



Driverless Cars: Time for Insurers to Shift Gears

Insurers must prepare, not only for the distant future of driverless cars, but also the phases in which it will evolve.



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Executive Summary

The automobile industry has continuously evolved over the decades but not as dramatically as the emergence of the driverless car. What still seemed like science fiction a few years back is now a reality. Along with the excitement and interest, the rollout of the driverless car is also having ripple effects across related industries. For example, insurance carriers are wondering how this innovation will impact the auto insurance space. Today, insurers cover the loss of an accident caused primarily by the driver. What happens when an accident occurs, sans driver?

While many insurance carriers have started planning for this eventuality, very few have considered what to do during the transition period. Before becoming completely driverless/autonomous, vehicles will go through stages of being driver-controlled and semi-autonomous (where control can be switched between driver and auto). Insurance carriers will need to transform in parallel with these stages.

To determine the way forward, insurers have to understand autonomous cars from the following perspectives.

- Technology impact:
 - > Evolution.
 - > Adoption.
- Insurance impact:
 - > Coverage.
 - > Price.
 - > Claims management.
 - > External factors.

This white paper aims to predict the timeline for the evolution and adoption of driverless cars. It also offers sound advice on what personal auto insurance carriers can do during the impending transitional period to stay ahead of the competition.

Autonomous Auto Technology Arrives

Many insurance carriers have driverless cars on their future agenda. However, three salient questions have emerged:

- How distant is the autonomous auto future?
- What can and should be done from an operational perspective to prepare for the autonomous car?
- Are there intermediate states for which insurance carriers need to prepare?

To understand how distant the driverless cars are, we look at the expected rate of technology evolution and adoption.

Technology Evolution Timeline

The driverless car landscape is occupied by a who's who of companies. On one side are technology purveyors such as Google; on the other side are car manufacturers such as Mercedes, BMW, Audi, GM and Tesla. All have announced plans for autonomous driving vehicles, and intend to roll out vehicles in a phased manner with increasing levels of automation over time.

Many car models already have automation features that can perform one or more driving functions, such as blind spot monitoring and automatic braking. As manufacturers strive to automate more and more functions, the hope is that such functions can work in unison and provide a complete driverless car experience. Technology evolution will also depend on the development of an ecosystem comprised of government bodies/regulators, insurers and vehicle manufacturers to support driverless car technology.

Moreover, road infrastructure must be developed and be robust enough to support driverless cars. Also, rules and regulations defined by government regulators could impact technology development and evolution.

For the purpose of analysis, we have classified the four levels of automation defined by the U.S. National Highway Traffic Safety Administration (NHTSA) into three phases driven by the shift in driving entity (i.e., driver vs. automated system). Figure 1 depicts the mapping and the expected technology timeframe.

Projected Driverless Technology Evolution Timeline



NHTSA Level	Phase	Driving Entity	Predicted Timeframe	Technology
1	I Driver Controlled	Driver	Current-2025	Function-specific automation: At any given time only one driving function is automated (e.g., electronic stability control).
2				Combined function automation: Automation of at least two primary functions designed to work in unison (e.g., cruise control with lane centering).
3	II Semi-Autonomous	Driver or Vehicle	2018 - 2030	Limited self-driving automation: System assumes complete control under favorable conditions. Control transitioned to driver under unfavorable conditions.
4	III Autonomous	Vehicle	2022 Onward	Full self-driving automation: System is able to perform all driving functions, eliminating the need for a driver.

Figure 1

Technology Adoption Projection

The adoption of driverless car technology depends on five factors: safety, cost, behavior, regulation and car life.



- **Safety:** An ecosystem consisting of technology, vehicle, infrastructure and network needs to develop and become robust to ensure safety of driverless cars on the road. Given the paranoia around any new technology, it will take some convincing for people to leave the control of their vehicles to a machine. Regulatory authorities now recognize automated control as a “driver.” If people also start seeing a machine as a driver – and perhaps the safest possible driver – adoption could be rapid. But to convince people, autonomous cars will have to prove themselves. According to the Insurance Institute for Highway Safety (IIHS), advanced safety features have reduced the chances of dying in a crash significantly.¹ Similar figures such as the decreasing number of reported accidents and fatalities will influence people to switch to driverless cars. Various groups of people will align themselves based on their enthusiasm for this technology.

