



The chaotic middle

**The autonomous vehicle
and disruption in
automobile insurance**

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KPMG insurance task force

"We are entering a period of radical change—the 'chaotic middle' of a transformation—that promises to reshape the insurance landscape. Now is the time for robust discussion and action. We look forward to the opportunity to have a conversation with you soon about the potential implications of autonomous vehicles on your organization."



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A message from the insurance task force

The effects of autonomous vehicle technology on insurance are likely broader and deeper than outlined in our first paper, *Marketplace of change: Automobile insurance in the era of autonomous vehicles*, released a little over 18 months ago. KPMG now believes that the core business models for traditional automobile insurance carriers may be under threat of obsolescence, with automobile manufacturers potentially becoming a viable alternative to cover driving risk. We are entering a period of radical change—the “chaotic middle” of a transformation—that promises to reshape the insurance landscape.

In the short time since we issued our research in the fall of 2015, the marketplace has continued to change—and fast. Traditional automobile manufacturers (commonly known as Original Equipment Manufacturers or OEMs) and high-tech players have announced robust pipelines of new capabilities, with a race to get fully autonomous cars on the road first. Strategic alliances have been established that promise to reshape the future of mobility, with major bets taken on the dominance of ridesharing. State and federal regulators have advanced positions. The press has carried updates and analyses—with articles becoming a daily notice. Full-scale testing of autonomous fleets has already begun in some cities with more planned. We at KPMG are increasingly convinced of the transformation—in fact, it seems to have started in earnest.

Just as the marketplace has changed, so too has our task force’s point of view evolved and narrowed on the effects for driving insurance. We now believe that the traditional personal automobile insurance marketplace has the potential to be even more severely disrupted by new competition and shifts to other types of insurance coverage. The move to new business models will not be smooth, and we anticipate a ‘chaotic middle’ of a decade or more as companies adjust their strategies and operations.

This new study synthesizes our latest research and thinking and covers four underlying themes:

Pace of change – acceleration on the move

The eight elements we previously identified as critical for the transformation have advanced—both individually and in concert. The pace of change has been faster than originally anticipated, with effects already being realized across the marketplace. The foundation for the transformation has been set, and insurance is already being affected.

The triad of disruption – aligning of forces

Three potential forces may be aligning to disrupt the traditional personal and commercial auto insurance

marketplace. Autonomous technology promises to make cars increasingly safer, which will significantly reduce accident frequency. Auto manufacturers could leverage new strategic positions around customer and data to displace carriers. Mobility-on-demand and car-sharing have created new business models that focus on the deployment of fleets of cars rather than individual auto ownership.

Perfect storm – auto insurance sector shrinks by roughly \$137 billion

We continue to work closely with our automotive practice to translate technology and mobility changes into shifts in key insurance industry metrics. Our actuarial models incorporate the latest in new more granular data and industry studies. The Perfect Storm Scenario indicates a potential reduction of almost 90 percent in loss frequency by 2050.¹ Coupled with potential severity declines and the effects of mobility-on-demand, total losses⁽¹⁾ could decline by 71 percent or approximately \$137 billion in nominal dollars and even greater in real terms.² The brunt of the decline could be taken by the personal auto insurance segment, which we forecast could erode to only 22 percent of total sector losses by 2050.³

The chaotic middle – a dual challenge

Transformations of this potential scale will not be smooth. Insurance executives will have a dual challenge: how to migrate to a new business model while still managing the changes in the current operations as the effects of autonomy take hold. Clarity of vision and plan will be critical to maintain the confidence of key stakeholders—including investors, regulators, customers, and employees. In this marketplace of uncertainty, we recommend companies take a combination of strategic and tactical efforts. It will take years to realize operational change, even longer for strategic shifts.

Now is the time to act.

Note: (1) Total losses refer to loss and allocated loss adjustment expense payments unless otherwise noted.



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Leading through change – Marketplace 2025:

A case study

Martin Daniels, president of Morgan Auto Insurance (MAI), settles into his office chair and reflects on the meeting. He knew going in that the board was nervous about the changing marketplace precipitated by the proliferation of autonomous vehicle technology, but had hoped that his business strategy would give them confidence in the direction of the company—and his leadership. Their support, however, had been slow in coming despite previewing his thoughts with a couple members before this session. Their questions were pointed—tougher than in any previous discussion—and aimed for a certainty of result that he just could not guarantee. The market disruption of the past couple of years was only a prelude to the increasing chaos to come. The auto insurance industry had entered uncharted territory, he now recognized, and defining the right path forward was far from clear.

In the past 15 years as president, Martin implemented a series of operational improvements across underwriting, claims, and customer service that made MAI a well-respected regional personal and commercial auto insurance company. He was proud of these accomplishments. The market changes of the past few years, however, had begun to challenge the business to its core—even question the ongoing viability of the automobile insurance business itself. Incremental enhancements would not be enough—MAI would need to instead redefine its core business model. This was not how he expected to finish his final years before retirement.

The effects of autonomous technology came faster and in ways other than he had anticipated. Seven years ago, he established a task force to look at autonomy—a progressive step at the time compared to many of his insurance peers. In retrospect, the scope and mandate of that group had probably been too limited knowing the shifts that actually occurred. The team had focused on the auto manufacturers' pipelines of new capabilities—ranging from the braking systems to accident avoidance system to traffic jam assist. Loss frequency would drop—but when and by how much? He wanted a realistic point of view. The actuaries developed initial models, but had insufficient data to leverage due to the limited number of vehicles involved and the short duration of experience. An uptick in loss frequency from 2015 through 2017⁴—due to a better economy fueling more

driving and smartphones distracting more drivers—masked the overall downward trend resulting from the use of autonomy technology. As a result, he concluded that the meaningful ramifications on the auto book would still be several years away. He and his team were wrong.

A race to the road for fully autonomous vehicles accelerated the time line of both self-driving cars as well as the underlying component technology found in other vehicles. Each generation of capability was markedly better than the previous and made cars safer. The federal government also pushed for faster adoption—under the banner of saving 30,000 lives⁵ and preventing thousands of injuries each year—and issued mandates for use of some autonomy components in new vehicles starting last year. A retrofit of existing vehicles was also being seriously considered by regulators. Economies of production began to drop costs in general, so the technology was becoming more pervasive.

The focus on the technology itself also missed two additional critical factors: proliferation of car-sharing and emergence of new competition. The use of car-sharing and mobility-on-demand platforms—particularly in cities and inner-ring suburbs—became an even more common approach to travel. The era of two-car families was quickly evolving to one-car households augmented by on-demand vehicles. The big mobility companies converted their fleets to autonomous vehicles, as the cost advantages—to both the organization and the traveler—were distinct. These big fleets required commercial, not personal, insurance coverage.

The emerging role of the automobile manufacturers in insurance caught everyone off guard. As the vehicle “brain” made more of the decisions, the risk moved from the driver to the manufacturer and underlying suppliers. In this new world, the OEMs had three key considerations: inevitable assumption of the risk, control of the driving data, and primacy of relationship with the vehicle owner. In addition, the OEMs' reliance on profits from lucrative after-market parts sales were also being eroded by safer cars and fewer accidents. As a result, the companies were looking for revenue alternatives with insurance offering an attractive play. Some OEMs began to sell driving data to insurance companies, while others recognized the

competitive advantage of this information and disaggregated the data away from insurers. Others began to include insurance as part of the monthly car payments. Martin thought it was only a matter of time before the OEMs shut out insurers altogether.

A perfect storm to disrupt the auto insurance industry had formed, and the tempest was just starting to rage. A safer car stock—expanded by adoption across on-demand fleets—reached a tipping point where loss frequency materially dropped. Less insurance was needed. As the “size of the pie” began to shrink, there was a simultaneous reallocation of the slices within the pie away from personal lines to commercial and products liability types of insurance. The big fleets needed commercial coverage while OEMs took the products liability exposure. As a result, the portion of the market left for traditional personal auto insurance companies like MAI rapidly contracted.

As the personal auto insurance marketplace shrunk, many carriers faced a corresponding decline in revenues. With heavy fixed costs and legacy systems, the insurers were not nimble enough to drop costs fast enough to match the contraction. As a result, the cost structures drove heavy losses. The inability to accurately price the risk—due to asymmetric information—only aggravated the situation. As companies tried to maintain cash flow to survive, irrational pricing and adverse selection put even more downward pressure on profits. The situation had deteriorated faster than anyone within MAI had anticipated. The company had posted heavy losses the past two years, and the prospect for the next year looked even worse.

Martin worked with his executive team to develop a response to the situation. They had a dual challenge. They needed to manage the downslope in the core automobile book of business, while plotting a plan to diversify into other areas. Trying to manage the declining auto book was difficult. The irony was that he needed to invest into the declining business, as the core operations were all changing. The way business was underwritten and priced needed to change to reflect real-time data and shared risks between the driver and the car itself. Claims adjudication was in a similar degree of flux, and the underlying systems and processes needed a full revamp. The ability to manage new data pressed the organization. Martin was struggling on how much to invest and where.

There was also a \$750 million dollar gap to close in revenue from the erosion of the auto book of business. He needed to find alternative revenue and was looking at diversification options. Fortunately, MAI still had excess capital to spend—like the rest of the industry—but it was quickly declining as losses mounted. The initial inclination was to emphasize the homeowners line of insurance. The problem was that all of the competitors were pursuing a similar strategy, and prices were unprofitably low. The same “ripple” effect pushed across the small commercial and peripheral lines of business of insurance. Martin and team were trying to find the right path forward. There were opportunities for sure, but the skills and resources needed to pursue them were limited.

The board meeting earlier in the day was focused on the business strategy—the balance between managing the current book of business while investing into new diversification plays. Martin felt he had the right mix of actions, but he needed flexibility to shift as the marketplace continued to evolve. The changes were only going to get more pronounced in the chaotic middle of the transformation ahead. The insurance industry had entered a new period. His management team and the board were only now appreciating the magnitude of the changes. He thought a bit more about the possibilities and sent an e-mail to his core team to regroup to discuss the feedback they just received and consider the steps ahead.



Section 1 – Alignment for mass autonomy:

**Acceleration of the
pace of change**



In our previous white paper, *Marketplace of change: Automobile insurance in the era of autonomous vehicles*, we identified eight elements impacting transformation in the autonomous era. Over the past year, advances within and across these elements have accelerated industry change, creating the potential for market conversion sooner than anticipated. An important foundation to support mass industry change has been set.



Integrity of technology – Cars are getting safer and smarter. Continued innovation in autonomous technology has provided more driver substitution. Investments by OEMs and high-tech companies, coupled with a significant flow of “smart money,” are delivering a broader, deeper set of capabilities. With millions of “shadow” miles being logged, organizations like Tesla are gathering data at an unprecedented rate. Following the release of its Autopilot program in October of 2015, the company confirmed that Tesla vehicles equipped with autonomous technology had driven 47 million “real-world” miles in six months.⁶ Deep learning from the data collected during these trials is enabling refinement of algorithms and other advances and allowing a leap-frogging past incremental change. Insights from large-scale testing of the technology and self-driving fleets promise to further inform and improve the integrity of the technology.



Capability accessibility – Companies are delivering pipelines of autonomous capabilities faster than originally announced. Growing competition has ushered in a race to the road, with several manufacturers committed to delivering highly automated vehicles within a few years. Sophisticated autonomous technology has become more accessible with each consecutive release of new vehicles from traditional manufacturers. For example, Volvo has introduced an advanced version of its semi-autonomous Pilot Assist software, which allows S90 models to stay within a lane and maintain a desired following distance without driver assistance.⁷ Pilot Assist software is now standard in new 2017 S90 models.⁸ As these semi-autonomous capabilities become more common, the gap to achieving fully autonomous vehicles gets even smaller.

In addition, a strategic commitment towards autonomous fleets of mobility-on-demand vehicles changes the calculus of the transformation. Widespread usage speeds exposure to the capabilities, and the resultant familiarity could further accelerate acceptance of the capabilities in individual vehicle purchase decisions.

Scale of production will also ultimately drop autonomy costs, making these vehicles more affordable over time.



Infrastructure availability – The technology works on existing roads. With the initial technology embedded into the vehicles themselves, industry players have already developed autonomous vehicles that can function on existing roadways—no up-front investment in infrastructure is needed to get started. Ford is currently testing self-driving vehicles in California, Arizona, and Michigan⁹—expecting to increase their fleet to 90 cars by the end of 2017.¹⁰ These vehicles are equipped with sensors designed to detect objects within hundreds of yards in all directions, while in-car software processes the information to help the vehicle safely navigate public roads.¹¹ As the autonomous era evolves, vehicle-to-vehicle (V2V) communication will expand into integrated driving, creating a flowing web of information between vehicles as well as the surrounding infrastructure potentially.



Regulatory permission – State and Federal oversight slowly expands. As of February 2017, 21 states (District of Columbia included in this number) had passed or introduced bills related to self-driving vehicles—up from 16 noted in our previous paper. We continue to believe that California, Michigan, and Nevada will likely set the standards to be adopted by the states.¹² Dialogue between states and at regulatory forums indicate heightened awareness of the need to act, but no coordinated program has yet advanced.

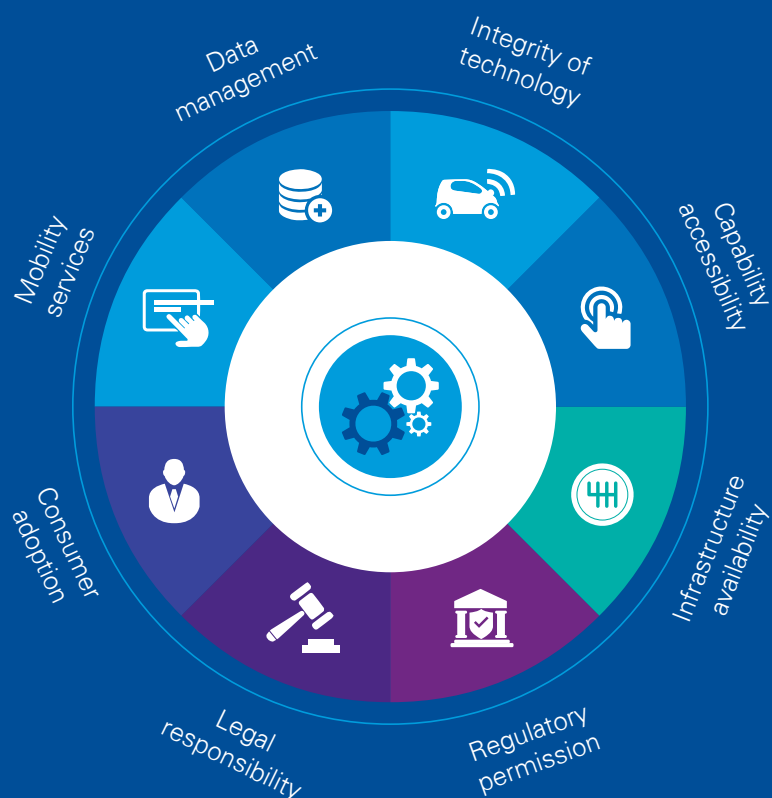
The National Highway Traffic Safety Administration (NHTSA) is poised to issue rules that could mandate transponders—devices that send and receive radio signals and allow autonomous vehicles to communicate—for all new cars and most trucks.¹³ In addition, NHTSA's pending V2V mandate is viewed by policy experts as a vital step for connected-car deployment, as the proposal may provide an opportunity for automakers to unite around common technical and security standards.¹⁴



Legal responsibility – Legal positioning and case law for a different risk profile. As driving decisions and the underlying risk shift from the driver to the vehicle itself, the legal liability also will evolve. Legal positions and case precedent have yet to be tested, but discussions and analyses are being advanced in task forces at manufacturers, insurance companies, and law firms/schools. One of the first companies to address this issue, Volvo, announced it will accept liability whenever one of its vehicles is in autonomous mode.¹⁵ According to Volvo Car Group president and CEO Håkan Samuelsson, Volvo is “one of the first car makers in the world to make such a promise.”¹⁶

Eight key elements for transformation

Interactions within and across these eight elements have shifted the driverless landscape and accelerated industry change.



**Consumer adoption – More exposure and familiarity with autonomy.**

Over the last year, there has been a significant increase in press and visibility around autonomous vehicles. Consumer awareness continues to climb as innovators capture headlines with bold predictions on the future of driverless technology. Pilot programs in Pittsburgh¹⁷ and Singapore¹⁸ are pioneering the use of autonomous fleets and allowing customers to experience the full extent of autonomous technology. Similarly, each new model of vehicle brings enhanced standard features and more sophisticated option packages, some already equipped with semi-autonomous capabilities. Slowly, consumers are beginning to adopt the technology by ceding some driving functions to the vehicle. As the consumer becomes increasingly removed from the driving experience, a shift to autonomous vehicles becomes a more natural evolution.

**Mobility services – Strategic alliances shape future marketplace.**

Bets are being made on the dominance of on-demand mobility platforms. In the mid-term, it is very possible that the majority of personal urban travel will be on-demand rather than via a personal vehicle. Mobility platforms allow consumers to buy the trip, not the car, delivering convenience and cost advantages directly to the user. A collective view that self-driving vehicles will first reach consumers as part of a ridesharing service has prompted major cross investments from industry players, like GM's partnership with Lyft.¹⁹ As anticipated, autonomous vehicles have become a part of the broader fleet of shared vehicles—autonomous passenger shuttles are now operating in multiple European cities²⁰—providing firsthand exposure to the technology for many drivers.

**Data management – An initial focus on controlling the driving information.**

Consumer advocates, technology companies, insurance carriers, and car manufacturers have begun to take positions on who controls and has access to the driving data. The stakes could not be greater. With “black box” information potentially capturing more driving information than ever before, access to this trove of information is critical for pertinent understanding of the exposures and market relevance. Disaggregation from information is a distinct risk for companies such as insurers and could severely hamper their ability to participate in the future marketplace.





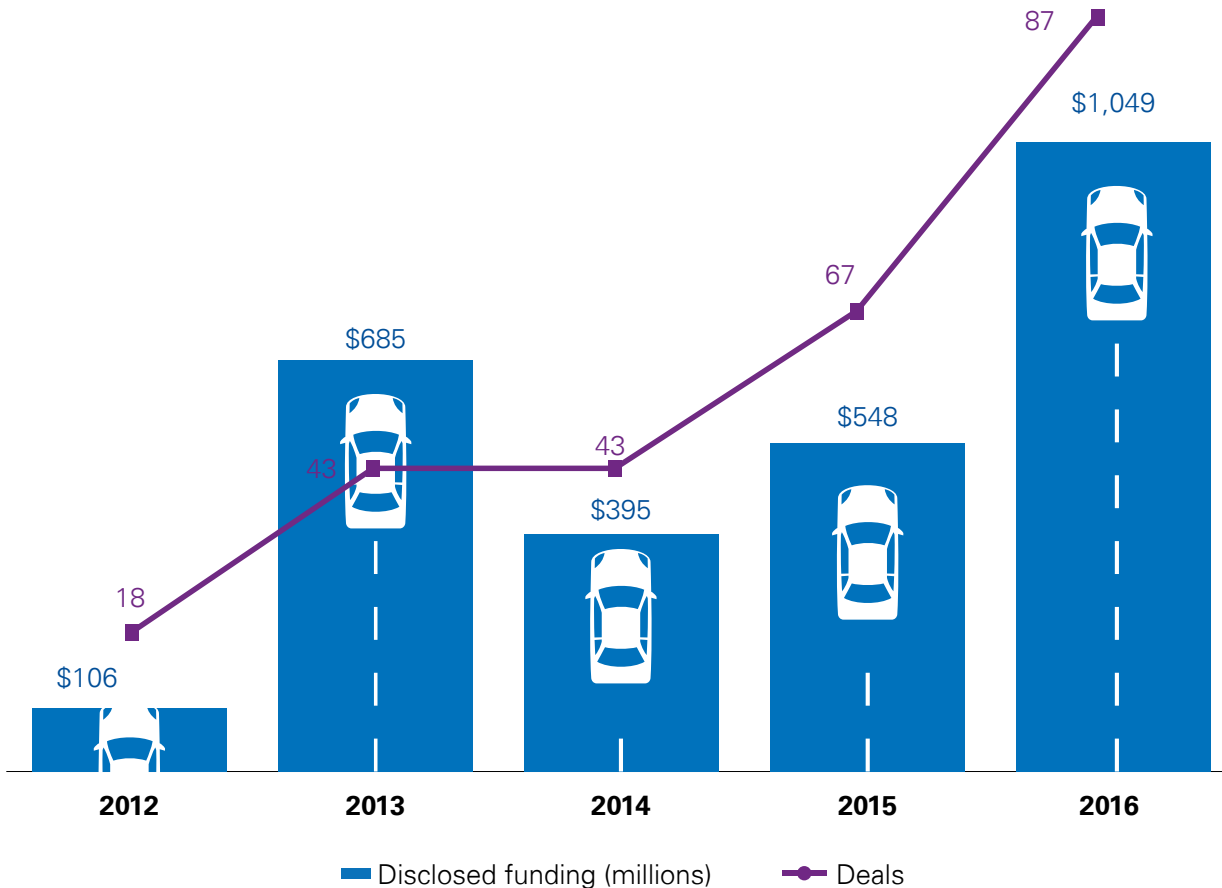
Autonomous capabilities on a fast track

“Smart money” is advancing autonomous capabilities

Investment activity in the autonomous vehicle technology space is growing as the landscape continues to evolve. A wave of “smart money”—generated by a variety of sources including venture capital (VC) firms—is boosting the development of autonomous capabilities and accelerating industry transformation.

