fast lane of autonomous trucking:

- **Be on time, but know when to go:** It’ll take some time for autonomous trucks to backfill the current shortage of 50,000 drivers. But because automated vehicles can cover 1,200 miles per day compared with 550 miles for a human-driven truck, at some point, less-costly efficiencies will result in major pricing impacts, fundamentally changing the trucking industry and every other method of shipping. A wait-and-see approach won’t work when the paradigm suddenly shifts for transporting goods to consumers. Exercise cautious optimism and begin preparing now with forward-looking investments, both in equipment that enables autonomous features in your fleet and in training your workforce on how to use it.

- **Stay in your lane:** Lawmakers will enable this ecosystem and set its rules. Allow them to do their job while you focus on navigating the rules and regulations of the nascent self-driving industry. The longer you fight against them, the less time you have to strategize toward your success.

- **Play nice with the robots:** Resistance is futile, but that won’t stop Luddites from trying. Creating a role in your organization for planning, organizing and encouraging human-machine teaming can help you develop a strategy for harmony between workers and AI. This is key for your employees, partners and customers to know how to engage with the robots in your workforce.

- **Prepare for the fast lane:** Shipping speeds will double, along with your customers’ expectations. Position yourself to meet the needs of their new normal. With data more plentiful than ever, acting on that data quickly, at scale, will be paramount.

- **Keep your eyes on the road:** Safety is the most important element when it comes to the proliferation of self-driving vehicles. Prioritize safeguards against hacking attempts, and limit operations to scenarios within the capabilities of the autonomous vehicle technology you employ.

Autonomous vehicles promise to usher in a wave of paradigm-shifting convenience and transportation advancements, as people and products are transported faster than ever before, more cheaply and safely. Members of the labor force, government organizations and business leaders bracing for the changes to come must assess the technological, economic and cultural forces that will both influence and be impacted by autonomous vehicles.

Self-driving vehicle technology does not exist in a vacuum. Other technologies, industries, regulatory bodies and consumer preferences will all play roles in how the trucking industry evolves. Leaders must take into account the interplay of all these factors when assessing their strategies. Buckle up for the autonomous road ahead.
Endnotes


The SELF DRIVE bill provides guidance for automakers on how many vehicles they can test, and affirms the NHTSA’s safety assessments to determine if the vehicles are eligible for use by consumers. Provisions for access to safety data and public education programs are also included in the SELF DRIVE Act.


Desmond Dickerson is a Senior Consultant within Cognizant Consulting's Retail practice. Leveraging his experience in digital transformation and marketing, Desmond consults clients on optimizing digital strategies that prioritize user experience and engagement. His research with The Center for the Future of Work focuses on the human impact of decisions related to technology development and deployment. He has an MBA (data analytics) from Georgia Institute of Technology, and an undergraduate degree in marketing from Georgia State University. Desmond can be reached at Desmond.Dickerson@cognizant.com.

Desmond Dickerson
Senior Consultant, Cognizant Consulting Retail
ABOUT THE CENTER FOR THE FUTURE OF WORK

Cognizant’s Center for the Future of Work™ is chartered to examine how work is changing, and will change, in response to the emergence of new technologies, new business practices and new workers. The Center provides original research and analysis of work trends and dynamics, and collaborates with a wide range of business, technology and academic thinkers about what the future of work will look like as technology changes so many aspects of our working lives. For more information, visit Cognizant.com/futureofwork, or contact Ben Pring, Cognizant VP and Managing Director of the Center for the Future of Work, at Benjamin.Pring@cognizant.com.

Cognizant (Nasdaq: CTSH) is one of the world’s leading professional services companies, transforming clients’ business, operating and technology models for the digital era. Our unique industry-based, consultative approach helps clients envision, build and run more innovative and efficient businesses. Headquartered in the U.S., Cognizant is ranked 195 on the Fortune 500 and is consistently listed among the most admired companies in the world. Learn how Cognizant helps clients lead with digital at www.cognizant.com or follow us @Cognizant.