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- **Cost:** IHS Automotive predicts that the price of level 3/4 driverless cars will be \$7,000 to \$10,000 more than manually driven cars in 2025.² This additional cost will only be \$5,000 by year 2030 and \$3,000 by 2035. Although initial models of driverless cars might be cost prohibitive for many people, prices are expected to decline with increased adoption and technological advancements. Moreover, the economic benefits, for both society and individuals, can far outweigh the incremental cost paid for driverless car technology. Some examples include savings of a driver’s salary, especially for children and people with physical disabilities who are dependent on others for a ride; repair costs for minor “fender-bender” accidents; and improved work/life balance, by allowing commuters to travel whenever they wish. There will also be direct cost savings for insurers in areas such as operational expenses associated with claims management.

Early adopters will likely be high-net-worth Individuals (HNIs) who have the money and desire to be on technology’s cutting edge. Others will likely wait for price reductions before taking the plunge.

- **Behavior:** For some people, a car is not only for moving from one place to another; it is about the pleasure of driving. The question then is whether these consumers will be willing to part with the pleasure of controlling a mechanical beast? In the long run, therefore, nonautomated cars will exist and retain vintage value. In the short run, the behavioral attributes could delay adoption.

The U.S. proposes spending \$4 billion to expedite regulatory guidelines for autonomous vehicles and invest in research to help bring them to market.

- **Regulation:** Regulators will play a major role in defining the rules and guidelines that will facilitate the launch and use of driverless cars. In doing so, they will instill confidence and clearly define liability, which will drive user confidence and, therefore, adoption. The U.S. proposes spending \$4 billion to expedite regulatory guidelines for autonomous vehicles and invest in research to help bring them to market.³

- **Car life:** Driverless cars generate a lot of interest, but will people just jettison the vehicles they own for a driverless car? Large-scale adoption of driverless cars will accelerate once existing vehicles reach the end of their lifecycle. The average longevity of a passenger car in the U.S. stands at 11.4 years,⁴ and as technology improves this is expected to increase in coming years.

Figure 2 illustrates the evolution of these factors across phases and their impact on autonomous driver adoption.

Projected Driverless Car Adoption Timeline

Phase	Adoption Factors Impact	Years	Technology Adoption
 I Driver Controlled	Safety: Increased safety due to advanced features favors adoption. Cost: Increased safety and convenience for minor cost increase favors adoption. Behavior: Driver still controls the vehicle, hence no significant behavioral impact. Regulation: Regulators mandate advanced safety features, thus favoring adoption.	CURRENT-2025	Current - '18 Customers continue to purchase Phase I cars.
			2018 - 2020 Advanced features to become part of base models; adoption increases.
			2020 - 2025 Although adoption slows as customers move to Phase II cars, Phase I cars continue to exist beyond this stage.
 II Semi-Autonomous	Safety: Slow adoption would depend on data that proves safe self-driving and ease of transition to driver. Cost: Increased convenience for low cost favors adoption. Behavior: Added convenience of self-driving and ability to assume control of vehicle in case of emergency would favor adoption. Regulation: Regulators may promote Phase II as safety data reinforces benefits and paves the way for Phase III. Car longevity: Slow adoption until Phase I cars become obsolete. Customers with newer Phase I models might wait and directly purchase Phase III cars.	2018 - 2030	2018 Expected Phase II car launch.
			2018 - 2020 Slow initial adoption owing to safety, cost and Phase I inventory.
			2020 - 2027 Increase in adoption as Phase I cars come to the end of their lifecycle; the cost of semi-autonomous comes down and safety is established.
			2027 - 2030 Increase in autonomous car adoption slows the adoption of semi-autonomous cars.
			2030 Onwards Although the majority of cars on the road are semi-autonomous, the pace of adoption slows as autonomous cars become common. Phase I and Phase II cars continue to exist.
 III Autonomous	Safety: Until safety is established, use could be restricted to low-density areas. Cost: The utilization per car could increase by means of ridesharing. Such economic benefits would favor adoption. Behavior: Higher utilization, convenience and limited driving exposure to Phase I & II cars over a period of time would propel adoption. Regulation: Once safety is proven, adoption of autonomous vehicles could be incentivized to reduce fatalities and make roads safer. Car longevity: Inventory of Phase I and Phase II cars and high initial cost for Phase III cars may slow the pace of adoption initially.	2022 ONWARDS	2022 Initial launch of autonomous cars; regulators impose usage restrictions.
			2022 - 2027 HNI adoption in limited geographies.
			2027 - 2030 Regulators abate restrictions as safety is proven; people unable to drive or services which rely on driving (i.e., delivery services) could be early adopters.
			2030 - 2034 Adoption picks up as cost comes down and regulators offer incentives to adopt Phase III cars.
			2034 Onwards Possible upgrades of semi-autonomous cars to autonomous cars. Most cars on roads can drive themselves. Few cars from previous phases are seen on the roads.