The pool of investors contains a variety of players, including institutional capital providers, hardware and software companies as well as large publicly traded corporations.²¹ Growth funding in this space in 2016 was unprecedented, as auto tech⁽¹⁾ start-ups achieved highs in both deals and dollars.²² In 2016, an estimated \$1.0 billion was invested across 87 deals, shattering the previous record of \$685 million set in 2013,²³ a year in which Mobileye received nearly 60 percent (\$400 million pre-IPO financing) of the total annual investment.²⁴

Auto tech annual global financing history



Note: (1) Auto tech companies are defined as those that use software to improve safety, convenience, and efficiency in cars, specifically looking at assisted driving/autonomous software, driver safety tools, connected vehicle/driving data, fleet telematics, vehicle-to-vehicle communication, and auto cybersecurity.

Source: CB Insights, Auto Tech Startup Financing Tops \$1 Billion in 2016

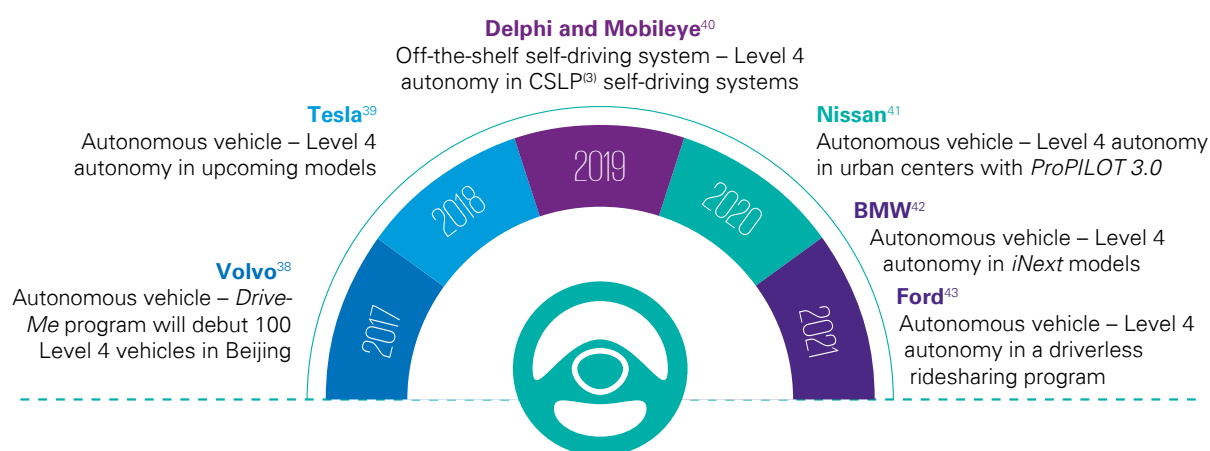
In addition to venture capital funding, recent acquisitions by large, publicly traded companies are helping to advance autonomous capabilities as well. General Motors made headlines last May by acquiring Cruise Automation for just north of \$580 million to accelerate its efforts in developing a fleet of self-driving vehicles.²⁵ New entrants to the driverless vehicle market have also made recent acquisitions to bolster their positions as autonomous vehicles get closer to mainstream commercialization. For example, Ambarella, a developer of video compression and image processing systems, broke into the self-driving market with its acquisition of automotive vision firm VisLab in July 2015.²⁶ The \$30 million deal helps boost Ambarella’s capability pipeline and allows the company to compete with major providers of driver assistance technology.²⁷

Notable acquisitions in the autonomous vehicles space

Company name	Company acquired	Deal value	Closing date
Uber ²⁸	Otto	\$680 million ⁽¹⁾	8/2016
Verizon ²⁹	Telogis	\$900 million	7/2016
Intel ³⁰	Itseez	Undisclosed	5/2016
General Motors ³¹	Cruise Automation	\$581 million	5/2016
Lear Corporation ³²	Arada Systems	Undisclosed	11/2015
Freescale ³³	CogniVue	Undisclosed	9/2015
Delphi ³⁴	Ottomatika	\$35 million	7/2015
Ambarella ³⁵	VisLab	\$30 million	7/2015

This surge of recent investment activity should provide a broader platform to develop autonomous technologies at a more rapid rate, thereby helping to accelerate the pace at which highly automated vehicles will hit the market. The head of GM’s Foresight and Trends unit said the timetable for autonomous vehicles has likely shifted from 2035 to 2020, if not sooner, partially due to these substantial investments in autonomous vehicle technology.³⁶ The reforecast comes on the heels of recent announcements that a variety of OEMs and technology companies will introduce Level 4⁽²⁾ autonomous technology in the next four years.³⁷

Expected introduction of level 4 autonomous technology



Note: (1) Deal value is an approximation based on various financial metrics; (2) Level 4 autonomous technology as defined by the Society of Automotive Engineers (SAE): “High Automation” in which the automated system performs all aspects of the driving task, in pre-mapped and programed areas, even if the human driver does not respond to a request to intervene; (3) Central Sensing Localization and Planning (CSLP).

Will we see a leapfrog in autonomous capabilities?

The prevailing theme that the autonomous evolution will happen through incremental change is being challenged by a growing concern over inherent safety issues with Level 3 “Conditional Automation.” Level 3 autonomous technology includes an autonomous driving system that can perform all operational and tactical aspects of driving with the expectation that the human driver will respond appropriately to a request to intervene.⁴⁷ For example, the core issue with Level 3 automation is finding a way to ensure that the driver can safely regain control of the vehicle after an extended period of automated driving. The human operator may only have split seconds to make important decisions, likely when it is least expected. A quick handoff to the driver is troublesome in abruptness and situation. Many believe driving is binary, a person is either driving or not, and “sort of” driving is not driving at all.

Solving the Level 3 handoff issue has been an important topic at recent technical conferences.⁴⁸ While many OEMs are continuing their advancement of Level 3 automation, the risks have prompted other auto manufactures to skip Level 3 altogether.⁴⁹ Instead, choosing to make the jump from Level 2 “Partial Automation” to Level 4 automation—a level in which an automated driving system performs all aspects of the driving task without the need for driver intervention.⁵⁰

Last August, Ford announced plans to provide a fleet of Level 4 autonomous vehicles available to consumers within five years.⁵¹ The company also indicated it would develop and improve driver assistance features up to Level 2, but it would not be introducing any vehicles with Level 3 automation—citing concerns over the dangers caused by an abrupt driver handoff in emergency situations.⁵² Although Ford is one of the first to act, there has been serious industry discussion regarding the leap from Level 2 to Level 4 automation. Developments in this area warrant ongoing monitoring.

Capability advancement may deliver autonomous vehicles sooner than anticipated

The rapid evolution of underlying driverless technology is helping OEMs and technology firms deliver on their commitments to deploy fully self-driving vehicles within a few years. Sophisticated autonomous technology has become more accessible with each consecutive release of new vehicles from traditional manufacturers. Technology that was once seen as science fiction is now offered as a standard feature in many luxury vehicles. For example, in October 2016, Tesla announced that all vehicles in production will be equipped with the hardware needed for full self-driving capability at a safety level substantially greater than that of a human driver.⁴⁴

Partnerships between industry players are also helping to make Level 4 driverless vehicles a reality sooner than many anticipated. Collaborations between innovators are providing the scale of production needed to reduce costs to make the technology widely accessible. Last August, Delphi and Mobileye formed a partnership to develop an off-the-shelf driverless system that OEMs can install directly into their vehicles.⁴⁵ According to Amnon Shashua, chairman and CTO of Mobileye, the collaboration aims to “...accelerate the time to market and enable carmakers to produce self-driving vehicles without the need for huge capital investment.”⁴⁶

Alliances such as these have pushed the industry towards more and faster action. Fueled by a wave of new investment, recent advancements in autonomous capabilities have reshaped the driverless landscape—setting the stage for the proliferation of autonomous vehicles much sooner than many have anticipated.



Legal responsibility

Defining accountability in the event of an accident

As the fleet of roadworthy vehicles transitions from the status quo through partial driver substitution to a state of near-complete autonomy, the culpability arising from accidents will most likely move from the consumer and arrive at the doorsteps of the auto manufacturers. The corresponding—and necessary—legal doctrinal transition will likely be a protracted one, but it will undoubtedly have a profound impact on the way vehicles are priced and insured.

In the immediate future, familiar concepts of duty, breach, and causation will likely continue to be the prevailing standard. But very soon, questions of who or what was at fault will likely become the first prong of any next-generation legal analysis.

As more vehicles begin to operate with Level 3 and ultimately Level 4 autonomous technology, drivers will play a decreasing role in the operation of the vehicle. If the driver is not in control of the vehicle, is it reasonable to expect them to be liable for accidents arising from the autonomous technology? Stakeholders should be developing positions on questions like this as we advance into the era of autonomous vehicles.

For example, according to Stephen Schwab and Elliot Katz, two partners who specialize in insurance and autonomous vehicles, respectively, at the global law firm DLA Piper, governments are already contemplating legislation to address scenarios such as this one. Schwab and Katz said

that the English Parliament is currently considering the insurance coverage implications of potential issues caused by autonomous vehicles in a pending Vehicle Technology and Aviation Bill. More specifically, one item to be addressed is distinguishing insurance coverage between times when a human is driving the vehicle and when an automated vehicle is driving itself.^{53,54}

Even before legal and case laws define these issues, companies like Volvo, Mercedes, and Google have announced that they will accept responsibility for any accidents caused by their future driverless vehicles.⁵⁵ We expect these announcements to not only set a precedent for the future, but help to quell the fears of both consumers and regulators, driving an increase in the public's willingness to adopt the technology.

The legal strategy and associated tactics employed by traditional insurance companies will need to evolve as the technology changes. Carriers will need to define their legal positions and likely partner with peer companies to solidify a common industry defense. In addition, insurers will also need to change how claims are processed. Investigations, discovery, and reservation of rights along with other core concepts will be in flux. Anticipating these changes will allow insurers to effectively prepare their legal and claims teams to coordinate efforts to minimize their shifting exposures. Companies are just now trying to understand the full set of implications.





Data management

The key question: Who controls the data?

Data may be the most important asset in the emerging autonomous landscape, and who controls it, the biggest strategic issue. Each constituent—from customer to regulator to manufacturer to insurer—needs this information. The decisions being made now about who controls the data will significantly impact the future marketplace.

Types of data

Autonomous driving will gather a significant amount of information, each data point with its own value and implications. Among the data collected, we believe three types of data will play an important role in determining how the information will be used and by whom. We have classified these data types into three general categories:

- Driving data
- Activity data
- Environmental data

Driving data is the information generated by the vehicle itself—speed of the automobile, time and date of travel, acceleration, breaking patterns, etc.—information that will be valuable to underwriting efforts and liability issues for carriers.

Activity data includes the information collected from passengers while they are riding in the vehicle. Key aspects may include the identity and demographic of the passengers, conversations between riders, as well as activities performed inside the vehicle during the trip. This information could be extremely important to insurers, for example, if saved audio and video records were used to protect companies from liability claims.⁶⁶ Of course, data privacy and ownership would have to be thought through for this to be permissible.

Environmental data encompasses all information outside of the vehicle—weather, road conditions, geographic location, etc. The value of this data may be immeasurable to insurers, allowing them to evaluate potential risks with enhanced precision.

Controlling the data

There are some who feel the real business opportunity in the autonomous revolution is not necessarily in the vehicle technology itself, but rather in ultimately being able to monetize the information that comes from it.

Those who develop this technology will have access to new caches of automotive, operational-type data. An array of built-in sensors will allow these companies to track vehicle motion, sending relevant data—like speed, route, and location—to a centralized cloud for further analysis. Data agreement information as it relates to autonomous vehicle technology is not widely available, but recent partnerships indicate that data could be shared between a variety of industry players—tech companies, OEMs, and insurers.



Several companies have already begun to build insurance-related businesses that harness the data coming from the vehicle. For example, Palo Alto-based Nauto uses artificial intelligence to filter through real-time data captured by various vehicle technology and sensors, including internal and external-facing dash cams, to help drivers operate more efficiently, effectively, and safely on the road.⁵⁷ Nauto's insurance clients can also reap significant benefits from analyzing this information by being better able to assess and underwrite risk, process claims, and prevent fraud.⁵⁸

Many have therefore begun asking, – who really owns the information collected from the underlying vehicle technology? Does the driver? The OEM? Or the company that created the actual technology?

Stefan Heck, CEO and co-founder of Nauto, said, “Industry wide, experts agree that the consumer owns the data emanating from his or her vehicle. I think, though, asking who ‘owns’ the data is really the wrong question—we should be more focused on who has usage rights to various sets of data. At Nauto, for example, we have licensing arrangements with our clients and partners that determine our ‘permissions,’ which essentially dictate what services we can provide using the information.”⁵⁹

There is huge opportunity in gathering, aggregating, and harnessing driver information. Those organizations that glean insights from this pending wave of information will likely gain a significant competitive advantage in the ever-changing autonomous landscape.

Information privacy

Consumers might not intrinsically value the data generated by their vehicle—at least from an analytical/marketing standpoint—but they may certainly be concerned with privacy implications and the potential for misuse of sensitive information. How would the public react if a system breach revealed the home address tied to vehicles parked at an airport or the moment a person left his/her house? Autonomous driving generates a significant amount of information;⁶⁰ protecting this information is key to gaining customer trust and enabling the growth of the platform itself. As the proliferation of driverless technology continues, legitimate privacy concerns must be addressed.

Industry players are aware of these concerns and are confident that many necessary measures are already in place.⁶¹ The technical leader for Ford Motor Company has emphasized that autonomous technology was built with consumer security in mind, noting that all V2V signals are authenticated and anonymous, making them difficult to track or alter.⁶²

Similarly, Heck also said, “Nauto’s platform allows secure sharing of data that also protects privacy. We built Nauto with our OEM and insurance partners to gather critical data for safe driving that will give context to both how and why humans behave behind the wheel—without revealing the “who” and “where” or other personal data that could be a privacy violation.”⁶³

NHTSA—an agency established by the Department of Transportation (DOT) that sets and enforces safety performance standards for motor vehicles⁶⁴—also understands the importance of data privacy and is working to create comprehensive protections for the development

of autonomous technology.⁶⁵ In September of last year, DOT, which sets the safety regulations governing the use of America’s roads and highways,⁶⁶ introduced the Federal Automated Vehicles Policy—a federal policy providing guidance for the testing and deployment of automated vehicle technologies.⁶⁷ Although DOT notes that the procedures in its new policy are not mandatory for companies developing automated vehicle systems, the document may be used as a stop-gap to accelerate the delivery of a preliminary regulatory framework while more formal regulations are being constructed.⁶⁸

The first section of the policy document outlines NHTSA’s Vehicle Performance Guidance for Automated Vehicles, which prescribes a thorough assessment of 15 safety-related areas.⁶⁹ Among the 15 areas, NHTSA details its expectations for data privacy. The guidance states that manufacturers should follow best practices—such as the Privacy Principles for Vehicle Technologies and Services—designed to protect individuals’ privacy as manufacturers collect and share data.⁷⁰

To help monitor the development of autonomous vehicles, NHTSA requests that manufacturers and other entities producing driverless technology provide a “Safety Assessment Letter” explaining how data privacy protections were implemented.⁷¹ While these letters are currently voluntary, NHTSA is considering making such reporting mandatory in the future.⁷²

Consumer privacy will continue to be a major focus for both autonomous vehicle users and regulators. Thus, OEMs and suppliers are continuing to develop the safeguards necessary to ensure sensitive information is secure.





Mobility services and consumer adoption

Mobility platforms are helping to shape the future transportation landscape by impacting adoption through the development of on-demand autonomous vehicle pilot programs

KPMG continues to believe that mobility companies—such as Uber and Lyft—will be vanguard users of autonomous technology. Several pilot programs featuring driverless vehicles are either planned or already underway due in part to the compelling economic case they present. For example, the costs of a future “mobility vehicle”—a small sedan worth roughly \$25,000 and completely replaced every three years with no residual value—could be almost half of those incurred in today’s car: 43 cents versus 82 cents per mile.⁷³ That does not even consider the potential safety gains.

The continued proliferation of pilot programs makes us, as well as others, bullish about autonomous adoption on a broader scale. Lyft president John Zimmer caused a media frenzy when predicting that his company’s ride-hailing fleet of cars will be mostly autonomous within five years and that “private car ownership will all but end in major U.S. cities” by 2025.⁷⁴ In his manifesto, *The Road Ahead: The Third Transportation Revolution*, he explains that “...the transition to an autonomous future will not occur primarily through individually owned cars. It will be both more practical and appealing to access autonomous vehicles when they are part of Lyft’s networked fleet.”⁷⁵ Zimmer asserts that the service will be more flexible than owning a car, giving users access to all the transportation they need.⁷⁶

With the development of pilot programs, industry players are able to gain valuable insight about the rider participants. Trips are being filmed with a focus on the rider’s reaction to the vehicle driving without human involvement. Post-drive surveys are also conducted to better understand the customer experience. Of particular interest is how the rider’s reaction evolves over the course of the ride, or in some circumstances, subsequent trips. Initial findings of such surveys were a topic of discussion in KPMG’s 11th Annual Automotive Executive Share Forum Series at the 2016 North American International Auto Show. Karl Iagnemma, CEO of NuTonomy, explained that initial rider apprehension quickly shifted into comfort as these trips progressed without incident.⁷⁷

KPMG focus group research consistently notes that the more consumers know about autonomous vehicles, the more likely they are to use one.⁷⁸ Familiarity leads to comfort and adoption. This is important as the early push of autonomous vehicles into on-demand fleets will provide a wide range of consumers a personal exposure to the technology—and its potential value proposition. We believe this exposure will be a catalyst to much broader adoption of self-driving vehicles—both on-demand and for personal purchase.

On-demand fleet activity

1 Uber and Volvo team up in Pittsburgh⁷⁹

- Volvo and Uber agreed on a \$300 million joint partnership last August to develop a fleet of autonomous vehicles.
- The Swedish automaker expects to have upward of 100 self-driving vehicles deployed in the autonomous fleet that is currently navigating roads in Pittsburgh.

2 Self-driving taxis debut in Singapore⁸⁰

- Members of the public in Singapore’s “one-north” district can now hail rides in autonomous taxis with their smartphones.
- The service currently features six vehicles, which may grow to an autonomous fleet of taxis by 2018.

3 Ford’s future ride-hailing service⁸¹

- Ford recently announced it would have an autonomous vehicle operating in a ride-hailing service within five years, as part of an initiative the company calls Ford Smart Mobility.
- The company plans to test 30 self-driving vehicles on public roads and expects to have up to 90 in its fleet by the end of 2017.

4 European cities utilize driverless shuttles⁸²

- Transdev, a leader in mobility solutions, is now operating autonomous passenger shuttles in Rotterdam, Netherlands and Civaux, France.
- Current autonomous vehicle operations carry 4,000 passengers per day in these two locations.

5 GM and Lyft partner to create a driverless fleet⁸³

- Last January, General Motors invested \$500 million in Lyft as the company began creating an on-demand network of self-driving vehicles.
- The goal is to provide an autonomous mode of transportation available to consumers.

Fleets of autonomous trucks

Strong economic incentives exist—helping to make trucking fleets early-adopters of autonomous technology

For the past century, innovation within the automotive sector has created safer, cleaner, and more affordable vehicles, but progress has been incremental. The industry now appears close to substantial change, spurred by the evolution of autonomous vehicle technology. A new wave of advancement has allowed some players to take the next step in the self-driving revolution—testing fleets of autonomous vehicles on public roads.

The use of autonomous technology to develop fleets of self-driving vehicles extends beyond automobiles to include large transportation vehicles like semitrucks.

In our previous white paper, *Marketplace of change: Automobile insurance in the era of autonomous vehicles*, we introduced the notion that adoption of autonomous technology could happen more quickly with trucking fleets given the more straightforward nature of many of their trips (driving west on the I-80 highway is far easier than commuting across Manhattan in a cab during morning rush hour). Additionally, owners of truck fleets have economic incentives—higher vehicle utilization being one provided that a human who has hourly caps is no longer behind the wheel—to embrace this technology. And now we are beginning to see significant progress in this area.

For example, in April 2016, a caravan of roughly a dozen autonomous, semitrailer trucks—for the first time—finished a trip across parts of Europe.⁸⁴ The project was designed to create a system that allows commercial trucks to follow one another closely, which would reduce drag, improve safety, and potentially create economic growth in the traffic and transport sector.⁸⁵ This test pilot is only an initial step in the development of autonomous fleets, but could provide valuable insight for marketplace feasibility and potentially act as a catalyst for widespread adoption.

Later in the year, start-up technology firm Otto—recently acquired by Uber—partnered with Budweiser to pilot a self-driving truck in Colorado, which made a delivery of a cargo of beer over a 120-mile journey without human assistance.⁸⁶ Now, that is worth a toast.

Long-distance travel on highways are an ideal scenario for automation. Distracted drivers, fatigue, and stress have been core safety risks to this industry. There are roughly 330,000 accidents involving large trucks each year—and approximately 90 percent of accidents are caused by driver error.⁸⁷ Autonomy—even initial “shadow-pilot” capabilities—can provide important intervention. The safety benefits together with inherent economic incentives provide strong support for the idea that commercial trucking could become an early-adopter of autonomous technology.

A potential shift in the phases of incremental change

We previously identified four expected incremental stages of transformation, moving from curiosity and introduction to full vehicle conversion and eventually a network of integrated driving. There are several challenges inherent in attempting to predict the future pace of change, and developments over the past year have shortened our expectations for the adoption and implementation of autonomous technology.

While the transformation will still transpire incrementally, recent advancements within and across the eight key elements suggest a faster transformation than we previously predicted. The marketplace is leaving its “training wheels” behind and has moved into the “first gear” of transformation.





As portfolios of new products—with each release offering more depth and breadth of driverless technology—come to market, the leap to achieving fully autonomous vehicles gets even smaller. Alliances between innovators—such as Delphi and Mobileye⁸⁸—are providing the scale of production needed to reduce costs to make the technology widely accessible.

Similarly, significant increases in press and visibility have created a means for initial consumer adoption. Pilot programs are helping boost consumer experience, providing a fully autonomous mode of transportation directly to the public. With semi-autonomous capabilities available in some new vehicles, consumers are beginning to adopt the technology by ceding some driving functions to the vehicle.

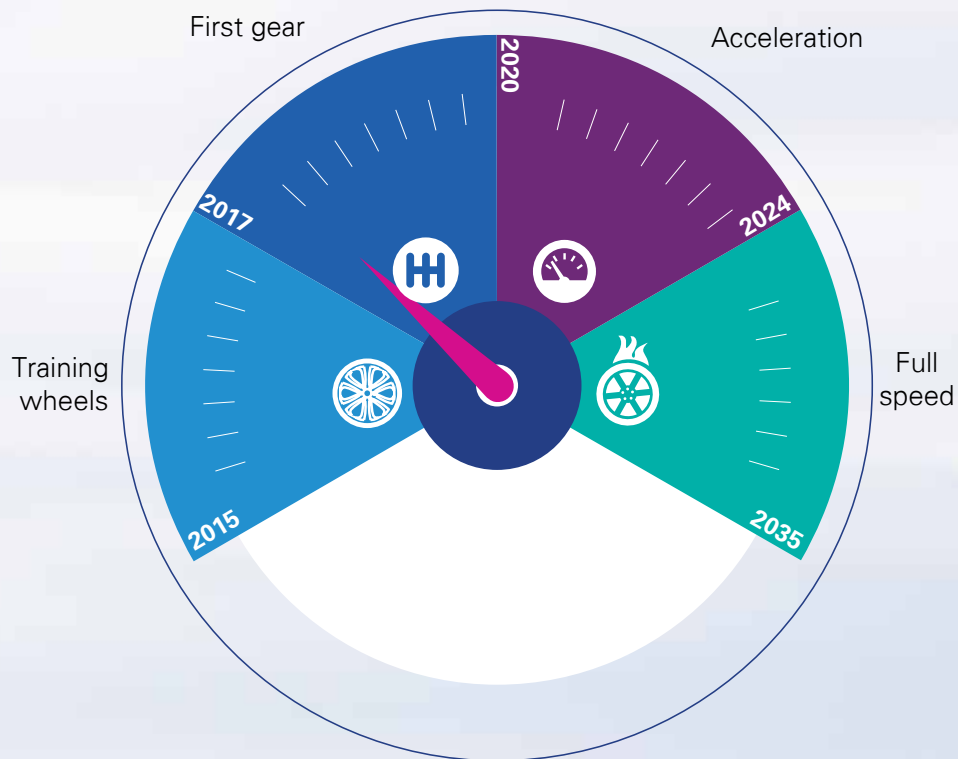
A wave of new investment is also accelerating industry transformation. In 2016, auto tech start-ups achieved highs in both deals and dollars.⁸⁹ More investment is sparking faster innovation, helping to set the stage for a potential self-driving revolution.

No one has a crystal ball to predict the future pace of change. However, based on recent industry developments, we believe the driverless landscape has shifted, creating the opportunity for market conversion sooner than anticipated. With auto manufacturers like Tesla expecting to have Level 4 self-driving technology ready by 2018,⁹⁰ each phase of change may be realized quicker than originally forecasted.

Four phases of transformation

	Phase 1 Training wheels	Currently ending
<ul style="list-style-type: none"> — Introduction to autonomous vehicles as manufacturers roll out some of the underlying technology. — High tech and traditional manufacturers accelerate plans for introduction of an autonomous vehicle. 		
	Phase 2 First gear	2017–2019
<ul style="list-style-type: none"> — Partial driver substitution capabilities grow in depth and breadth. — Widespread piloting of autonomous vehicle fleets. — More consumers are exposed to the technology, experiencing firsthand its safety and soundness. Marketplace perceptions shift towards acceptance. — Continued expansion of on-demand and car-sharing mobility options. — Introduction of first autonomous vehicles. — Potential mandate from NHTSA for V2V communications. 		
	Phase 3 Acceleration	2020–2024
<ul style="list-style-type: none"> — Majority of travel within cities and surrounding suburbs will be on-demand rather than via a personal vehicle. — Array of autonomous vehicles available for purchase. — Swift adoption of autonomous vehicles in on-demand and car-sharing fleets. — Realization of many safety gains through widespread availability of Level 2 autonomy capabilities. — Broader car stock conversion begins. 		
	Phase 4 Full speed	2025–2035
<ul style="list-style-type: none"> — Tipping point on conversion of car stock – Significant drop in overall loss frequency with severity eventually falling. — On-demand mobility becomes primary transportation option in cities and first ring suburbs. — New normal by 2035 – five years sooner than originally predicted. 		

Phases of incremental change

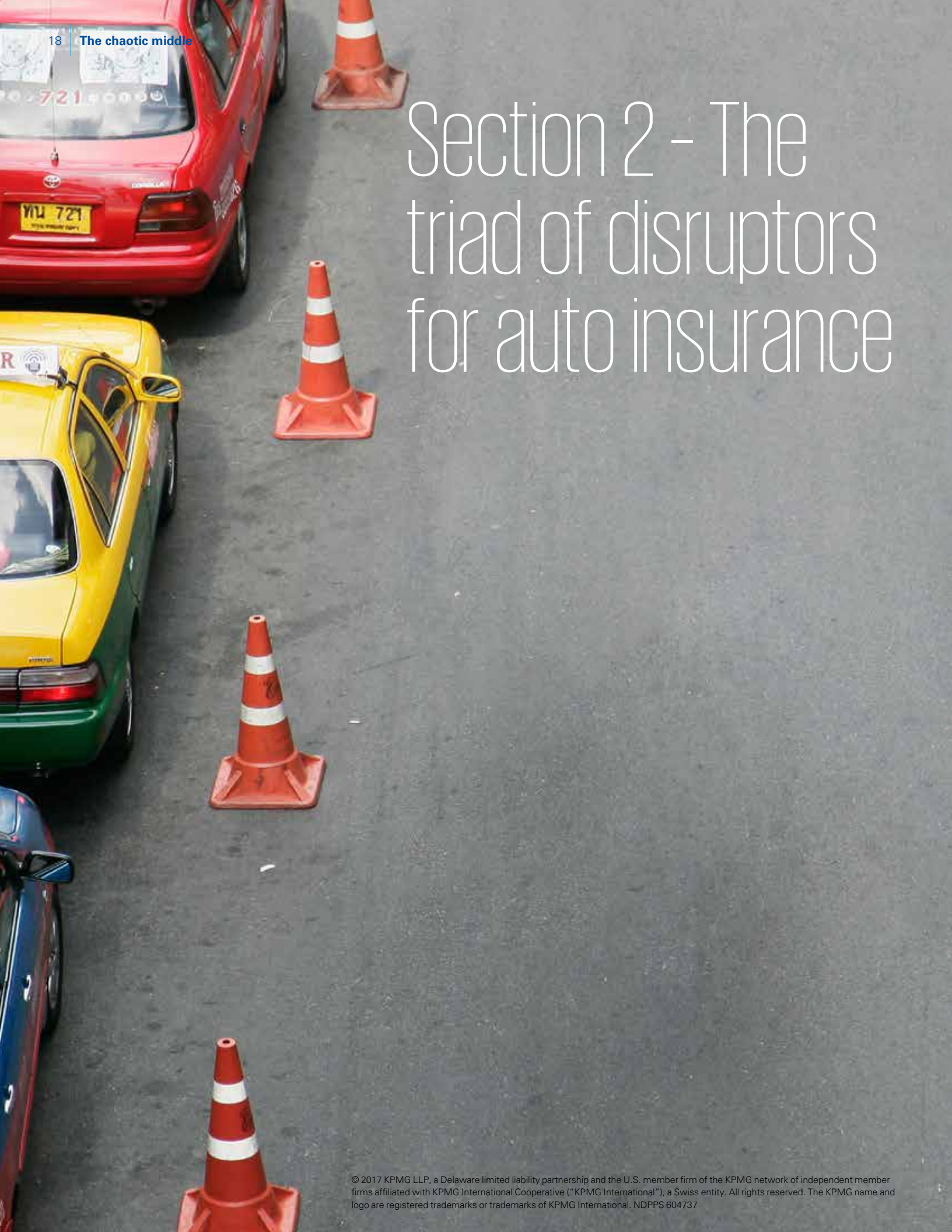


Revised

We now anticipate the transformation to hit “full speed” five years sooner than originally anticipated.



Section 2 - The triad of disruptors for auto insurance



Three potential forces may be converging to disrupt the \$247 billion premium auto insurance marketplace.⁹¹ First, autonomous technology promises to make cars increasingly safer, which will significantly reduce accident frequency and potentially accident severity too.⁹² Second, auto manufacturers could leverage new strategic positions around customer and data to displace carriers. For example, the OEMs could use new advantages to provide insurance to car buyers and take market share away from traditional insurers. And, as the car's algorithmic "brain" makes more decisions, the driving risk will move from the driver to the manufacturer and contributing vendors with products liability insurance emerging as a key cover for driving risk. Lastly, mobility-on-demand and car-sharing have spawned new business models that focus on the deployment of fleets of cars rather than individual auto ownership. The use of fleets requires commercial auto insurance rather than personal auto coverage, thereby causing further disruption to the traditional insurance landscape.

Thus, the size of the automobile insurance industry will shrink to reflect less exposure, and the allocation of the business will move from personal insurance towards commercial auto and products liability policies.⁹³ The competition for the significantly reduced remaining personal coverage will get fiercer with OEMs likely taking more share.

Disruptor #1 – Autonomous technology

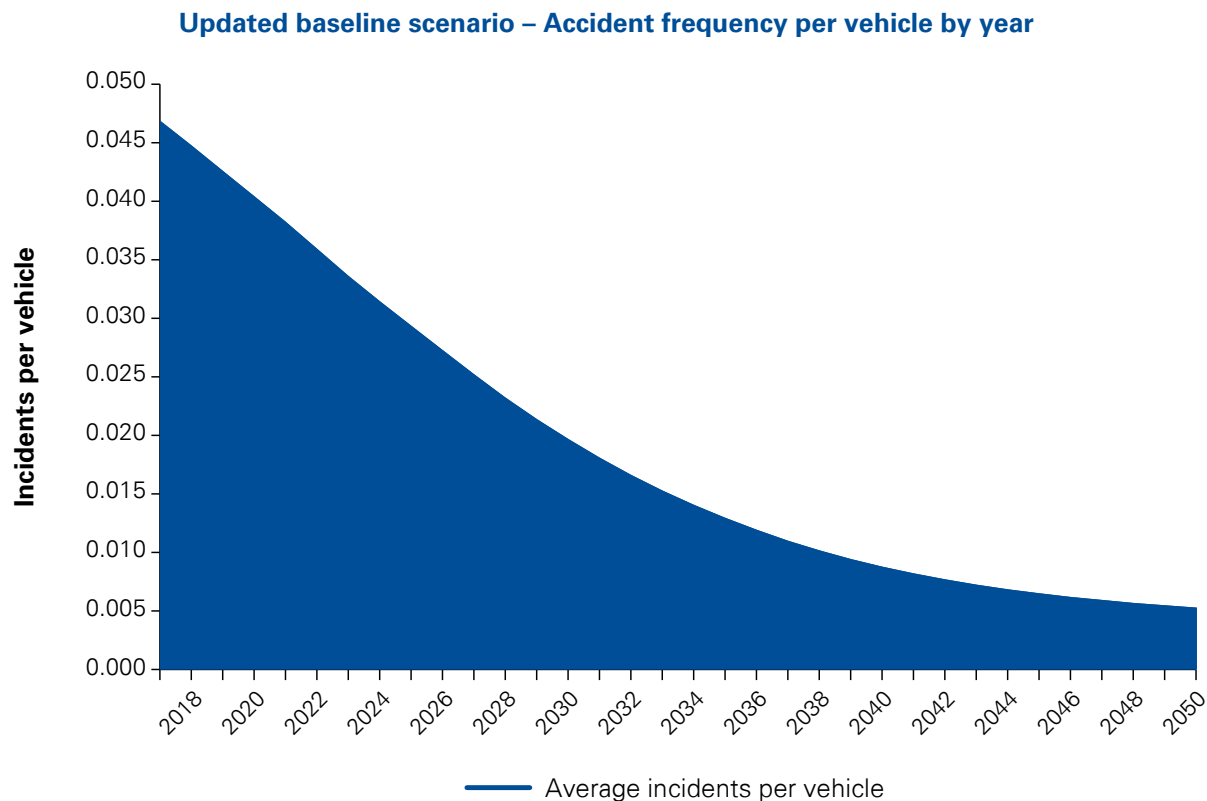
Cars will become increasingly safer with the use of autonomous technology, and there will be far fewer accidents.⁹⁴ Those accidents that do occur could ultimately be less severe due to quicker braking and other evasive actions. In aggregate, the industry's losses—the amount paid for all automobile accidents—could fall by roughly \$122 billion in nominal dollars (per the Updated Baseline Scenario model), and the real impact would be even greater.⁹⁵ As there is less driving exposure to cover, the size of the traditional auto insurance industry will shrink.⁹⁶

Our insurance task force continues to work closely with KPMG's automotive team to translate advances in autonomous technology and other proprietary research into business implications for insurance. Since our last white paper in October 2015, our actuarial models have become deeper and more sophisticated as we add more variables and insights into the underlying equations and assumptions. We also included another 10 years to the model outlook—to 2050—to provide a full cycle effect of the changes.

There are four key insights from our analysis of the disruption due to technology advances:

Technology insight #1 – Potential 90 percent reduction in accident frequency by 2050

KPMG's Updated Baseline Scenario is presented below. Our models continue to affirm an overall downward trend in the number of accidents through the cumulative benefits associated with better technology and its proliferation across the car stock. Our team estimated an approximate 90 percent reduction in accident frequency per vehicle by 2050, resulting in roughly 0.005 incidents per vehicle down from the current 0.047 incident rate.⁹⁷ When the assumption that vehicles with autonomous capabilities are likely to drive more miles in their lifetime than traditional vehicles is considered, this decrease in incidents per vehicle is even more substantial on a per-mile-driven basis. These projections are consistent with those announced in our first white paper, but show continued decline over another decade now ending in 2050. Recent claims by Tesla have given us additional confidence in our forecasts. In January of this year, Elon Musk revealed that Tesla is targeting an eventual 90 percent reduction in vehicle crashes with future versions of its Autopilot software.⁹⁸



Source: KPMG LLP actuarial analysis

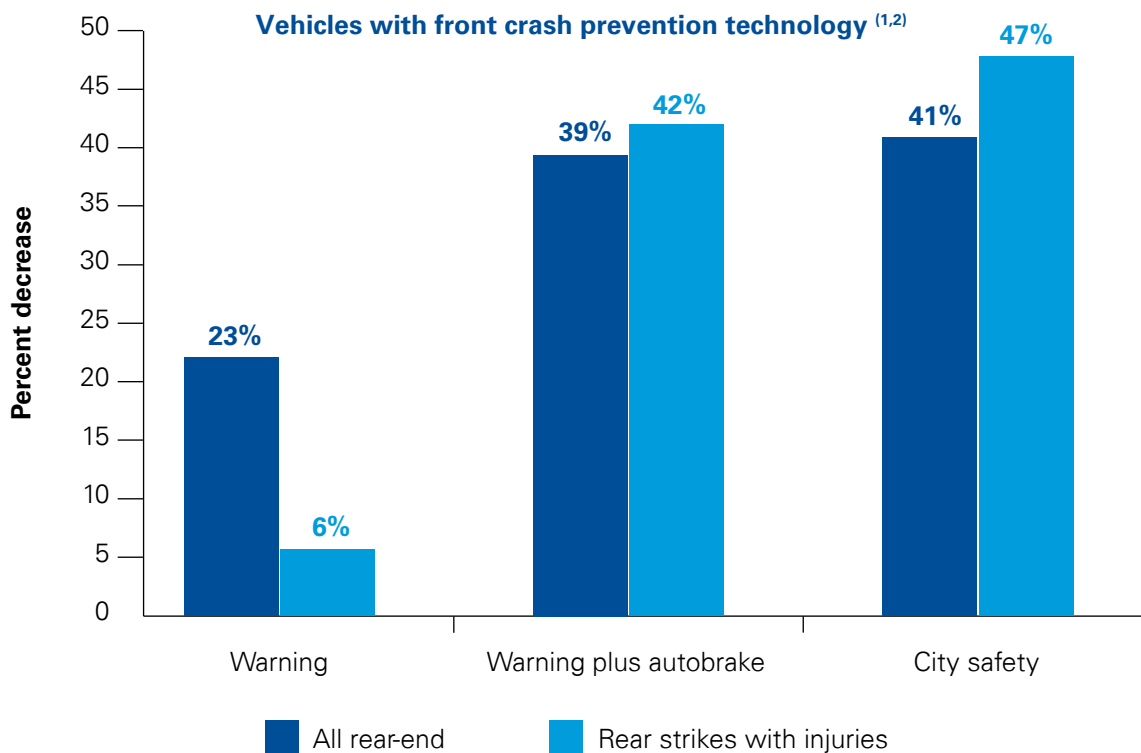
Technology insight #2 – The effects of better technology are already happening

Autonomy is making vehicles safer, with results already being realized today.⁹⁹ Crash avoidance features that underpin self-driving technology are already improving the safety profile of vehicles. According to recent studies released by the Insurance Institute for Highway Safety (IIHS)—an organization that aggregates and analyzes driving data from companies across the entire insurance industry—those vehicles that have a front crash prevention technology engaged posted significantly less rear-end accidents.¹⁰⁰

The following chart details the percent difference in police-reported crash rates between vehicles equipped with front crash prevention technology and those same models without this technology.¹⁰¹ IIHS findings show a reduction in loss frequency of between 23 percent and 41 percent of all

“rear-end strikes” depending on the type of prevention system in place.¹⁰² Those accidents with injuries posted even greater declines when two types of systems were deployed.¹⁰³ According to the IIHS, more than 700,000 police-reported crashes in 2013 could have been avoided if the vehicles were equipped with autobrake technology.¹⁰⁴

There have been recent increases in overall accident frequency over the past couple of years due to additional distractions while driving and increased miles driven resulting from the economic recovery and lower gas prices.¹⁰⁵ Our models suggest, however, that these results are a short-term bump along an overall downward trend as more cars convert to the new technology.¹⁰⁶ The IIHS study gives us further confidence in our models and overall projections.