Figure 2

The Impact on Insurers

The advent of driverless cars will have significant impact on the insurance industry. Here's what insurers can do to prepare and stay relevant to consumers.

Impact on Coverages

Currently, all personal auto insurance products are purchased by vehicle owners, since drivers are held accountable for accidents. With the advent of driverless cars, accountability will shift from the driver to the vehicle manufacturer and the network provider. The vehicle manufacturer will be liable when the accident is due to an issue with the hardware or software of the car; the network provider will be liable when the accident is due to a network fault such as failure to provide the correct direction coordinates. Driverless cars will be dependent on the network to determine driving aspects such as the location of the car and traffic. The vehicle manufacturer and network provider are expected to buy hybrid auto insurance products that will augment the personal auto insurance that exists today.

Different phases will attract different parties to buy insurance. A manufacturer or a network provider faces potential liability starting from auto mode for Phase II. So in addition to insureds (individuals), manufacturers or network providers would also buy product liability to cover their loss exposure.



Who Is Covered by Insurance?

Phases		Coverages				
		Collision	Liability	Comprehensive	Medical	UM
I: Driver		Insured				
II: Semi-Autonomous	Manual	Insured				
	Auto	Manufacturer/Network Provider/Insured			Insured	
III: Autonomous		Manufacturer/Network Provider/Insured			Insured	

Figure 3

Phase I: Impact to Coverages for Driver-Controlled Cars

Car manufacturers can be held liable only if it can be proven that the loss happened due to an automotive malfunction. However, with gradual automation (i.e., electronic stability control and collision control), car manufacturers' safety accountability is increasing as the loss events in some cases may be attributed back to the vehicle's automation. In Phase 1, auto insurance coverages will still be bought by the vehicle owner and not by any other party.

Phase II & Phase III: Impact to Coverages for Semi-Autonomous & Autonomous Cars

The coverages for a car in manual mode of Phase II will be the same as Phase I. As noted earlier, the car can either operate in manual or auto mode in Phase II, but will always be in auto mode for Phase III.

In auto mode, the car manufacturer will be liable for any collision or liability damage that occurs when the car is auto-driven. The exception is if the vehicle was not roadworthy (non-maintenance), in which case liability returns to the insured, or for rear-ending cases where the autonomous vehicle halts suddenly causing a collision

Changing Coverages

	Phase	Year	Coverage Impact
	I Controlling Entity: Driver	Current- 2025	No product structure change.
	II Controlling Entity: Driver or Vehicle (Semi-Autonomous)	2018-2030	<ul style="list-style-type: none"> All coverages are needed by insured drivers when cars are driven in manual mode and thus no change in product structure. No change in comprehensive and uninsured/underinsured product structure for auto mode. Liability, collision and medical coverage will be bought by vehicle manufacturers and network providers for when car is on auto mode.
	III Controlling Entity: Vehicle (Autonomous)	2022 Onwards	<ul style="list-style-type: none"> No change in comprehensive and uninsured/underinsured product structure. Liability, collision and medical coverage will be bought by vehicle manufacturers and network providers.

Figure 4

N.B. If an animal is hit when vehicle is auto-driven, the liability for loss will be covered under the vehicle manufacturer's product liability. For rear-ending accidents, the insured's coverage will be invoked.

with a vehicle that was not expecting such an abrupt reaction. The network provider can be held liable only if the proximate cause of loss is misdirected navigation/network failure/network hack. In some cases, failure of infrastructure such as a missing/incorrect road symbol could also result in a loss event.

Comprehensive coverage would still be bought by the insured. However, animal impact will be covered by the vehicle manufacturer for auto mode as the vehicle is expected to stop in the event of an imminent collision. Uninsured motorist and underinsured motorist coverages will always be bought by the insured since the vehicle manufacturer can't be held liable if the at-fault party either does not have insurance, or does not have enough insurance. Medical payment coverage will be invoked based on which party is liable for the loss.