Note: (1) IIHS Study analyzes police-reported rear-end crashes in 22 states during 2010–2014 involving Acura, Honda, Mercedes-Benz, Subaru, and Volvo vehicles with forward collision warning (“warning”) and autonomous emergency braking (“autobrake”) vs. the same models without the optional technology; (2) “City Safety” represents Volvo’s low-speed autobrake system. The test was conducted by comparing two Volvo models with City Safety vs. other vehicles without front crash prevention technology.

Source: IIHS’s research papers “Effectiveness of Forward Collision Warning Systems with and without Autonomous Emergency Braking in Reducing Police-Reported Crash Rates” and “Effectiveness of Volvo’s City Safety Low-Speed Autonomous Emergency Braking System in Reducing Police-Reported Crash Rates” and IIHS’s “Status Report, Vol. 51, No.1, January 2016”

Technology insight #3 – The cost of future accidents is less clear but will likely fall

Although the downward movement in the frequency of accidents is clear, the cost of future claims is less certain. Several counterbalancing forces are at play, and the average cost of a claim could evolve in different ways. The following chart highlights a few possible scenarios regarding the severity of an auto claim. The most basic forecast is to assume that a cost of the claim—comprising property damage and bodily injury claims—will continue to experience increases due to inflation. In this scenario, the average cost of a claim will increase from roughly \$15,400 now to \$39,400 by 2050.¹⁰⁷ More expensive component parts—like cameras, computer circuitry, and sensors—could result in average cost rising faster than historic rates resulting in a pricier scenario.

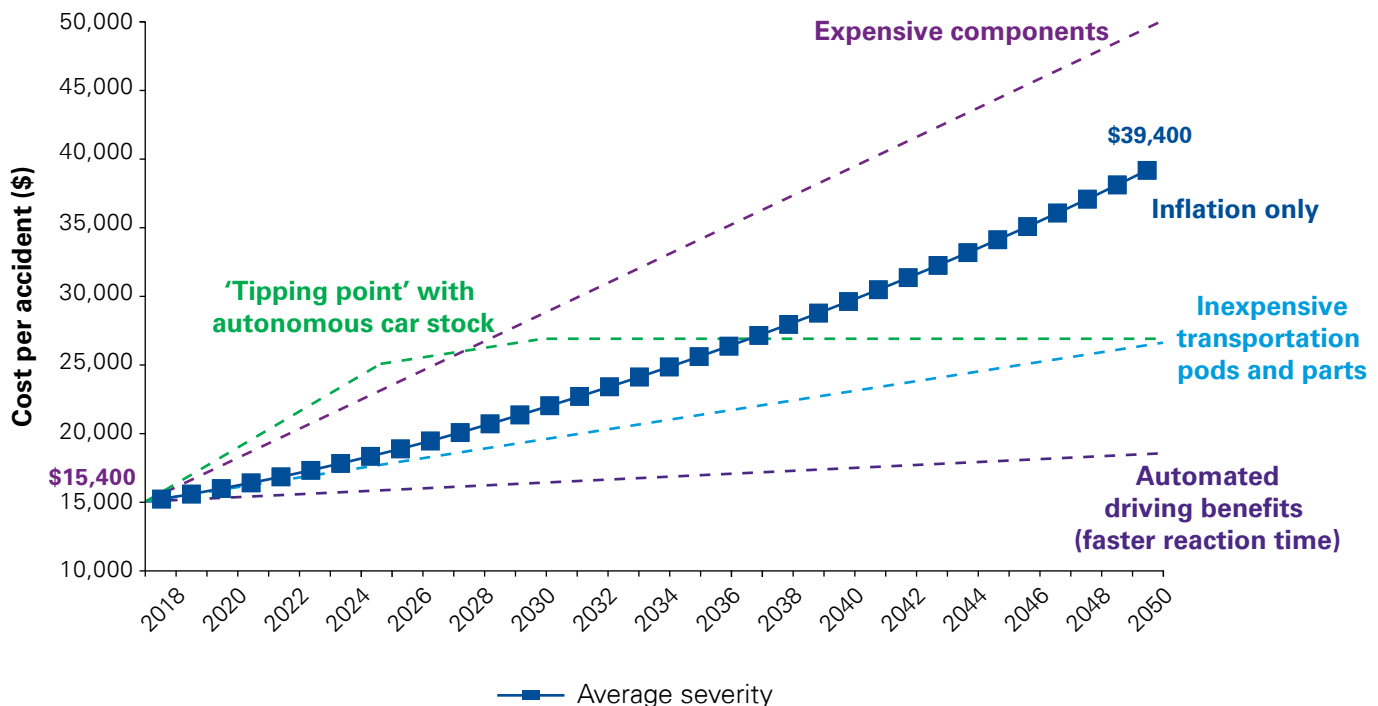
While the full impact of the technology on bodily injury is still unclear, there are, however, forces that could push the average property damage costs lower. Economies of scale are helping to drive down the cost to produce some autonomous vehicle components. For example, Ford and Chinese search engine Baidu have invested \$150 million in Light, Detection, and Ranging (LiDAR) firm Velodyne in an effort to accelerate autonomous vehicle development.¹⁰⁸ Funding has allowed Velodyne to expand production of its automotive LiDAR sensors, making them less expensive and widely accessible.¹⁰⁹ Traditionally, LiDAR sensors were known to be very costly—early systems developed by Velodyne cost roughly \$80,000. Today, the firm's latest LiDAR prototype costs about \$8,000, which is being used in

the testing of driverless vehicles. The money invested from Ford and Baidu will be used to help Velodyne lower the cost of its sensors even further, targeting a price in the mid to lower \$100s by 2018.¹¹⁰

Similarly, improved vehicle safety could help reduce average costs. Autonomous technology allows the car to identify and react to an imminent accident more quickly, and evasive actions could be taken to minimize impact. Split seconds matter. An accident happening at 30 miles per hour is likely much less severe than one occurring at 50 miles per hour. Also, the proliferation of simple, low-cost “transportation pods” in mass on-demand fleets could reduce the overall cost of a vehicle, and the associated claims cost would most likely be lower as well.

Another potential option that would decrease property damage severity even further would be a hybrid scenario. In this situation, the cost of an average claim first rises faster than historic rates due to more expensive parts being used. As more vehicles have autonomous technology engaged, a tipping point will occur about five years from now, which should begin to plateau the rate of increase. Several years later—when large fleets of autonomous transportation pods are deployed—the average property damage severity begins a downward trend; however, this would be partially offset by increased costs associated with bodily injury. Scale of manufacturing operations will reduce costs further and the adoption of less expensive materials support further declines.

Updated baseline scenario – Accident severity



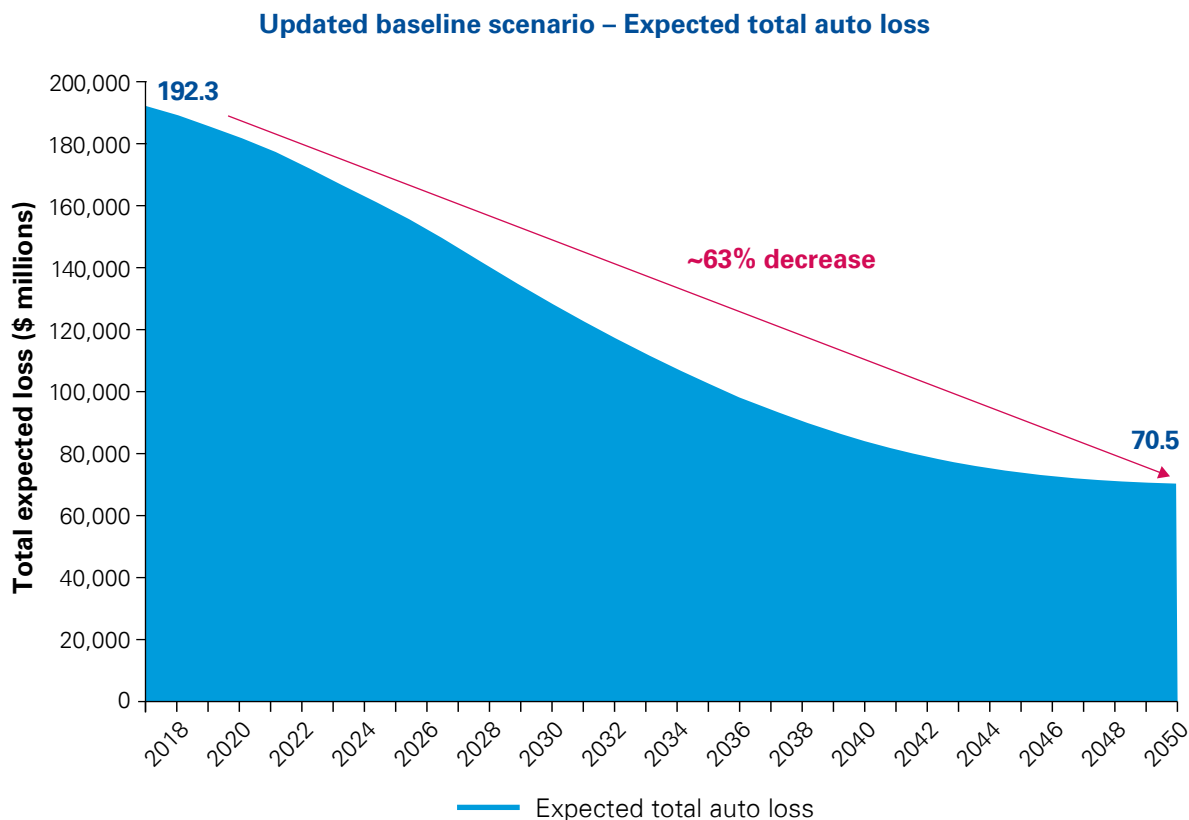
Source: KPMG LLP actuarial analysis



KPMG's models predict industry losses to decline by nearly two-thirds. As premiums follow losses, we anticipate a significant reduction in the size of the auto insurance market.

Technology insight #4 – Total losses from automobile accidents could fall by roughly 63 percent, or approximately \$122 billion

Our models suggest that total losses from auto accidents could fall by roughly 63 percent by 2050—about a \$122 billion-dollar reduction in losses.¹¹¹ Safer cars, combined with less costly accidents, together will potentially radically reshape the size of the automobile insurance industry. The magnitude of the potential reduction would have profound effects for the sector.



Source: KPMG LLP actuarial analysis

Disruptor #2 – Emergence of OEMs

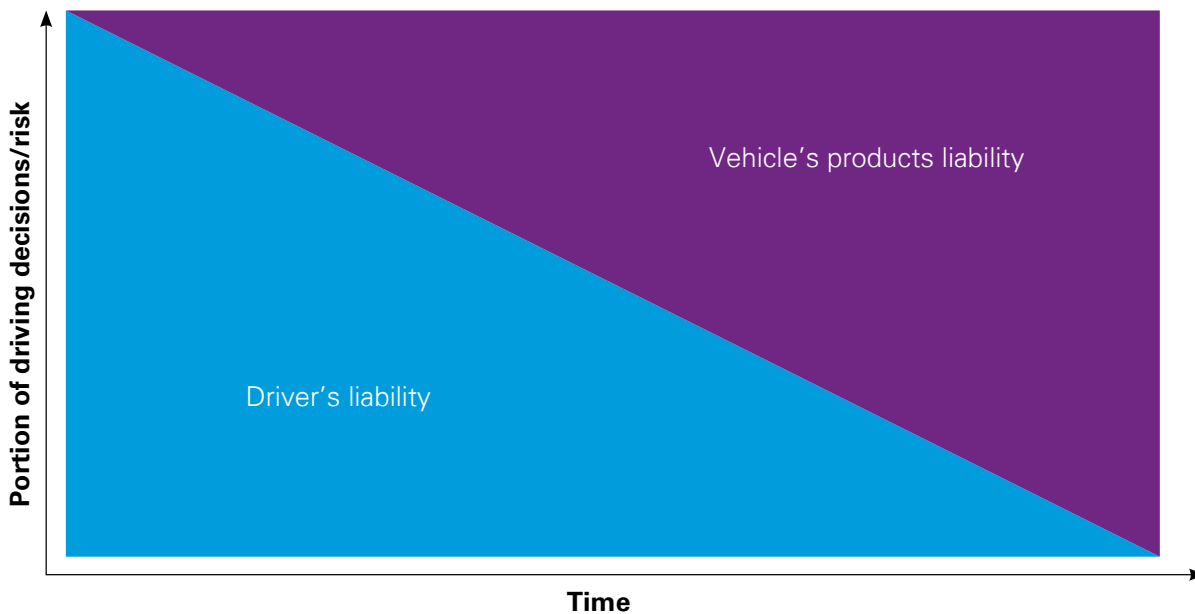
The role of auto manufacturers in the insurance industry is another potential disruptor to the marketplace. As autonomous technology becomes core to mobility, we believe that insurance will become an important consideration for automobile manufacturers. New exposures associated with the autonomous driving decisions made by their next generation of cars will in turn demand broader liability coverage. Conversely, the OEM's relationship with the automobile owner, along with control over robust new driving data, will offer competitive advantages that could up-end the way individuals traditionally buy insurance.

We believe that the OEMs will assume a new pole position around insurance. This section will explore in further detail eight important insights that could shape the OEM's insurance play.

OEM insight #1 – Shift of driving risk to manufacturers

As the vehicle's proprietary algorithmic "brain" makes more of the driving decisions, the auto manufacturer—along with the underlying vendor suppliers—will assume increasingly more of the driving risk (and associated liability) away from the individual driver. Volvo and other manufacturers announced that they would accept responsibility and liability should an accident occur due to their autonomous technology.¹¹²

Illustrative liability transition



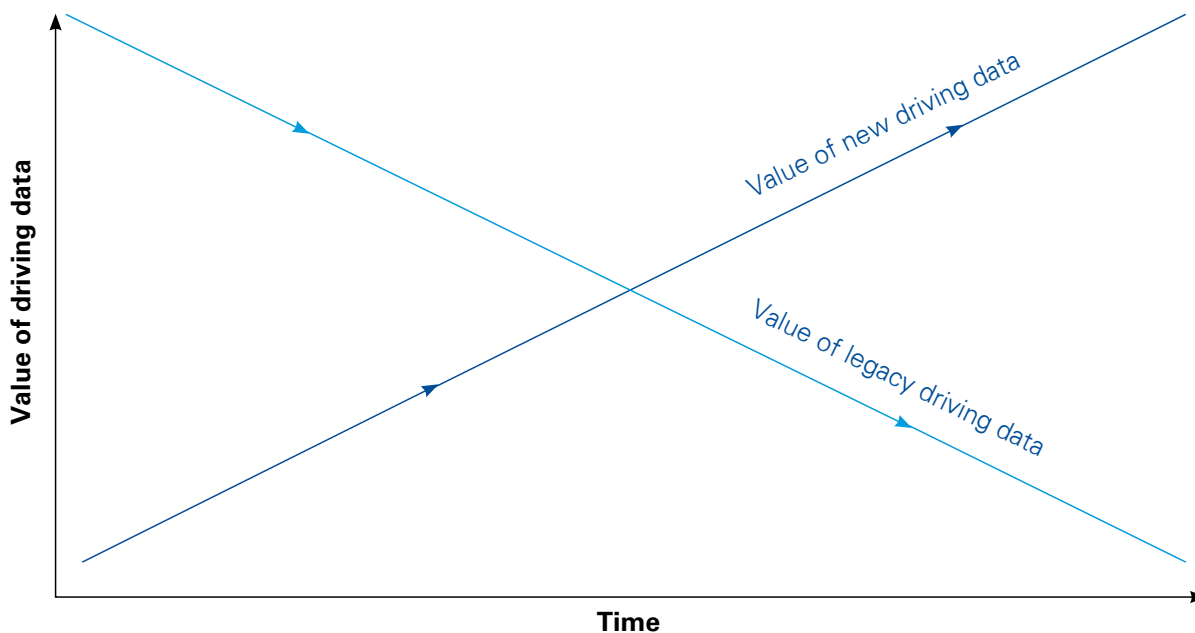
OEM insight #2 – Consolidating the legal exposure

In a hybrid environment where driving decisions are likely shared between the driver and the vehicle itself, providing insurance to both parties could prove to be a legal advantage according to our conversations with law school academics and legal advisers. This consolidation of exposure could reduce the volume of cross-suits between the driver and manufacturer about blame in case of an accident, and provide an integrated front against third-party actions.

OEM insight #3 – Watch for control of new driving data

The next generation of cars will likely capture complete moment-by-moment driving statistics, including speed, acceleration, braking, etc. With an array of sensors and cameras feeding real-time information into a “black box” repository, the wealth of information will ultimately encompass the entire driving experience including road conditions, movement of other vehicles, and weather. A history of the driving decisions made by the vehicle’s algorithmic “brain” will be recorded. Similarly, for earlier models that require or allow human intervention, data related to driver behavior will also be recorded. The relative risk associated with an individual driver will become measurable and better understood than ever before. As the depth and breadth of this driving information expands, legacy point-in-time driving data held by insurance companies will decline in relevance and value.

We believe that OEMs may ultimately get to use and control the new driving data. For their driving algorithms to learn and be aware of current road environment, the vehicle’s algorithmic “brain” will need to be continually fed data from their fleet of vehicles on the road. Contractual requirements and incentives—both financial and safety-oriented—may persuade drivers to deed their driving data to the manufacturers at the time of the vehicle purchase.

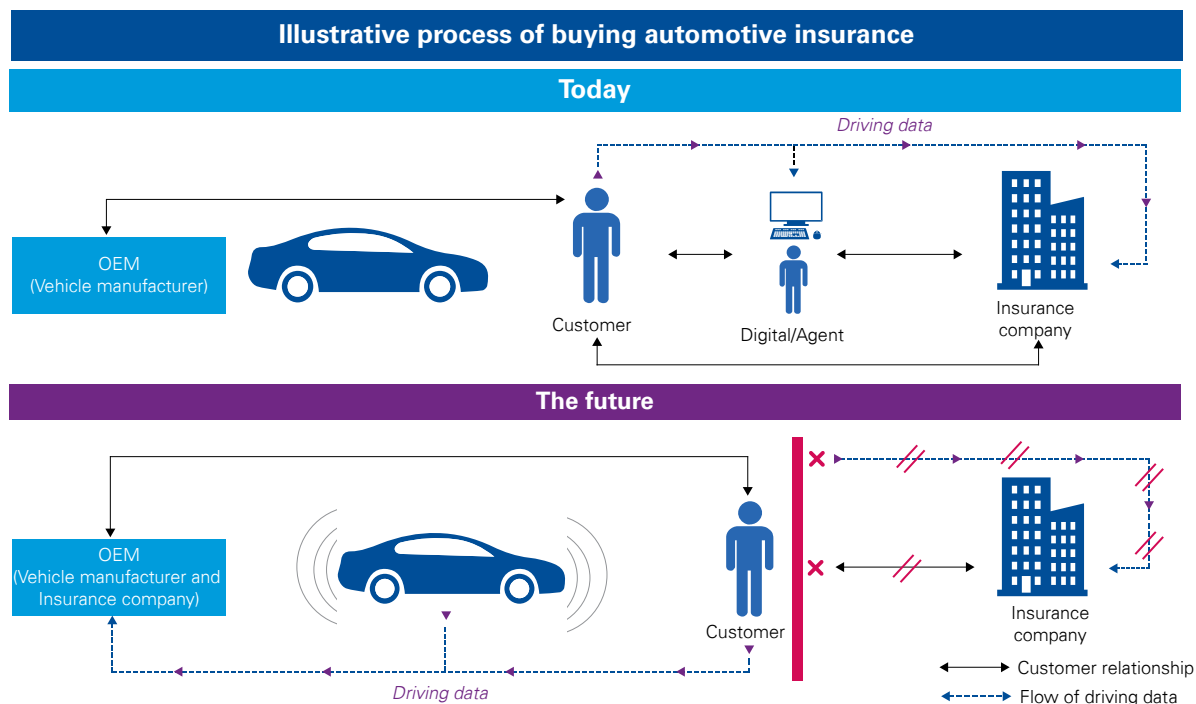


OEM insight #4 – Another option to build long-term customer relationships

Traditional manufacturers are keen to extend the depth and breadth of their customer relationships. The OEMs have an opportunity to maintain and deepen their relationships with auto buyers beyond the point of sale. Like financing and maintenance, insurance offers another ongoing touchpoint—and annuity revenue stream—with the customer.

OEM insight #5 – Disintermediation of traditional insurance companies

Control of new driving data, primacy of relationship with the automobile owner, and assumption of legal exposure allow OEMs to redefine the driving insurance marketplace. Under the historic process, the manufacturer is not fully embedded in the insurance transaction with the customer interacting separately with the insurance carrier directly or via an agent. In this traditional model, the insurance company captures point-in-time driving data and underwrites the policy on a periodic basis—typically at annual renewal.



In the future, the OEM could disintermediate the insurance company altogether. As part of the contract for the vehicle, OEMs could attain control of the “black box” driving data. We believe that the OEM will have strong competitive reasons to keep this information proprietary rather than share, since the information allows them to have critical insights on the performance of the autonomy platform as well as the performance of the driver. By leveraging asymmetric information, the OEM could price insurance more precisely and share safety gains with customers while potentially realizing margin itself. There is a win-win situation for the customer and manufacturer. To deepen and lock in the customer relationship, the OEM could provide the insurance as part of the monthly car payment, part of the sticker price, or some other convenient arrangement. The traditional insurance company could therefore find itself outside of the insurance process.



OEM insight #6 – Insurance premiums could offset the erosion of after-market parts business

As noted earlier in this paper, KPMG predicts that safer cars due to autonomous technology could reduce the frequency of accidents by almost 90 percent by 2050.¹¹³ After-market parts are a critical source of revenue for OEMs, with richer margins contributing disproportionately to enterprise profits. Fewer accidents will significantly shrink the size of the after-market parts business. OEMs will need to look for revenue diversification options, and insurance could be an attractive play. Auto manufacturers have been in and out of the insurance business over time in various capacities. While many OEMs have distribution relationships with numerous insurers, these companies have an opportunity to play a larger role in the insurance ecosystem. Presently, OEMs use financing and warranties to enhance profits at the point of sale; insurance could be a similar business that provides for some annuity in revenues and continuity of customer relationship.

OEM insight #7 – Several options exist to (re)enter the insurance marketplace

The OEM's potential (re)entrance into insurance could take a variety of forms that would evolve to match changes in its core business. There is flexibility to shift business models over time to reflect changes in the marketplace and scale of the autonomous operations/fleet. The OEM could sell driving information data to insurance companies, but this approach could jeopardize future insurance plays as it would provide potential competitors with the information necessary to gain experience underwriting these new risks. The manufacturers/dealers could sell insurance for existing carriers and act as referring agents. With scale of operation—and the assumption of more driving exposure—the OEMs may want to consider becoming insurance companies. Depending on the level of business, insurance regulatory environment and appetite of operation, the core functions could be largely outsourced to third-party vendors. A fully integrated insurance company that owns and runs the distribution, operations, and financial management could be another option.

Illustrative future-state business models

	Entity	Scenario A	Scenario B	Scenario C	Scenario D
OEMs		— Provide driving and vehicle data to insurers	— Become distributor of insurance for a selected set of carriers	— Act as an insurance company with many functions outsourced	— Become a fully integrated insurance company
	Strategic angle	— Telemetry data	— Brand, customer connectivity	— Product advantage	— Product advantage
	Revenue model	— Fees	— Commissions	— Underwriting profit and investment income (annuity) — Vehicle and parts sales	— Underwriting profit and investment income (annuity) — Vehicle and parts sales
Insurer		— License data from OEMs to underwrite policies	— Form alliance with OEMs	— Serve as third-party administrators – for example, current insurers could process the claims of the OEMs	— Transform business model to compete with new entrants — Expand into new products and services

We recognize that becoming a fully integrated insurance company is not an easy decision. To be clear, there are risks and challenges associated with such a commitment. Some key issues include implementing operational capabilities to handle large-scale policy volume, meeting statutory capital requirements, complying with a complex set of regulations across 50 states, and attaining new skills to manage and govern the business. Still, we believe the potential benefits—coupled with future market realities—may make such a move a viable alternative for some OEMs.

OEM insight #8 – OEM advantages could flip the insurance profit equation

Vehicle manufacturers could change the economics of the auto insurance industry, with the following graphic indicating how the profit equation could change. We use a hypothetical \$500 policy to illustrate the potential shifts.

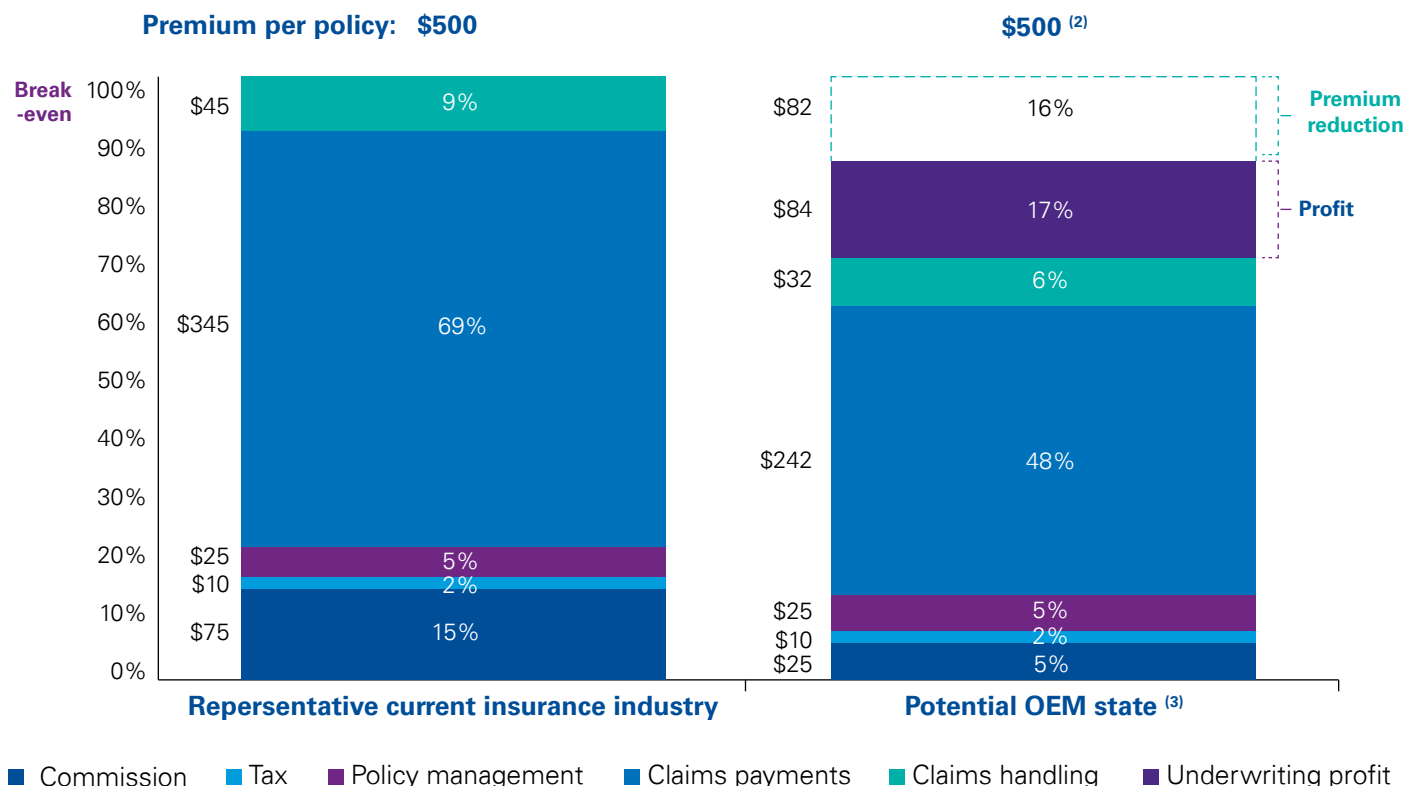
The left bar shows rough industry percentages, and, for the purposes of this example, the insurance industry is at a break-even point with premium revenue roughly equaling the amount of money paid for commission, policy management, taxes, and claims—both losses and the expense to handle the claims. Presently, claims account for the majority of outlays—\$345 for loss payments and another \$45 for handling—for a total of \$390 (about 80 percent of total costs).¹¹⁴

The OEM could potentially change the amounts paid across the core expense categories. The vehicle's algorithmic autonomous technology will reduce accident frequency (and potentially severity, too) to lower the amount of claims paid.¹¹⁵ We estimate, for illustrative purposes, that claim

costs could fall to \$274 dollars (\$242 for loss payments and \$32 for handling)—a significant \$116 reduction.¹¹⁶ Commission payments/acquisition costs could be changed from the current 15 percent average to about 5 percent,¹¹⁷ which still allows for some payments to be made to dealers to get buyer commitments to insurance. Overall, costs could fall by \$166 for the policy.¹¹⁸ We assume that to promote a “win-win” situation, the OEM would pass on some of the profits back to the consumer through lower premiums while also keeping some profits for itself.

This scenario is partly predicated upon asymmetric information. The auto manufacturer would keep driving data performance to itself, so that others would not be able to understand the improved risk profile of the vehicle. These companies would need to secure data rights up front from the buyer through transparent agreements, likely with some incentive package. The OEM would also need to lock in the insurance arrangement at this point.

Illustrative underwriting analysis ⁽¹⁾



Note: (1) Representative current insurance industry case is based on current market dynamics and for illustrative purposes only. Potential OEM state case represents a future case assuming safer vehicles; (2) \$500 represents the premium per policy before the \$82 premium reduction given by the OEM. Therefore, the actual premium paid by the policyholder would be \$500 less \$82, resulting in a premium per policy of \$418; (3) Dollar amounts and percentages are rounded for the purposes of the chart in the Potential OEM state case. Premium percentages may not equal 100 percent due to rounding.

Source: SNL Financial and KPMG LLP analysis



Insurance has the potential to drive material profits, with policy profits multiplied by the duration of renewals and the number of vehicles covered.

On average, buyers own their new vehicle for 6.5 years.¹¹⁹ Similarly, the average auto owner will hold onto their used vehicle for 5.3 years¹²⁰—creating a profit opportunity for those who insure these vehicles. With an estimated \$80 of annual profit per policy, the insurance contract could act as an annuity for OEMs, generating a stream of profit each year the vehicle is owned.

Annual profit/policy

~\$80

X

Years owned

~5

=

Potential total value/policy

~\$400

This scenario considers only an individual policy. Seen below, the potential profits could be significantly material when the margin contributions are multiplied by the number of vehicles sold and the number of years the policy is in place.

Potential total value ⁽¹⁾					
# of cars insured (millions)	Years the policy is renewed				
	1	2	3	4	5
5.0	\$400M	\$800M	\$1.2B	\$1.6B	\$2.0B
4.5	\$360M	\$720M	\$1.1B	\$1.4B	\$1.8B
4.0	\$320M	\$640M	\$960M	\$1.3B	\$1.6B
3.5	\$280M	\$560M	\$840M	\$1.1B	\$1.4B
3.0	\$240M	\$480M	\$720M	\$960M	\$1.2B
2.5	\$200M	\$400M	\$600M	\$800M	\$1.0B
2.0	\$160M	\$320M	\$480M	\$640M	\$800M
1.5	\$120M	\$240M	\$360M	\$480M	\$600M
1.0	\$80M	\$160M	\$240M	\$320M	\$400M
0.5	\$40M	\$80M	\$120M	\$160M	\$200M

Profit potential

Note: (1) This table is for illustrative purposes only, and does not include time value of money calculation.

Disruptor #3 – Emergence of mobility-on-demand

The third potential force that could disrupt the automobile insurance market is the move to alternative mobility approaches that emphasize on-demand and car-sharing fleets rather than personal auto usage. Over the past decade, the depth and breadth of these transportation alternatives have greatly expanded to become a common option for many urban and suburban residents, and we predict that the growth will only continue. As discussed in detail in our previous white paper, these new business models were designed to make mobility faster, more flexible, and cheaper. The move towards shared vehicles, rather than single ownership, has profound implications for auto insurance. More car-sharing will ultimately translate into fewer personal auto policies, while commercial coverage for the ubiquitous fleets will conversely expand.

The following section provides three insights surrounding the increase in mobility-on-demand and car-sharing.

Mobility insight #1 – New era of shared mobility has begun

We are in the midst of witnessing an extraordinary shift in the transportation industry. The extreme growth and rapid adoption of mobility-on-demand and shared services like Uber, Lyft, and Zipcar, show us that consumers are ready to accept different transportation models. The total number of connected vehicles used for ride-hailing purposes has nearly tripled over the last two years—forecasted to exceed 1.5 million in North America by the end of 2017.¹²¹

Mobility-on-demand programs allow consumers to buy the trip, and not the car, delivering benefits that are compelling to a budding base of consumers. The core benefits—convenience and cost savings—have triggered a growing demand for ride-hailing services—with Uber and Lyft as good examples. Ridership information is not widely available, but mid-year 2016 estimates show Uber totaling 15.8 million monthly active users (MAU)—the number of unique users who utilize the Uber app at least once within a 30-day period—nationally, with MAU growth of 6.6 percent from May to July.¹²² The emergence of on-demand services have begun to create social changes that are hard to ignore. Today, a millennial is 30 percent less likely to buy a car than someone from a previous generation.¹²³ As we move further into this era of shared mobility, it is very possible that the majority of personal urban travel will be on-demand rather than via a personal vehicle. With fewer vehicles purchased for private use, there will be less need for personal auto insurance.

Mobility insight #2 – Big players are making big bets

Big money is flowing into the shared mobility sector. Last January, GM invested \$500 million in Lyft, a mobility-on-demand company.¹²⁴ In parallel, the auto manufacturer announced the launch of its own car-sharing company, Maven.¹²⁵ Daimler has its Car2go business operating in eight European and North American countries,¹²⁶ while competitor BMW runs the DriveNow venture, which currently serves over 500,000 customers in Germany.¹²⁷ Volvo is partnering with Uber to test autonomous vehicles in a Pittsburgh pilot.¹²⁸ Most of the major OEMs have or are contemplating plays in shared mobility. Rental car companies are getting in on the action, too with Hertz leveraging a massive global footprint of 8,500 locations in 150 countries¹²⁹ to expand a car-sharing business—Hertz On Demand.¹³⁰ This activity is likely a prelude to more investments and strategic alliances.

Mobility insight #3 – Mix of insurance lines will change

Shared mobility is already a part of many people's daily lives, primarily in urban areas for the time being, but the capabilities and reach of these companies are only growing with the enhancement of autonomous technology and new partnerships, such as GM-Lyft¹³¹ and Toyota-Uber.¹³²

For example, Lyft president John Zimmer expects that autonomous fleets will replace a significant portion of what are currently personally owned vehicles as people shift from owning a vehicle to using mobility-on-demand instead.¹³³ But as shared mobility becomes more prevalent, what changes can we expect to see in the auto insurance market? Will vehicles still be owned predominantly by families and driven for personal use? Or will mobility-on-demand and ultimately driverless fleets continue to take on a larger role in the industry?

The answers to these questions have several implications on the future of the auto insurance market. While we are confident that the size of total losses will decrease significantly, the types of losses could also change as autonomous vehicles might require new types of coverage. This would lead to a disproportionately larger decrease in personal auto losses as new coverages replace the old.

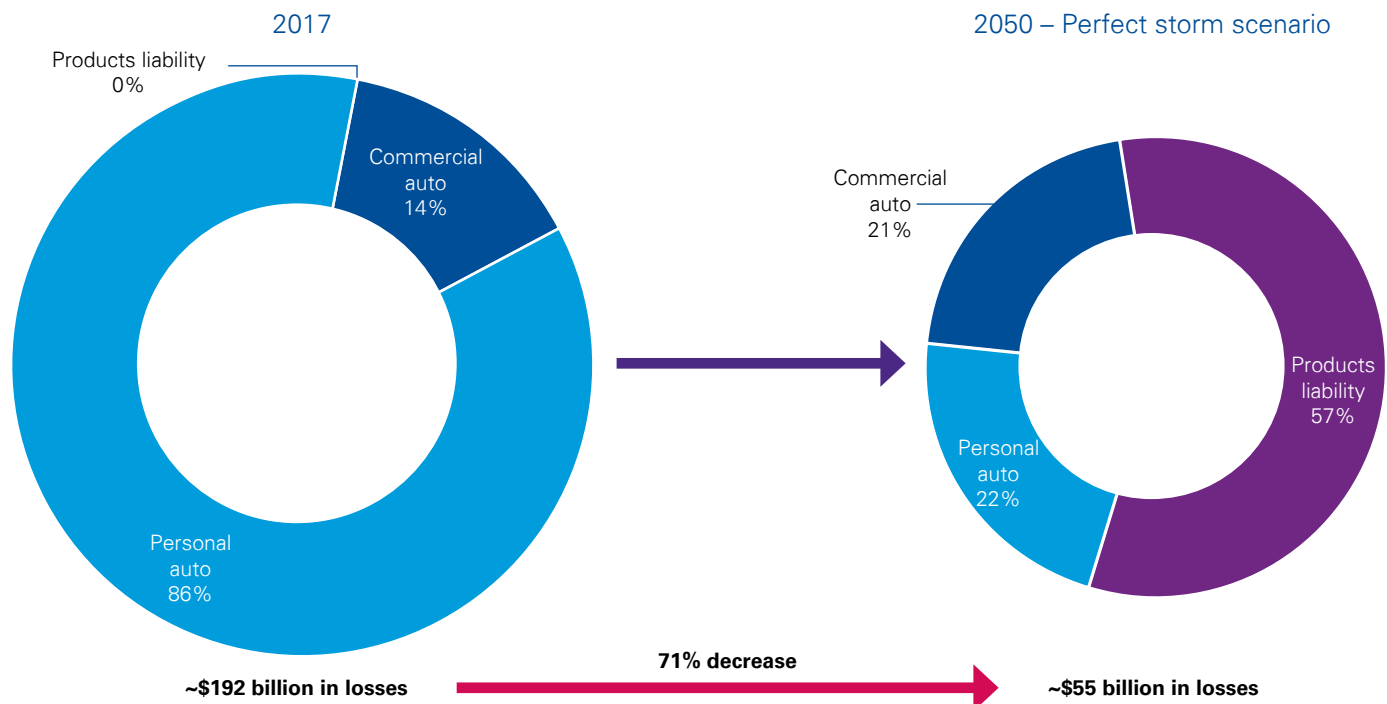
To truly appreciate the impact this will have on insurance companies, it is important to understand that auto losses

help determine premium. This is because auto insurance companies set premiums at amounts that will match or slightly exceed overall claims and other costs. Set premiums too low, and the company loses money; set them too high, and they lose customers. This means that as overall auto losses decrease, so too will premiums—an insurance company's main source of revenue.