Due to different interfaces of data transfer, new coverages such as cyber-risk will be part of the product insurance bought by the vehicle manufacturers/network providers to handle potential losses due to terrorism, kidnapping, stealing, etc. that result from cyber-hacking. Underwriters will have to factor this type of risk related to driverless cars. Figure 4 is a summary of our prediction of the coverage changes for driverless cars.

Impact to Pricing and Underwriting

Auto insurance has historically been priced using factors such as insured details, vehicle details, vehicle usage and loss history. In the impending autonomous car era, most of these factors will still impact vehicle premiums, though the level of impact will differ. New pricing and underwriting parameters will emerge over time.

Phase I: Impact to Pricing and Underwriting for Driver-Controlled Cars

Underwriters typically offer discounts for safety devices such as lane departure warning or antilock brakes since they reduce the probability of accidents. With the advent of autonomous cars, huge reductions in property damage and bodily injury liability claim rates are expected. This could result in reduced auto insurance



premiums. At the same time, higher sticker prices of individual vehicles will increase premium costs. We predict that the reduction in premium costs due to safety will far outweigh the increase in premiums due to the higher vehicle cost.

Phase II: Impact to Pricing and Underwriting for Semi-Autonomous Cars

Underwriting of a motor vehicle is likely to change in the driverless car era. To start with, changes would come in the proposal form. Additional information captured on the proposal form could include:

- Automation level of the vehicle.
- Vehicle operating system/software.
- Vehicle network provider.

The loss history of current cars will not be a good predictor of losses for driverless cars. We anticipate that the weight of loss history in pricing will be less in the first few years of driverless cars. Once a good amount of data is captured, loss history will become a bigger parameter and the judgment factor in pricing will be reduced. The underwriter may also have to reword policy and warranty conditions to clearly highlight the duties of the insured, and demarcate exclusions clearly.

For auto mode, apart from conventional factors and expensive on-board devices, pricing could also be based on the loss history of the vehicle (make model) in combination with the default network provider and the vehicle operating system. The default network will have an impact on pricing because a vehicle may sometimes switch networks based on availability to ensure seamless connectivity. Every switch in the controlling network could make the car unreliable and thus create higher premiums for the vehicles using it. Operating systems fitted in the car will need to be thoroughly tested by independent rating agencies and will need to comply with regulatory guidelines. Software will also be quality rated depending on the level of safety and reaction time for impending collision, and will be expected to do better than average human reaction time. Different operating systems would require different premiums based on their relative safety ratings.

Telematics would be used to calculate the actual amount of time a vehicle was driven manually or automatically. Based on that calculation, premiums would be adjusted during the policy period in a periodic mode. Since the vehicle manufacturer will also have an insurable interest in the vehicle, it will be mandated by the manufacturer to have a device that can capture information on auto and/or manual driving. Thus pricing would be based on:

- Pricing for manual cars (when in manual mode).
- Pricing for automated cars (when in automated mode).
- Premium adjusted at the end of policy term by audit (to bifurcate the above two modes).

Interestingly, based on sales projections from 2018 to 2029, it is anticipated that driverless car technology could add not more than \$3,000 to \$10,000 to a vehicle's cost. The price of a car will fall after an initial spike, which may have a marginal impact on the rating of a car. Hence, car price is not expected to influence car premiums substantially in the long run. Thus, the severity of the loss would also decrease along with the frequency. Given the lack of concrete data, we anticipate

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The skill set required to underwrite personal auto insurance can also change. Currently, the warranty, as an insurance product, is written by specialty lines underwriters. Since driverless cars' insurance is expected to resemble the warranty in few areas, underwriters might be expected to have specialty lines underwriting skills.

Phase III: Impact to Pricing and Underwriting for Autonomous Cars

With no human intervention (except direction input, start-stop), only the loss history of the vehicle in combination with the default network provider and the vehicle operating system will influence premium prices. Driver-specific factors such as age, gender, driving history and driving tickets will no longer have any bearing on auto insurance premiums. Telematics will be a thing of past and will have no influence on pricing, although such devices still may be used for other purposes, such as monitoring the behavior of different operating systems.

We also expect that by the time we enter this phase, there will be a significant pool of data from Phase II which would offer additional insight on the loss history pattern of a driverless car. As a result:

- The underwriter will be able to price a car with reasonable confidence.
- The high deductible on the car will also ease and eventually reduce.
- Underwriting will get simpler than Phase II with accurate and increasing volumes of data.