Presently, the personal auto insurance line of business dominates the \$247 billion domestic auto insurance industry—accounting for approximately 87 percent of total premiums.¹³⁴ We envision a radical reallocation of premiums across different insurance lines of business. According to our Perfect Storm Scenario, by 2050, personal auto insurance could become a small component of the industry, with only 22 percent share of total sector losses,¹³⁵ which will also likely impact industry premiums.

As car-sharing fleets take a greater share of mobility travel, the underlying commercial auto line of business will also take a larger share of industry losses.¹³⁶ In addition, the concurrent move towards autonomous technology will pass more driving risk to the auto manufacturer and away from both the individual and fleet owners of cars. The shift to autonomous technology will lead to the expansion of the products liability line of business—given that the technology is now being insured rather than driver—and therefore, a further reduction in personal auto insurance.¹³⁷

Loss splits between personal auto, commercial auto, and products liability



Source: KPMG LLP actuarial analysis

Section 3 – Perfect storm:

Modeling the potential impact

A new mix of auto insurance lines

Different vehicle use models will have significant implications for the type of insurance sold

Types of coverage for a diverse set of use models

Personal auto claims currently make up 86 percent of auto losses,¹³⁸ but with a shift to commercial auto and the introduction of products liability for autonomous vehicles, we expect the personal auto piece of the pie to shrink significantly. Commercial auto currently makes up 14 percent of losses,¹³⁹ but this is likely to increase as a percent (albeit as a larger portion of a smaller loss pie) as we transition to fleets of cars operating under the umbrella of a company—such as Uber and Lyft.

Regardless of personal or commercial vehicle use in the future, as autonomous technology becomes more common, we expect to see a new type of coverage, products liability, develop into a significant portion of the auto insurance market.

Example #1 – Personal vehicle use only

For an autonomous vehicle with a manual driving option, owned by an individual and driven for personal use only, several different coverage types could apply. If the vehicle is being operated manually, then losses would be covered by personal auto insurance, the same as it is today.

If the vehicle is in autonomous mode, then damage could be covered by products liability, and the technology or manufacturer would be liable for covering losses, since software, not a person, is driving.




Damage can also result without any driver or technology error though. Personal comprehensive insurance coverage would still be required to cover losses resulting from unavoidable acts like hail, falling branches, deer jumping into the road, etc.

Example #2 – Personal and commercial vehicle use

If we take the current mobility-on-demand model, employing personally owned and person-driven vehicles also used for commercial use, then there will be a different set of auto insurance coverages required. When being driven for personal use, the same personal coverage as Example 1 will apply. When being used in a commercial context, like driving passengers and accepting fares, commercial coverage will be required. Depending on who or what is operating the vehicle, losses will either fall into the commercial auto losses subsection we see in the market today, or they will fall into a new category of products liability. Again, personal comprehensive coverage will be required for unavoidable acts.

Example #3 – Commercial vehicle use only⁽¹⁾

Finally, we could see more changes with the potential for fleets of autonomous vehicles operating only for commercial use. Picture the business model airlines use for plane travel, but with cars. Damage to, or caused by, vehicles owned by companies and operating autonomously for commercial purposes will be covered by products liability insurance, with the manufacturer or technology being liable for the damage. Comprehensive losses will still occur and these would fall under the commercial comprehensive coverage category.

Illustrative future-state insurance coverage by driving model				
Driving model		Collision risk ⁽²⁾		Comprehensive risk
		Manually operated	Vehicle operated	Unavoidable acts ⁽³⁾
 Personal use		Personal auto	Products liability	Personal auto
 Fleet of drivers		Commercial auto	Products liability	Commercial auto
 Personal/fleet ⁽⁴⁾		Hybrid coverage ⁽⁵⁾	Products liability	Hybrid coverage

Line of business

Note: (1) For fleets of autonomous vehicles operating only for commercial use, a significant share of what is projected as commercial auto may go to a self-insurance mechanism; (2) Collision risk includes bodily injury due to collisions; (3) Unavoidable acts describe losses resulting from incidents such as hail, falling branches, deer jumping into the road, etc.; (4) Personal/fleet models refer to the current mobility-on-demand model, employing personally owned and person-driven vehicles also used for commercial purposes (e.g., Uber and Lyft); (5) Hybrid coverage indicates both personal and commercial coverage.



How will cyber risk impact the auto insurance marketplace?

It is important to also consider new risks associated with autonomous driving. Cyber risk—the risk that autonomous vehicles are hacked, either for private usage data or for more sinister motives—will likely require coverage for this new era of driverless vehicles. Cyber risk is not a risk currently covered in the personal, commercial, and products liability coverages analyzed in this report.

A Munich Re survey, conducted on-site at the Risk and Insurance Management Society Conference in April 2016, found that 55 percent of risk managers feel that cybersecurity is the greatest insurance concern associated with autonomous vehicles.¹⁴⁰ Tony Kuczinski, president and CEO of Munich Reinsurance America, Inc. weighed in, “As autonomous vehicle technology progresses, the potential risk exposures and their implications for the insurance industry and society will continue to evolve. Cybersecurity in particular is one area we are watching closely, as the vulnerability and implementation of safeguards for AVs remains to be seen.”¹⁴¹

With over-the-air technology updates increasing—from 4.6 million vehicles in 2015 to a projected 43 million by 2022¹⁴²—cyber risk and the insurance to cover it will become more and more important.

An uncertain future

Depending on how the three disruptors—technology, competition, and new mobility—impact the insurance market, a variety of scenarios are possible.

Frequency, severity, and loss allocation

In our previous white paper, *Marketplace of change: Automobile insurance in the era of autonomous vehicles*, we leveraged our internally developed actuarial model to analyze the potential future changes in the auto insurance market. This analysis highlighted the significant reduction in accident frequency, the expected increase in accident severity and the likely shift in the mix of insurance lines.

Since then, the KPMG actuarial team has updated its model in order to capture technological improvements, industry announcements and increasing market acceptance of autonomous technology. The revised model has the flexibility to change assumptions to reflect a variety of possible scenarios for the auto insurance market. In addition to extending the time horizon 10 years—through 2050—we developed an Updated Baseline Scenario and a Perfect Storm Scenario to reflect different possible outcomes, depending on the timing and magnitude of the triad of disruptors discussed previously.

The model takes several key variables into consideration including, but not limited to:

- Expected total loss
- Loss by coverage type
- Loss frequency
- Loss severity
- Annual miles driven per vehicle

Updates to these variables, combined with key trends, adoption curve assumptions and shifted phase start dates allowed us to develop scenarios reflecting the possible impact on the future auto insurance market.

Potential automobile insurance market scenarios: 2050

Key metrics	Today	2050 scenario 1 – Updated baseline	2050 scenario 2 – Perfect storm
Expected total loss (claim \$)	\$192 billion	\$71 billion	\$55 billion
Loss by coverage type	Personal: 86% Commercial: 14% Products Liability: 0%	Personal: 44% Commercial: 22% Products Liability: 34%	Personal: 22% Commercial: 21% Products Liability: 57%
Loss frequency (per 100 vehicles)	4.7 accidents	0.5 accidents	0.6 accidents
Loss severity	Total cost per incident: \$15k <ul style="list-style-type: none"> — Bodily injury: \$6k — Property damage: \$9k 	Increase in total cost per incident from \$15k to \$39k <ul style="list-style-type: none"> — Bodily injury: \$6k to \$18k — Property damage: \$9k to \$22k 	Increase in total cost per incident from \$15k to \$29k <ul style="list-style-type: none"> — Bodily injury: \$6k to \$18k — Property damage: \$9k to \$11k
Annual miles driven per vehicle	12k	Gradual increase from 12k to 14k as the car stock converts to autonomous vehicles	Gradual increase from 12k to 15k as the car stock converts to autonomous vehicles

Source: KPMG LLP actuarial analysis



Our new scenarios continue to show a significant decrease in accident frequency, with an almost 90 percent reduction per vehicle by 2050.¹⁴³ This drop is even more staggering when the 25 percent increase in miles driven per vehicle over the same time span is considered. This increase in miles driven is discussed in our automotive practice's white paper, *The clockspeed dilemma: What does it mean for automotive innovation?*: "Younger and older age groups are making small changes in their mobility decisions that will drive big changes in personal miles traveled. Our models project as much as an additional trillion or more by 2050."¹⁴⁴

The paper goes on to explain that the substantial increase in miles driven is attributable both to the ability of autonomous vehicles to be on the road during times that traditional, personally owned vehicles are sitting motionless in a garage, and the ability of the young and the elderly to use vehicles when they have historically been unable to.¹⁴⁵

As previously discussed, there are several moving factors contributing to the future of the automobile industry, and therefore the auto insurance industry. Depending on technological improvements, market players, consumer mobility choices, and regulatory decisions, the coming auto insurance market could take many forms.

Scenario #1 – Updated baseline scenario

Incremental change

KPMG's Updated Baseline Scenario projects expected total auto losses through 2050, including an estimated allocation for the three previously discussed lines of insurance: personal auto, commercial auto, and products liability. The results stem from the KPMG actuarial model analyses, including a variety of factors, such as the continued increase in safety technologies until fully autonomous vehicles are predicted to be widely available in 2025.

A new component of the model allows us to incorporate different use model scenarios for autonomous vehicles. The Updated Baseline Scenario shows the outcome if the market were to experience a gradual turnover in the car stock to autonomous vehicles, a modest increase in ridesharing, and a limited transition to products liability insurance.

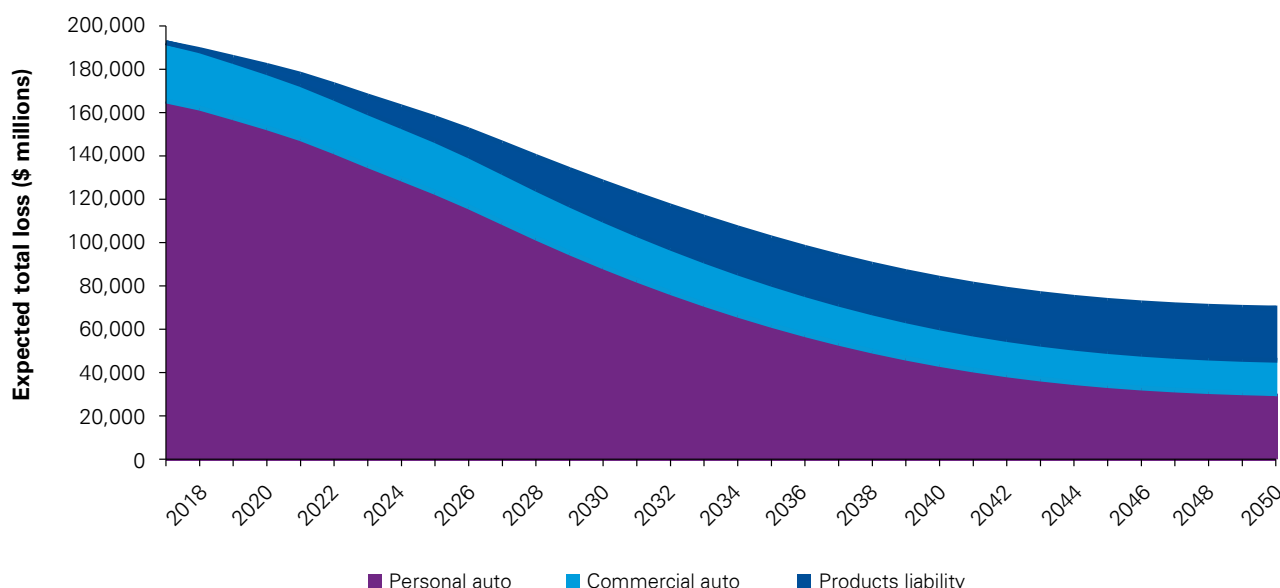
The model reflects a nearly complete adoption of autonomous technology by 2050 and an almost 90 percent reduction in accident frequency per vehicle by then, resulting in roughly 0.5 incidents per 100 vehicles.¹⁴⁶ The reduction in accident frequency would result in a decrease in both claims and overall losses (and therefore insurance premiums) with an estimated decrease of 71 percent per vehicle and a 63 percent decrease in total losses, resulting in approximately \$71 billion in total losses or roughly a \$122 billion reduction from today's amount.¹⁴⁷

This scenario also factors in the potential increase in severity—total loss per claim gradually increasing from \$15k to \$39k¹⁴⁸—due to both the increased cost of high tech components powering autonomous features of vehicles and historical claim cost inflation. The increase in severity partially offsets the immense reduction in losses due to decreases in accident frequency.

This scenario projects a slow shift from personal vehicles to ridesharing, resulting in 44 percent of losses still attributable to personal automobile insurance in 2050.¹⁴⁹ While 44 percent of the market would still be personal auto, the significant decrease in total loss results in a 81 percent decrease in overall personal auto losses, from around \$165 billion to about \$31 billion.¹⁵⁰

As previously discussed, an increase in ridesharing would lead to a rise in the percentage of vehicles being used commercially,⁽¹⁾ which accounts for 22 percent of total losses in this scenario.¹⁵¹ The remaining 34 percent of losses would be covered by products liability insurance,¹⁵² a new offering relevant for vehicles that drive themselves, as the accident will be attributable to the underlying technology rather than the driver. This, the more cautious of our two scenarios, still projects a significant decrease in losses—especially for personal auto—requiring insurers to develop their commercial and products liability lines of business if they wish to provide competitive offerings in the auto insurance market.

Updated baseline scenario – Expected loss allocated to products liability, personal auto, and commercial auto



Note: (1) As previously noted, a large portion of commercial fleets may be self-insured, resulting in a further decrease in the commercial insurance market.

Source: KPMG LLP actuarial analysis

Scenario #2 – Perfect storm scenario

Major disruption

The second scenario addresses the possibility that many of the projected assumptions could come to fruition simultaneously and might be more severe than in the Updated Baseline Scenario. This would significantly increase the overall negative impact and create a particularly critical state of affairs for the auto insurance industry—a perfect storm.

This scenario includes a combination of factors. The first result is that the allocation of losses would shift heavily—57 percent of overall losses—towards products liability.¹⁵³ This coverage allocation shift would be the likely result from a significant increase in the number of autonomous vehicles in the car stock, leading to a higher percentage of losses attributable to the underlying autonomous technology.

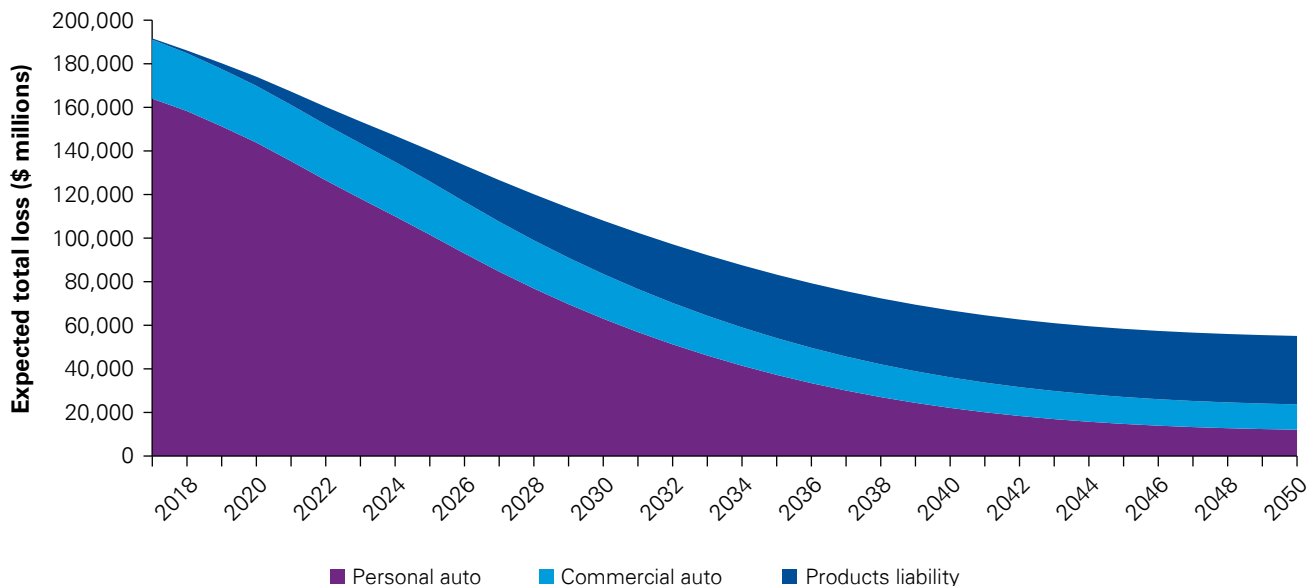
The Perfect Storm Scenario contemplates a situation whereby safety features in autonomous vehicles might actually improve severity, making claims more affordable over time. In this scenario, property damage increases from \$9k to \$11k per accident, and while this looks like an increase in severity, the increase is far less acute than we would expect when compared to historical severity increases.¹⁵⁴

Severity could decrease—in real terms—in two ways. First, the faster reaction times of autonomous driving could lead to impacts at lower speeds. Second, as autonomous technology scales up, low-cost “transportation pods” become commonly used in fleets of vehicles. These pods might lack the luxuries of modern vehicles, being built with cheap components for the sole purpose of getting from point A to point B. In this instance, the pods would also be far cheaper to replace than the vehicles of today, leading to a decrease in severity.

Either of these would lead to a decrease in the average property damage cost of claims and—combined with the nearly 90 percent decrease in accident frequency—a cumulative decrease of 71 percent in total losses, or roughly a \$137 billion reduction from today’s amount.¹⁵⁵

The Perfect Storm Scenario combination of a decrease in overall losses and a shift towards products liability losses, results in a 93 percent decrease in personal auto losses, from \$164 billion to just over \$12 billion.¹⁵⁶ With the amount of money being invested in autonomous technology, new vehicle use models, the increase in consumer acceptance, and the social value of safer vehicles and roads, this scenario is not as unlikely as it may seem. As insurance premiums typically follow losses, it is important for insurers to consider where and how they would replace the loss of 93 percent, approximately \$152 billion of losses and the corresponding premium, of their core business.¹⁵⁷

Perfect storm scenario – Expected loss allocated to products liability, personal auto, and commercial auto



Source: KPMG LLP actuarial analysis

The black swan or an entire flock?

Have we entered into a period of sustained disruption? Are we now dealing with a flock of black swans?

In his award winning 2007 book, *The Black Swan: The Impact of the Highly Improbable*, Nassim Nicholas Taleb, a finance professor and former trader, describes a Black Swan event as:

“...an outlier, as it lies outside the realm of regular expectations, because nothing in the past can convincingly point to its possibility. Second, it carries an extreme ‘impact.’ Third, in spite of its outlier status, human nature makes us concoct explanations for its occurrence after the fact, making it explainable and predictable.