With the increase in regulator and customer confidence in the safety of autonomous vehicles, and the rapid growth in penetration of this new technology, the cost of such

vehicles is expected to decrease from Phase II and add a small amount of about \$3,000 to the overall cost by 2035. Thus, with better safety, fewer accidents, proper infrastructure (for driverless cars) and inexpensive devices, pricing is likely to fall for driverless cars in the long run. De-tariffication could occur, wherever the regulator imposes a tariff on prices in Phase II, and thus insurers would have the freedom to charge a premium based on their loss experience rather than the loss experience of the auto insurance industry. Another factor

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Premium Impact

	Phase	Year	Premium Considerations	Impact on Premium
	I Controlling Entity: Driver	Current-2025	Discounts for newer safety features.	↓
	II Controlling Entity: Driver or Vehicle	2018 - 2030	The price will be higher initially but will reduce over a period of time. Underwriters will use judgment to price a risk for lack of data.	↓
	III Controlling Entity: Vehicle	2022 Onwards	The price of expensive devices on the car can reduce further from Phase II. Overall pricing may be lesser than Phase II but more than Phase I. With a substantial data pool, underwriting should be more accurate.	↓

Figure 5

Impact on Claims Management

Driverless cars will require a complete overhaul to the claims management process. Numerous steps will be eliminated with the help of self-diagnostics devices present in the car, for things such as first notification of loss (FNOL), claims survey, claims estimations (partially) and litigation. Claim operational expenses will be reduced and the benefits ultimately will be passed on to the customers.

A rise in the number of cases where a third party (e.g., a vehicle manufacturer/network provider) is responsible for the loss event will cause an increase in the number of subrogation recovery cases. The primary insured's insurance company will expedite settlement, and will reach out to the at-fault party for recovery.

High repair costs for replacing cutting-edge technological devices in the car, along with high salvage value of a car (reusable electronic components + reusable mechanical components), is likely to increase salvage and reduce repairs. Thus, a vehicle can easily be classified as "totaled" in the event of serious damage.

The vehicle loss pattern will be completely redefined in the driverless era due to the availability of data that is more accurate and structured. Vehicle loss data is expected to be driven by the vehicle operating system used in combination with the vehicle's network and make-model. What follows are our predictions on the impact of driverless cars on the claims management process and our perspective on what insurers can do to embrace such change. Since Phase I is already in flight, we will focus on Phases II and III.

Vehicle loss data is expected to be driven by the vehicle operating system used in combination with the vehicle's network and make-model.

Phase II: Claims Management Impact for Semi-Autonomous Cars

When an accident occurs, the car might be able to automatically do the following:

- Send an automated FNOL report to the insurer and the vehicle manufacturer.
- Display or call the closest available roadside assistance.
- Run a self-diagnostic tool to generate and send a report to the insurer and the vehicle manufacturer outlining the recommended car attributes (e.g., car software version and other roadworthiness factors) and actual car attributes when the loss event took place. This will be a significant factor for the vehicle manufacturers to determine the cause of loss and even put the onus of loss back on the insureds if there is a breach of warranty due to non-maintenance. Claims settlement will ultimately depend on the merit of each case.
- Capture the entire loss sequence as a video by a head mounted device and share it immediately with the insurer and the vehicle manufacturer. This will help reduce fraudulent claims and litigation expenses to some extent.
- Run a self-diagnostic tool to enable an internal assessment of damage along with the estimated cost of replacement or repair of the damaged parts. In addition to providing better predictability of expense, this will also increase the speed of repair – thereby enabling the insured to be back on the road faster.

Claim management will change in Phase II due to two reasons:

- It will become important to identify whether the vehicle was running in auto or manual mode. If the vehicle was running in auto mode, then it will be important to determine if the cause of the accident was due to a vehicle malfunction or a network issue.
- The advancement of technology will require various devices that can provide accurate accident information.

Phase III: Claims Management Impact for Autonomous Cars

For Phase III vehicles, the loss event is expected to follow the same sequence as auto mode of Phase II, except that the vehicle will always be auto driven. In case of a loss event, it will still be important to track if there was a breach of warranty which led to the loss.

Gauging Claims Impact Over Time

	Phase	Year	Claims Impact
	I Controlling Entity: Driver	Current - 2025	<ul style="list-style-type: none"> • Significant time lag between claims, FNOL and investigation. • Prone to fraud.
	II Controlling Entity: Driver or Vehicle (Semi-Autonomous)	2018-2030	<ul style="list-style-type: none"> • Track who was steering. • Black box to capture claim details. • FNOL report to be sent to insurers. • Self-diagnostic tool to send internal damage assessment report and recommended car attributes vis-à-vis actual car attributes. • Notification to roadside assistance.
	III Controlling Entity: Vehicle	2022 Onwards	<ul style="list-style-type: none"> • All the points from Phase II except tracking who was steering the vehicle.