I stop and summarize the triplet: rarity, extreme ‘impact,’ and retrospective (though not prospective) predictability.”¹⁵⁸

The financial crisis has often been cited as one of the more profound Black Swan events in recent memory. For example, according to one financial expert, more than 70 percent of collateral debt obligations (CDOs) in this period defaulted despite the fact that approximately 75 percent of these debt securities received a AAA rating from credit agencies.¹⁵⁹ For a point of reference (and not a pure “apples to apples” comparison), corporate bonds rated AAA have had a historical cumulative default rate of less than 1 percent¹⁶⁰ – a far cry from the significant number of CDOs that went bad.¹⁶¹

Does the continued proliferation of autonomous vehicle technology represent the next Black Swan event, but for the auto insurance industry? If one looks at Taleb’s criteria for Black Swans, it certainly could, especially as it relates to the first of two components of the author’s “triplet”:

Rare – For more than 100 years, human beings have been driving vehicles—now, in the near future, algorithms and computer software will operate those same cars, which ultimately represents a dramatic shift in the nature and risk of vehicles on the road.

Extreme “impact” – The effects could be far reaching—private and commercial auto insurance is a \$247 billion industry,¹⁶² thereby by making the potential disruption by this revolutionary technology sizable.



Section 4 – Chaotic middle:

Dual challenge facing insurers

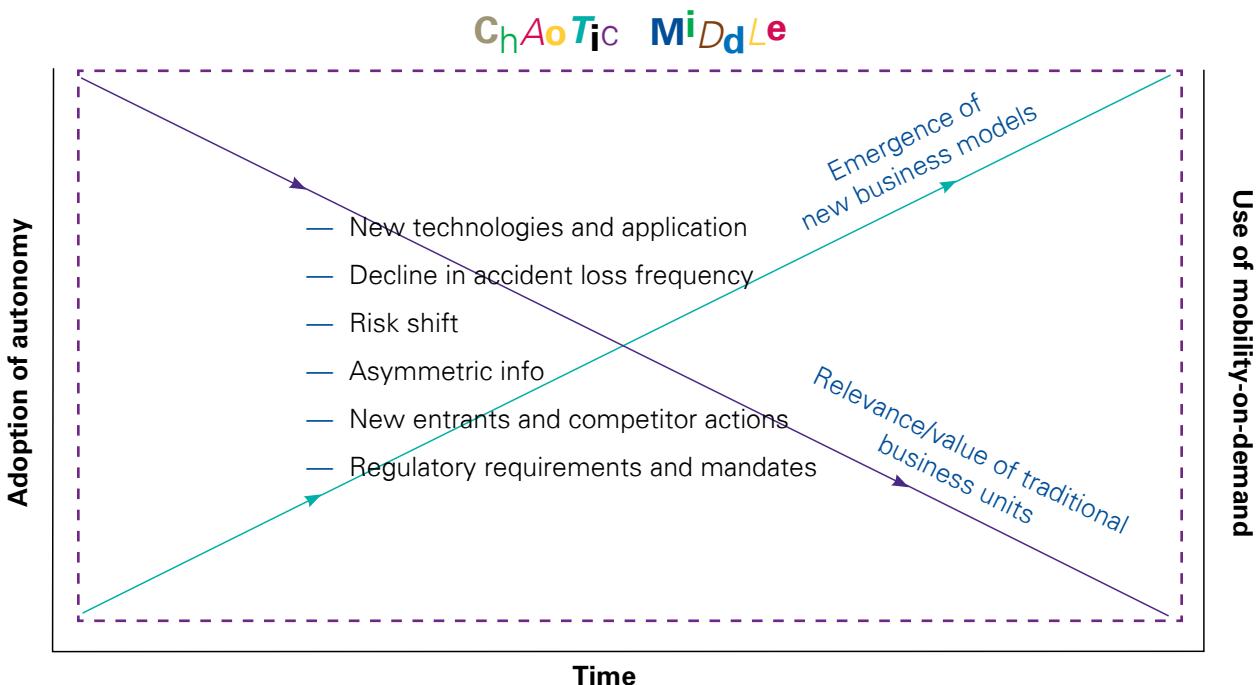


Everything could change

As previously discussed, a triad of disruptors—technology, competition, and new mobility—have the potential together to drive a transformation of the entire automotive ecosystem, with particularly severe implications for the auto sector. From our perspective, almost every aspect of this insurance marketplace will be put in flux. Just consider the implications of the potential changes ahead:

-  **Technologies will make cars safer, resulting in radically less accidents and lower severity of costs**
-  **Urban consumers will use on-demand and car-sharing platforms to meet the majority of mobility needs**
-  **Car stock will shift from self-owned vehicles towards mobility fleets**
-  **Data—which will emanate from the vehicle—will be broader, deeper, and potentially real time, which will force changes in core operations around underwriting, product development, and claims**
-  **Risk will shift from a human driver to the manufacturer/suppliers (“Driver” vs. “Driving” risk)**
-  **New competitors—led by OEMs and other high-tech entrants—could disintermediate insurers from both customers and data**
-  **Some carriers—severely challenged by a declining overall automobile premium volume—could resort to irrational pricing to capture cash flow**
-  **Regulations and mandates could alter the legal and competitive landscapes**

KPMG anticipates a “chaotic middle” over the next 10–15 years, as insurance companies absorb and respond to these changes. As old business models and strategies become increasingly obsolete, carriers will need to identify new ways of doing business. This is not incremental change but rather a radical rethink of the core mission of the company.



The dual challenge ahead

During this period of transformation, insurance companies will face a dual challenge. As their automobile books shrink in size, insurance executives will need to understand the pace of their respective downslope and manage the business through the change. The irony is that to be successful and relevant, insurance companies will likely need to invest into this declining line of business to update core functions to reflect new risks, technologies, and data. In parallel, the leadership team will need to identify alternative products and services to close the gap in revenues lost to the declines in automobile premiums.

This diversification approach will also require significant investments—both for financial commitments and executive team mindshare. The ability to balance both imperatives simultaneously will be difficult yet critical for a company's continued success—if not long-term survival.

We want to avoid playing a fear card and recognize that much is uncertain about how the future will evolve. Still, we are convinced that change is coming and that now is the time for companies to plan for multiple scenarios. The following table describes in further detail the dual challenges that insurance carriers will need to address.

Optimize the downslope in auto book

- Predict degree and timing of the marketplace disruptions. Develop a point of view on pace and degree of change. Identify and monitor leading indicators
- Localize the marketplace changes to the company's own auto book of business
- Determine how best to manage expense in a shrinking market. Understand variable, step, and fixed-cost structures. Develop cost management scenarios
- Determine new pricing and product strategies
- Understand how core operations—products, underwriting, claims, customer service—will need to change
- Identify level and timing of investments
- Synthesize analyses into comprehensive financial forecasts/scenarios
- Develop messages to key stakeholders like employees, customers, analysts, and shareholders



Diversify into new products and services




- Test the company's core mission—what services and products will be provided and to which target customer segments
- Identify current and potential areas of competitive advantage. Understand the sustainability of position with upcoming market dynamics
- Develop a point of view on competitor shifts—how will other auto insurers respond and adjust strategies. Determine how your strategy will be similar or vary
- Translate analysis into a broader diversification strategy—products/services and market positioning
- Identify key gaps in portfolio and determine options to close. Consider build, buy, or align. Consider target businesses and alliance partners
- Determine the level and timing of investments
- Synthesize analyses into comprehensive financial forecasts/scenarios. Link with the similar efforts on the auto book to gain an enterprise perspective
- Develop messages to key stakeholders like employees, customers, analysts, and shareholders



Insurance industry response to the pending change

With the dual challenge ahead, we thought it important to understand how the insurance industry has responded thus far to the potential disruption. Since the release of our previous white paper, our Task Force has had the opportunity to meet with many executives, associations, and regulatory bodies across the insurance industry to discuss our research and share our perspectives. From those conversations, we have found—similar to the insights highlighted in our initial industry survey—that companies varied widely in the level of preparedness. In general, there is more awareness of the trends. Company responses—to whatever degree of effort—have largely focused on the auto line of business with limited action taken related to diversification.

A few preliminary themes are worthy of note as a potential barometer of industry position:

 <p>The degree of overall awareness regarding autonomy, car-sharing, and other potential disruptors to auto insurance is increasing across the sector</p>	 <p>The focus of the efforts has been largely on understanding the implications of the pipeline of autonomous technology itself</p>
 <p>The level of preparedness and action varied widely—many companies were just starting to develop a point view with an initial task force in place, fewer had developed a strategic response, and only a few had begun to execute against a plan</p>	 <p>There has been limited localization work done to define the impact on a company's particular book of automobile insurance. Again, some companies have started to apply trends and OEM actions against their own business, but most carriers have not yet done that level of analysis</p>
 <p>The ramifications of car-sharing and on-demand mobility will likely affect their business before self-driving vehicles</p>	 <p>Few insurers have yet to identify necessary changes to core functions like underwriting, pricing, and claims in anticipation of the potential changes ahead</p>
 <p>Executives in general recognize and appreciate the magnitude of the potential disruption ahead, but most believe that any material impact on their auto book will still be 10 years away or more¹⁶³</p>	 <p>Few companies have examined corporate strategy and core mission to reflect the potential disruptions in the automobile line of business. We are aware of only a few diversification strategies being advanced across the sector. Most companies appear to be focused on only the auto book of business—the parallel challenge of alternative business plays has not gotten a lot of attention</p>
 <p>There has been limited industry-wide coordination to develop common positions and lobby around key areas like liability, data rights, and legislation</p>	

KPMG plans to conduct another survey later in 2017 to better gauge how the insurance industry's perspectives and actions have evolved with respect to autonomy, car-sharing, and other potential disruptors. We aim to confirm and complement many of the points just highlighted with more extensive analysis of the survey results. We look forward to sharing the results of the survey this upcoming fall.

**The future marketplace
will not be kind to the
unprepared. Now is the
time to develop plans.**

Functional implications

The adoption of autonomous technology will have profound implications on how automobile insurance companies perform core operations. Several revolutionary factors will need to be considered and integrated, with important changes resulting to processes, underlying technologies, and employee skills. Driving decisions will increasingly shift from the driver to the vehicle itself. With an expanding array of inputs from sensors, radar, and satellite, driving data will over time likely be deeper and broader than currently available during application or renewal. Near real-time data feed is a distinct prospect. Safer cars will mean fewer accidents. Competition could intensify with evolving entrants—including insurtechs and OEMs—aggressively trying to grab share. New insurance options—from usage-based insurance to coverage incorporated in sticker price of the car—could also fundamentally challenge how and where insurance is provided.

While insurers are encouraged to take a holistic view of their operations, these carriers may believe that certain areas may warrant more consideration than others, at least initially. For example, Mike Nelson, a partner at Eversheds Sutherland LLP, said, “This disruption caused by automated vehicle technology will most likely reach the claims department’s door first, not the new product or marketing teams. Claims teams will have to up their game in areas like accident scene documentation, evidence protection, reparability issues, and calibration of new types of devices to name a few. Claims will also be impacted by new insurance regulations and emerging state and local traffic laws. For auto insurers, now is a good time to assess what assets they have and what new resources they will need to adapt to this rapidly changing claims environment.”¹⁶⁴

With all of these pending changes, insurance companies will need to reassess how they conduct business. KPMG believes that carriers will need to undertake a complete rethink about how core operations will be performed. As the marketplace transformation shifts between the four phases of change, we advise that insurance companies will also need to have plans to evolve their operations through the stages. The pace of the transformation is, of course, unclear, but we have outlined a time line that has a “new normal” arriving over the next decade. If anything, our prediction of the timing of the stage gates has only accelerated. The key point here is that carriers will need to have plans in place that can be deployed at the rates dictated by the marketplace.

The following section highlights several key considerations that insurance companies will need to address across their core functions.



Product development

- As cars become increasingly safer due to autonomous technology, what will be the core exposures? Will there be new risks,—like cyber, sensor failure, or driver override of decisions? Will bodily injury and comprehensive components become more prevalent? What exactly is being insured? And what is not?
- What happens to standard and high-risk auto insurance programs?
- How will personal auto insurance coverage evolve? With decisions being made by both the car algorithmic “brain” and the individual driver, what does the product actually cover? What is the delineation of responsibilities?
- How will consumer expectations change? How will their experiences in other industries inform their views? (Think Google and Amazon)
- What are the new business models—usage-based, on-demand coverage, integration of coverage into car price?
- What are the other products and services to complement the auto insurance line of business?
- What market plays will there be in fleet (commercial) and products liability? How to diversify?
- Given that there are significant benefits to bundling auto and home insurance products, how does the potential deterioration in auto products impact homeowners insurance?



Underwriting and rating

- If driving variability becomes more controlled via car-made decisions (like accident avoidance), what are the appropriate risk factors?
- Driving data will become deeper and broader with a “black box” capturing all driving decisions and environmental factors. How will this information be used? What does underwriting look like if near-real-time information is available? What technologies will be necessary to absorb, process, and analyze this wave of information?
- Who controls the data? What information will feed underwriting if auto manufacturers and high-tech companies disintermediate the carrier from the information?
- What will be the effects of the pipeline of new autonomous capabilities (or even mere automated vehicle technology software updates)? How will loss frequency and severity change? How will these effects move across the book of business? When? How fast?

- How is predictive analytics done for new emerging automated technology capabilities? Are there comparable safety capabilities previously introduced that could act as a potential proxy?
- How will frequency and severity change? When?
- When will customers begin to demand discounts given a reduced risk profile? How much is appropriate? What level of information is necessary to quantify with confidence?
- How will variations in performance of the different algorithmic “brains”—driving platforms across the manufacturers—be measured?
- How will damaged sensors be repaired and tested? Who will guarantee the now-repaired sensors are again fit for purpose? Who certifies this? How much will this cost? How does the certification process change the customer experience (especially if the repair and certification are done by separate parties)?
- How will the customer claims experience need to evolve? What is the customer’s perspective when the car makes a mistake?
- How will subrogation—particularly with OEMs—need to evolve?
- If OEMs take a significant market position in insurance, what firms will handle the claims?



Claims

- With driving decisions made by both the car and the driver, who owns the liability in an accident? Is it the driver, manufacturer, supplier, or a combination? How will liability be assigned—on what criteria?
- How will information flow from initial accident to settlement? Who has data rights?
- What is the first notice of loss like—direct notification of parties? How will discovery and investigation take place when full driving data is available?
- What should be the insurance industry’s perspective on liability? How have carriers worked to advance a common statement? Who is lobbying to strengthen the industry’s position? Can tort law and regulation be influenced?
- How can carriers realize a closed loop between claims, underwriting, and product development? Is there a “single source of truth” across data?



Distribution

- Will distribution need to reflect new or evolving products (e.g., usage-based and real-time coverage)?
- Will OEMs imbed coverage into the purchase price of a car? Provide other insurance options at the point of sale? How do traditional insurance carriers remain relevant to the transaction?
- What is the role of the agent in selling auto insurance if the exposures covered are greatly diminished or if the insurance product is included in the purchase price?
- How do channels need to be educated?
- What happens to agent and broker compensation? How will lost commissions be offset?

The above questions are only an initial set—many more will follow as the disruption deepens. Still, significant time and effort will be needed to understand, prepare, and respond. Companies clearly will not have all the answers at this time. But now is the time to start.



Traditional insurers: Advantages and options

While radical marketplace changes will present significant challenges to traditional auto insurance carriers, all is not doom and gloom for these companies. Business model transformations—not mere operational or strategic “tweaks”—are, no doubt, daunting and will require carriers to leverage their core competencies. That said, many insurers are better positioned for diversification than they might think.

Our market view considers a variety of factors that auto insurance carriers must harness in order to adapt to a changing competitive landscape and chart out their new vision for the future. We look at the range of vulnerabilities faced by traditional insurance carriers, particularly in an era of sweeping change.

We then evaluate various strategies for mitigating operating and even existential risks going forward, from new ways to leverage core competencies to diversification strategies in complementary product lines. The path forward for many carriers may ultimately mean branching out into other lines of business, whether that be through organic initiatives or by acquiring related insurance and financial services companies. The only certainty lies in the inevitability of change and the need for companies to evolve.

Traditional carrier vulnerabilities

Despite a number of core strategic advantages, traditional underwriters of auto insurance also face certain vulnerabilities in their ability—and in some cases, perhaps willingness—to adapt to dramatically different market conditions in the near future. These challenges may be most acutely felt by small or some mutual insurers, due to one or multiple of the following factors in comparison to larger peers:

1	Relatively little diversification among geographic markets, customer base, and/or product offering
2	Generally reduced access to new capital in support of growth or, potentially, limited financial resources to begin with
3	Limited distribution among a narrower population of captive and/or independent channels
4	Constrained operating resources, often with less developed technological and other infrastructure

Although auto insurers of all sizes and types will certainly be forced to adapt, KPMG believes that smaller carriers with limited diversification are at the greatest risk. This may take the form of limited geographic presence or narrow product focus, with a high proportion of overall business in private passenger or commercial auto. Highly concentrated businesses may lack the institutional knowledge and product expertise to add new lines. Such companies, particularly mutual insurers, may also face limited access to new capital, which can help companies keep pace with technological change, invest for the future, or ride out periods of financial distress. Some smaller companies also tend to have less developed distribution networks (e.g., versus the expansive multichannel models of the largest players) and operating infrastructures (e.g., technology platform, underwriting, claims, etc.), which can hamper their ability to compete against larger carriers.

For small companies in comparison to market leaders, these inherent challenges—lack of diversification, subscale operating and distribution platforms, and limited financial flexibility—can significantly hamstring a carrier as it seeks to evolve alongside a rapidly shifting marketplace. Despite the advantages that many of these companies arguably have in terms of nimbleness, they also may not have the brand recognition to facilitate expansion into new markets. Perhaps most importantly, financial distress will most likely hit subscale carriers first and/or more severely than their larger and more established counterparts.

Conversely, even leading companies face particular challenges in adapting to the changes brought on by autonomous vehicles, given the need to guide a larger, more complex, and often more rooted enterprise toward an uncertain target. In particular, for some of these carriers, cultural complacency bred by historical size or success serves as a significant impediment to change.

Whether small or large, heavily concentrated or diversified, auto insurers also possess various core competencies that, leveraged properly, can offer significant business model optionality in adjusting for the future of autonomous vehicles.

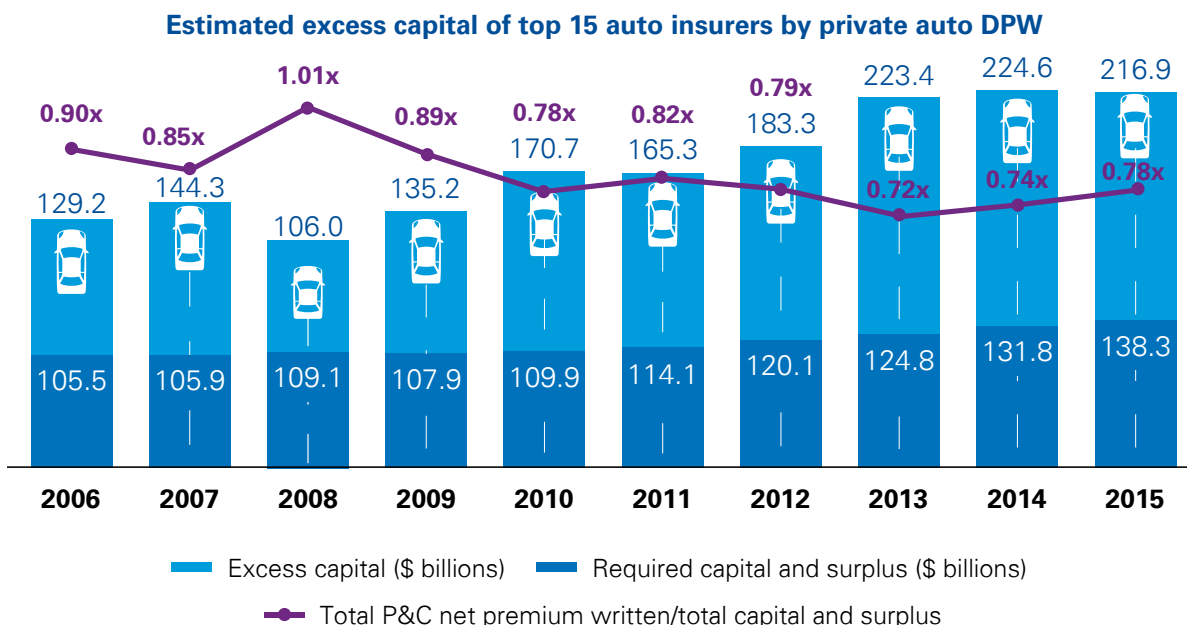
Core competencies of traditional insurance carriers

While turbulent waters exist ahead for carriers due to autonomous vehicle technology, many insurers have at their disposal a variety of tools and competitive advantages to manage these sweeping changes. For example, in the current market, widespread excess capital gives carriers significant dry powder to invest for the future. Additionally, insurance companies have vast amounts of data and, ideally, the analytical capacity to apply this data toward new opportunities. Many leading companies have significant brand value, distribution networks, and customer relationships that provide a green field for introduction of new products and revenue streams. All of these core competencies combine to give insurance carriers, collectively, a significant degree of optionality in choosing their path forward through a changing marketplace.

Joe Petrelli, president of Demotech, Inc., an established insurer rating agency in Dublin, Ohio, said, “Carriers need to be able to respond to an operating environment that is in flux at every level. Financial results are and will continue to be impacted by changes in frequency, severity and other factors linked to technologically sophisticated and autonomous vehicles. Given that, insurers will need to understand the core competencies and competitive advantages that they currently possess, or lack, and concurrently evaluate if these competencies and advantages can be replicated in a competitive landscape that will clearly be much different in the future than it was in the past.”¹⁶⁵

Carrier core competency #1 – Significant dry powder

Despite the fact that the private auto insurance industry as a whole last wrote a profit in 2008, while for commercial auto carriers it was in 2010, a majority of leading auto insurers appear to be significantly overcapitalized.¹⁶⁶ Based on estimates using the ratio of net premium written to capital and surplus, a common metric to determine how much statutory equity is needed to write a certain amount of business, the auto insurance industry had almost \$217 billion in excess capital as of 2015.¹⁶⁷ In the current market, all leading competitors are writing significantly below typical guidelines regarding acceptable underwriting leverage, indicating a substantial amount of industry-wide excess capital relative to premium written.¹⁶⁸



Source: SNL Financial and KPMG LLP analysis

Broad levels of excess capital afford auto insurers ample financial flexibility, at least in the current environment, to pursue strategic acquisitions, overhaul information technology systems, and make other investments in their businesses. However, this economic blessing may, in fact, lead to the pursuit of prolonged “wait and see” strategies. For some insurers, substantial dry powder could serve as a perceived safety net and ultimately breed a degree of complacency.

Carrier core competency #2 – Data access and analytics

Insurance companies have data and lots of it. Not only do they have basic information on their customers such as how old they are, where they live, what type of car they drive, etc., but through the auto insurance underwriting process, they may also obtain data points such as credit scores, demographic information, income levels, driving record, and insurance coverage history, among others.

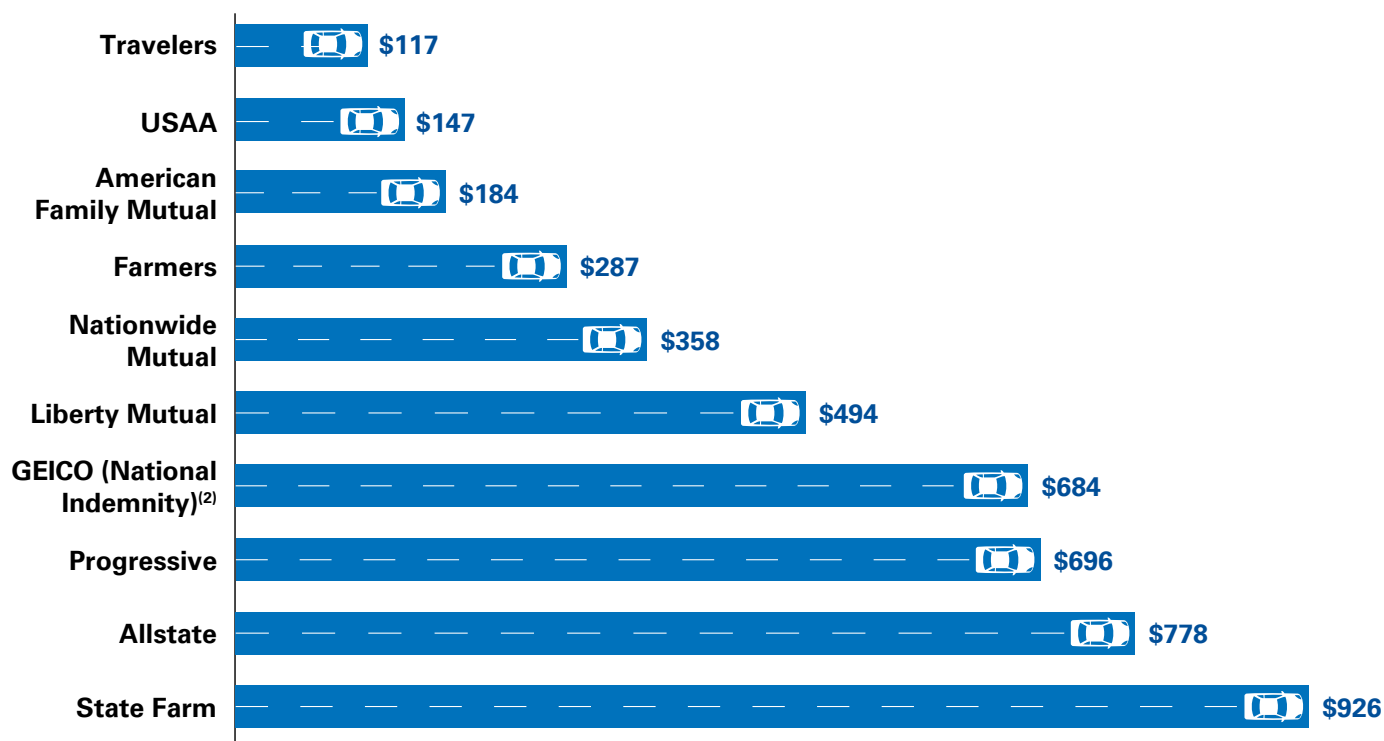
The underwriting data of insurance customers—past, present, and prospective—represents a potentially rich source of insight into consumer behavior and risk characteristics. With sufficiently large and detailed sets of information, these can be mined to develop a robust consumer profile that can then be leveraged to more effectively target, cross-sell, and/or underwrite new product offerings to these individuals.

For instance, while multiline insurers may commonly offer a bundled homeowners policy to an existing auto policyholder, the potential exists to cross-sell a wide variety of other insurance and consumer financial products, from life, health, and personal accident products to warranty coverages. In this scenario, much of the relevant customer data needed to underwrite a variety of ancillary products may already have been collected to underwrite the auto policy. With autonomous driving pushing a system shift toward products liability in the risk profile of software-driven automobiles, such customer data may have limited utility going forward in pricing auto risk. It may, therefore, be better deployed in marketing and underwriting a broader product portfolio of value to the same customer.

Carrier core competency #3 – Brand recognition

From the GEICO Gecko to Progressive’s Flo to Aaron Rodgers’ spots for State Farm, insurers have engaged in an advertising arms race of sorts in recent years. Auto insurance carriers collectively spend billions of dollars per year to promote their brands and leave their own stamp on American pop culture—all with the ultimate goal of winning customers and selling products. Based on statutory filing data, the 10 largest marketing and advertising budgets among U.S. writers of private passenger auto amounted to more than \$4.6 billion in 2015.¹⁶⁹

Total advertising spend among leading personal auto insurers (\$millions) ⁽¹⁾



Note: (1) Represents the combined NAIC group level of the respective companies for 2015; (2) The referenced figure for GEICO (National Indemnity Company) does not include an undisclosed amount of general expenses ceded by GEICO to its parent, National Indemnity Company, through affiliate reinsurance arrangements. As such, it is probable that this amount is materially understated.

Source: SNL Financial

With this attention to brand management, it should come as no surprise that some auto insurers are recognized among the most well-known and valuable corporate brands in the United States and internationally. Based on Brand Finance's 2016 global brand value rankings, three of the Top 20 global insurance companies based on estimated brand value are U.S. private auto writers. These are Allstate, ranked 7th globally, followed by Progressive and GEICO at 18th and 20th, respectively, with all three companies improving from their 2015 rankings.¹⁷⁰

Additionally, from a consumer perception standpoint, a 2016 Harris Poll of brand equity (based on a range of factors including familiarity and quality) among auto insurers ranked the following top companies:

2016 Harris poll brand rankings ¹⁷¹	
1)	AAA auto insurance
2)	State Farm auto insurance
3)	USAA auto insurance
4)	American Family auto insurance
5)	Nationwide auto insurance
6)	Farmers auto insurance

Strong, stable brand recognition among consumers can lead to, and help companies sustain, key competitive advantages. Potential new customers may therefore be more receptive to marketing of these carriers' products, while existing customers may be more inclined to renew—not only because they are content with their coverage and service, but also due

to simple familiarity. Perhaps equally important to insurance companies looking for new avenues of growth, brand may be parlayed to enter new markets, ranging from regional expansions to entirely new cross-sold product lines.

Carrier core competency #4 – Distribution and customer relationships

Auto insurers have vast distribution networks, often a combination of channels including captive and independent agents, brokers, and, increasingly, direct-to-consumer capabilities via the Internet, mobile applications, and other means. For incumbent carriers facing the prospect of competing in a new environment against new business models, these established distribution networks can serve as a distinct advantage, if leveraged correctly to adapt to evolving risks and customer preferences.

Existing distribution channels are a well-established, known quantity to carriers, which means that they have the infrastructure and experience to push products and services to a substantial portion of the population. Emerging business models may be starting comparatively from scratch, or at least with less established, far-reaching, and/or tested distribution strategies.

While agents and other intermediaries may be involved to varying degrees throughout the insurance value chain, carriers in nearly all cases do have access to the ultimate policyholder, meaning that they are not a distant or unknown service provider. This ability to “touch” the customer represents a substantial opportunity for insurers to expand their relationships with policyholders via the sale of additional products.



Revenue diversification – Ripple effects across the entire financial services marketplace and beyond

Personal automobile insurance premiums in the United States are approximately \$214 billion per year¹⁷²—the largest product line in the industry. As this core business for many carriers faces disruption, we anticipate an increasingly smaller volume of revenues and profits. Based on our modeling, the industry could shrink by 60–70 percent,¹⁷³ which would mean \$100+ billion of lost revenues. Companies will need to find alternative sources of revenues and margin through new products and services.

As carriers pursue this diversification, we are concerned about the next level of ramifications across the broader insurance and financial services marketplace. We predict a ripple effect with carriers moving into other insurance lines, which will disrupt the competitive landscape and economics for other insurance and financial services companies. The fact is that the disruption in the automobile insurance sector will affect the entire industry.

Based on our discussions and analyses, we believe that personal line automobile insurers are generally contemplating three initial areas of diversification: home-related products, commercial automobile coverage, and small commercial. The following sections discuss each play in additional detail, and consider some of the pros and cons of each option.

Diversification play #1 – Home-related products and services

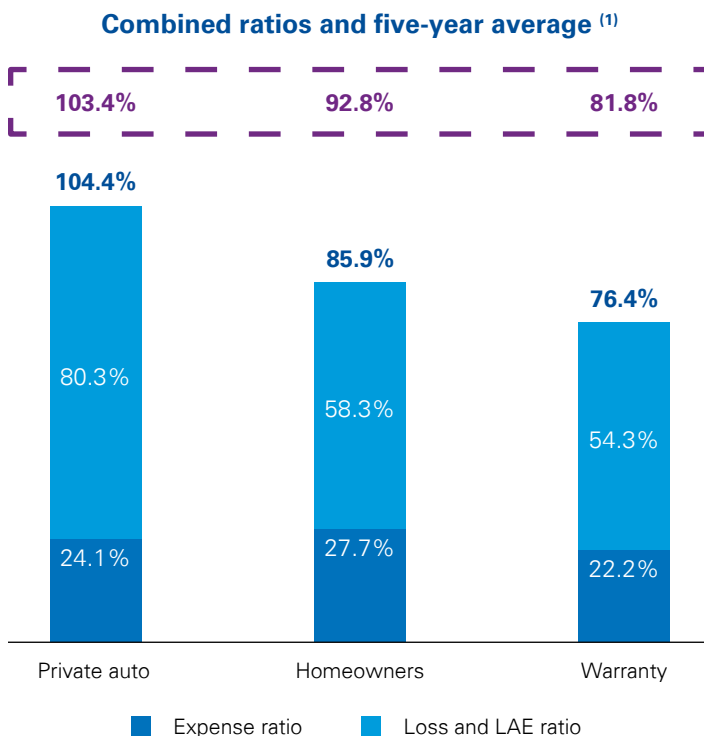
For competitors in the personal lines P&C space that elect to pursue a strategy of greater diversification, certain products may serve as more natural extensions of a private passenger auto book. For example, the central nature of the home in people's lives combined with the wealth of potential data in this area provides enormous potential for the evolution of new products and services to offer the customer.

With a holistic view of the range of risks centered around the home and a tailored portfolio strategy for addressing these risks, insurers can potentially better leverage their core strengths (from the customer relationship to data analytics) to offer a more comprehensive array of insurance and other products and services.

Relevant products include traditional homeowners and renters insurance policies, but go a step further into other coverages related to the home and personal property, such as specialized personal lines (e.g., insuring vintage cars), title insurance, and warranty coverages, among others. Certain products may also generate material fee income as well as premium, offering additional benefits in the form revenue diversification.

- 1) **Homeowners/renters/condo insurance** – Typical homeowners, renters, or condo insurance policies may be offered to insure a customer's dwelling and possessions.
- 2) **Warranty** – Applicable warranty offerings may range from the home structure itself to appliances and electronics.
- 3) **Title** – At the point of purchase/sale, title insurance services can be offered to provide for proper transference of ownership.
- 4) **Other products and services** – Areas of opportunity for other products and services are wide ranging, from extensive data analytics to interconnected home devices, all of them underpinned by the rapid expansion of data and technology and a shared connection to the home. Ultimately, this may evolve to insurers offering services—such as home repair—that are not financial in nature, but may merely be focused on satisfying customer needs with existing core competencies.

As illustrated by the chart below, certain of these representative lines of business, for which statutory filing data is readily available, have delivered positive underwriting results over the last five years, averaged across the P&C industry.



Note: (1) 2015 combined ratios are presented on a direct basis, excluding policyholder dividends. Title insurance not included due to lack of comparable data.

Source: SNL Financial

Many auto writers also provide homeowners insurance—often in a bundle/package offering. From our conversations, most auto writers have indicated the intent to focus more on homeowners as an initial offset. The shift is understandable based on familiarity, customer base, and existing operational platforms. A significant increase in supply would challenge currently solid pricing, which could lead to margin erosion. Increased appetite could also change the response to coastal exposures, with traditional carriers taking more risk. This could upset the mix of companies providing insurance, particularly the excess and surplus writers who have covered the risk over the past year. Similarly, concentration and catastrophe risks will also need to be carefully managed, with the reinsurance industry requiring a relook at how to serve the new dynamic.

Diversification play #2 – Commercial auto coverage

With the shift towards fleets of cars, some personal auto writers are thinking about offering commercial coverage. This diversification move, however, is not available to many of the smaller auto carriers. To meet the desires of the large fleet owners, an insurance company would need to have a national footprint to satisfy interstate needs.

The number of fleet owners is far less than the personal auto owners, so there are fewer buyers of the product. Again, additional supply of coverage will put the buyers in the position of strength, both in terms of pricing as well as the level of service demanded. We anticipate more competition in the commercial space, so traditional writers of this product will need to anticipate how to defend their market positions and manage through potential softer pricing and elevated combined ratios.

With many individual drivers opting to do ridesharing—Uber, Lyft, etc.—they will need to be insured properly for this hybrid situation. Several carriers are responding to this marketplace shift, and we anticipate further competition to drive more flexible terms and lower pricing over time.

Diversification play #3 – Small commercial

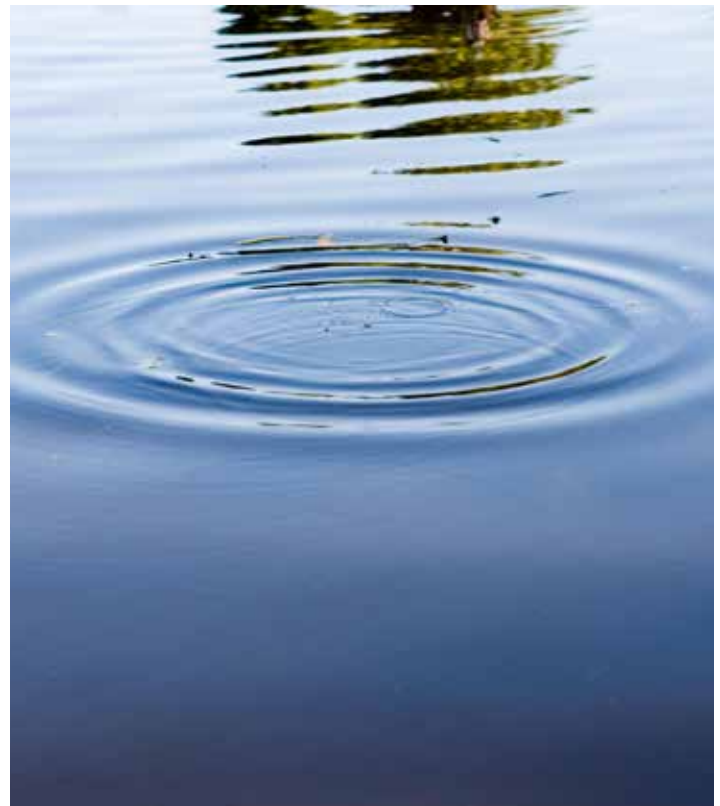
The third area of initial diversification seems to be into small commercial policies. Many of the larger auto writers also offer business owners policies (BOP) to their customer base. Again, based on our market conversations, there is a comfort in expanding the product position due to some familiarity, customer base, and platforms. The reoccurring issue will be around additional supply driving looser terms and lower pricing to grab share.

Some carriers are thinking about extending beyond BOP into small commercial policies itself—a step up in exposure and risk. Target covers most referenced would include general liability and fire/property. A move into this space would require refined knowledge around sectors (SIC code-level) and new competition with broker channels. The ability to price these exposures without adequate claims history could be a challenge, but doable with tight monitoring and quick response.

Potential benefits from diversification

Product diversification offers insurance companies several benefits that warrant consideration. Providing supplementary revenues is likely the most critical dimension, particularly as auto insurance premiums begin to decline. Other benefits could include risk dispersion, retention gains, and channel support.

- **Providing supplementary revenue streams** as an offset to declines in the auto insurance line as effects of triad of disruptors are realized.
- **Spreading of risk exposure** beyond one particular market and/or line of business (a key concern for small regional and monoline companies).
- **Opening up new growth** opportunities by leveraging existing core strengths (e.g., operating infrastructure, established distribution, customer relationships, etc.) to obtain a head start on building out new product lines.
- **Enhancing retention** and customer stickiness by offering greater overall coverage and value proposition to the customer, through bundling discounts and as a one-stop shop for multiple insurance needs.
- **Keeping distribution happy** and potentially negotiate greater economic terms for independent distribution, due to greater volumes.



Next steps:

Heightened call to action

A series of actions to consider

As the industry enters the chaotic middle, we continue to recommend auto insurers take a combination of strategic and tactical efforts.



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KPMG's Insurance practice

KPMG's survey and previous white paper on this topic have been cited in a variety of domestic and international publications.



KPMG's Automotive practice

In case you missed them, you can download from KPMG's Web site our previous papers related to the future of the automotive industry.



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