Figure 6

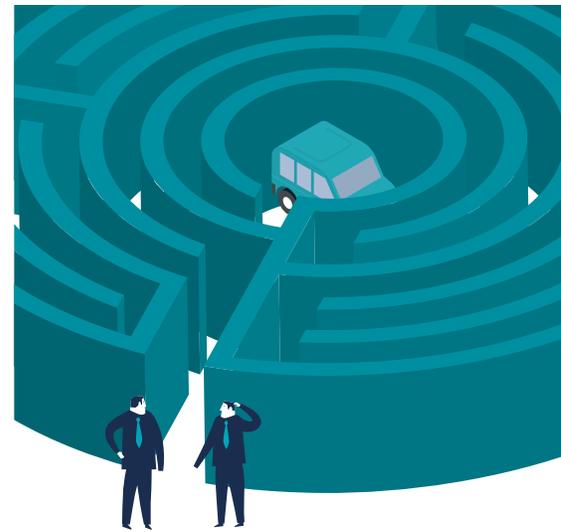
With reduction in both claims frequency and severity (eventually), we believe that claims management will be one area where there will be a great degree of disruption. Teams of adjusters, litigators, investigators and claims handlers might shrink, and move from a decentralized to a centralized staffing model. The claims survey will also be restricted to specialists with a high degree of technical expertise. In the case of an accident, self-diagnostics tools will generate a vast amount of information on the vehicle and vehicle occupants, which can be automatically transferred to insurance carriers. This will challenge the status quo of current business practice in terms of both technology and efficiency.

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Regulatory Impact

Autonomous cars will require new technology. But this new technology, which will penetrate an existing industry, is one where minor mistakes can result in fatalities. That mandates the need for a standard operating model. Insurers will look for clarity in the standard definitions and a revision of driver's manuals by autonomous automakers. States such as Nevada and California have already legalized driverless cars and have defined associated terms such as "artificial intelligence," "autonomous technology" and "autonomous vehicle." It is likely that other states will follow in the near future by working closely with driverless car manufacturers and insurers. Additional questions insurers must answer include:

- **Who is a driver?**
 - This will require a change in the standard definitions set in the 1949 Geneva Convention on Road Traffic. The definition of driver has been given under Article 4 as "any person who drives a vehicle, including cycles, or guides draught, pack or saddle animals or herds or flocks on a road, or who is in actual physical control of the same." Regulators could seek to explicitly include machines or robots into the ambit of drivers so that there is no discrepancy on who can drive a car.
- **What are the state rules?**
 - Every state's DMV provides information for drivers and vehicle owners, rules of the road and safe driving tips. Among the many points that need to be altered to cover driverless cars are subjects such as licensing, ownership, road rules, speed recommendations, seat belt guidelines, vehicle conditions, night driving, road sharing etiquettes, etc. State DMVs will need to define vehicle operating system, vehicle network and the general conditions for roadworthiness of a driverless car.
- **What happens to the insurance application?**
 - Data capture will include the new information that is required to underwrite driverless cars.
- **Who can arbitrate?**
 - The knowledge required to be an arbitrator will change. The technological know-how of a qualified arbitrator will need to be defined.
- **How will rates be regulated?**
 - It will be interesting to see how regulators set rates without historical loss data.



When an accident is inevitable, what should the car do? Is the objective of a car to solely protect the car occupant/s or is it to minimize human loss even if that means killing the occupant/s? We believe that there is no simple answer to this question.

- **How will regulations change over time?**
 - During the initial years, regulators might impose restrictions around when and where autonomous cars can be used. For example, regulators might initially not allow autonomous cars in hilly terrain, unpaved roads, high-density residential areas, etc. These restrictions will subside as driverless cars prove to be reliable and safe.
- **How will ethical dilemmas be managed?**
 - When an accident is inevitable, what should the car do? Is the objective of a car to solely protect the car occupant/s or is it to minimize human loss even if that means killing the occupant/s? We believe that there is no simple answer to this question. Insurers will need to solve this ethical question since it can potentially expose vehicle manufacturers to million-dollar lawsuits as fallout of a decision made by a driverless car. The role of the regulator would be very critical here. We believe that regulators can work with vehicle manufacturers and ethicists to define guidelines on how a driverless car should maneuver in the event of an ethical dilemma. The decision would be binding on insurers and, in the event of a loss event, the insurer would have to validate if the protocol was followed.

Figure 7 covers our predictions on how regulatory activity will evolve throughout the various driverless car phases.

The Regulatory Road Ahead

	Phase	Year	Regulatory Evolution
	I Controlling Entity: Driver	Current - 2025	<ul style="list-style-type: none"> • Recognizing driverless cars and updating the standard definition of vehicles according to Geneva conventions and state DMVs. • Defining minimum testing requirements so that vehicle manufacturers can comply with them.
	II Controlling Entity: Driver or Vehicle	2018 - 2030	<ul style="list-style-type: none"> • Capturing additional information on proposal forms. • Tariffication of motor rates and formation of motor pools for loss sharing. • Formation of an arbitrator role for fast tracking disputes.
	III Controlling Entity: Vehicle	2022 Onwards	<ul style="list-style-type: none"> • De-tariffication of rates and dissolving of motor pools. • Further evolution of guidelines as technology evolves.

Figure 7

Future Possibilities

The future of driverless cars will be shaped by many variables, some very difficult to predict. This figure depicts possible future scenarios based on two variables.



Figure 8

The Way Forward

Driverless cars are on the way and will disrupt key aspects of the insurance industry. As a result, insurance carriers must begin to prepare for significant changes to remain relevant over the near and long term. Insurance carriers cannot control the evolution of technology. They can, however, prepare by adapting to autonomous vehicle technology. To get ready, we believe carriers must:

- **Analyze their existing books of business and determine future target segments and transition timelines.**

Like any technology, the evolution of driverless cars will be defined by innovators, early adopters, early majority, late majority and laggards. Insurers will have to analyze their books of business (BoB), identify customer personas and determine when their customers are likely to move to driverless cars. As examples:

- If an insurance carrier has a BoB that is 70% HNI individuals, then they will need to soon start building its product for semi-autonomous cars.
- If an insurance carrier has a BoB that is predominantly AARP members, then it has choices:
 - » One option is to wait a few years before building an autonomous-car product since its target customers will most likely skip semi-autonomous cars and autonomous cars.

- » The other option is for the insurance carrier to change its target customers. This sounds radical, but it might be a necessity. By the time driverless (autonomous) cars arrive, some insurance carriers are likely to have established themselves as thought leaders in the semi-autonomous market and could be the go-to source for autonomous car insurance. Insurers that waited for autonomous technology to evolve might lose their customers, even though those customers were not the early adopters.
- **Develop a scenario-based action plan.** Anything about the future comes with a price of unpredictability. Though driverless cars are expected to be widely adopted, insurers will do better if they are prepared for different possibilities. The evolution and adoption of the technology and its impact on insurance could lead to multiple outcomes that insurance companies could anticipate, assess and prepare for. Figure 8 (previous page) depicts potential outcomes on two dimensions – the extent of driverless car adoption and the entity providing insurance.
- **Develop a product strategy.** Insurance carriers must aim for agility in innovation in order to develop the right product/market mix. For example, product strategy will involve deciding coverages, coverage terms, product versions and customer profile mapping. Since there would be no driverless loss history for customers during the initial period, the insurance carrier will have to establish an innovative way of pricing. If the insurance carrier decides to launch its product a bit later, then it can use available loss history, instead of judgment rating.
- **Form a partner ecosystem.** The safety and adoption of driverless cars will depend on a connected ecosystem comprised of vehicle manufacturers, insurers, regulators, government bodies and technology companies. Insurers should form these partnerships ahead of time to stay ahead of the curve.

Driverless Car Partner Ecosystem

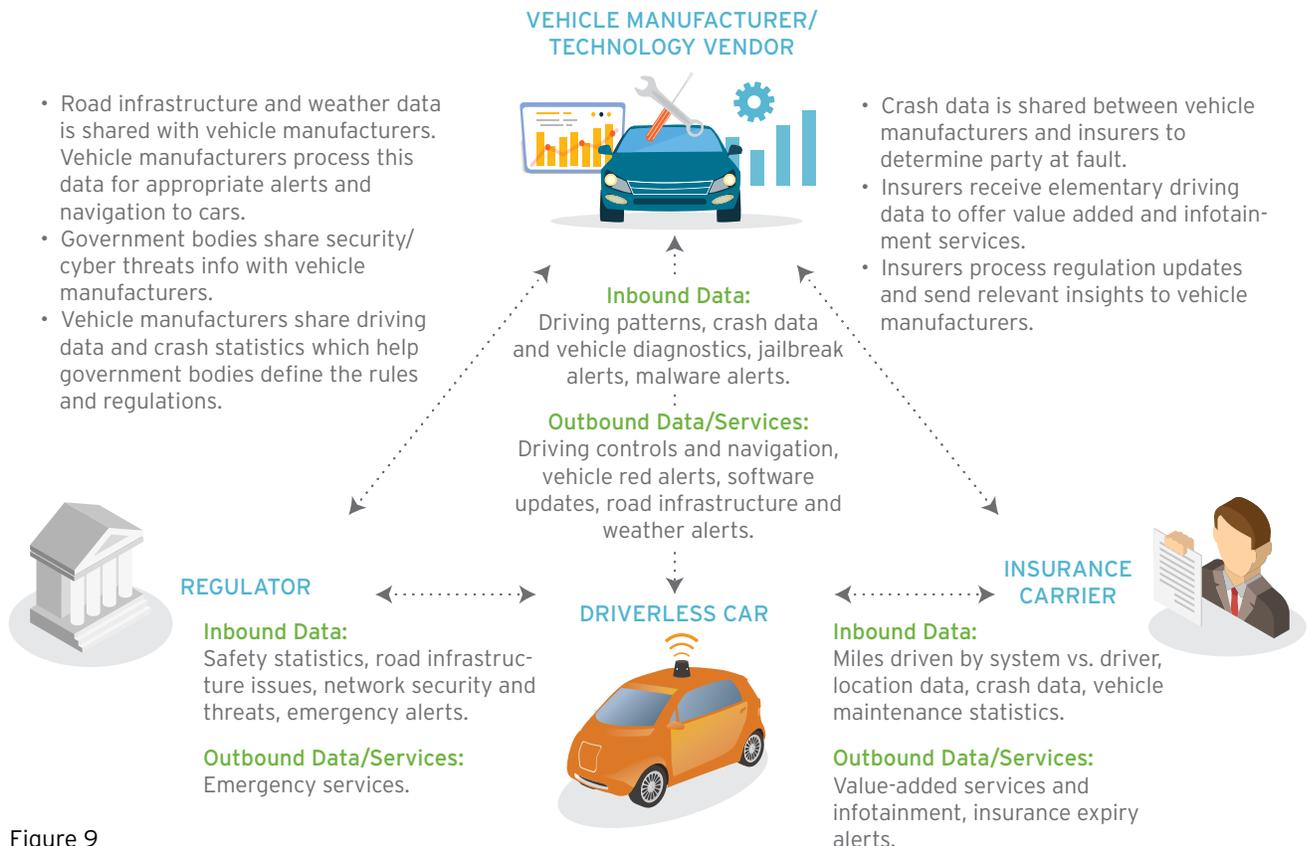


Figure 9

- **Capture, process and utilize data.** Once the partner ecosystem evolves, insurers will receive data from driverless cars, and also from regulators and technology vendors. Insurers might have to create data centers to capture and process this data and send relevant insights back to the ecosystem. Regulators and technology vendors will aggregate the data, perform data science (i.e., analysis) and determine ways to increase safety.
- **Develop and test product.** Once insurance carriers develop innovative products for the driverless car market, they will have to test the products in a pilot market. The market should be chosen to be in a state that is advanced in driverless car regulations. For example, the states of Nevada, Florida, California and Michigan have been at the forefront of driverless cars. They could be good test markets unless the scenario changes in the next few years. The market response from controlled testing, and data from the connected ecosystem, will help refine products to achieve success.

While creating the new product and launching it in test markets, the insurers should embrace the fact that the product might fail initially. Technology is fast advancing, consumer behaviors and expectations are evolving, and insurance products are also evolving. With so many moving parts, a mindset shift is required for insurance carriers to break with convention and become more innovation focused.

The states of Nevada, Florida, California and Michigan have been at the forefront of driverless cars. They could be good test markets unless the scenario changes in the next few years.

Footnotes

- ¹ "SAVING LIVES – Improved Vehicle Designs Bring down Death Rates," Insurance Institute for Highway Safety Highway Loss Data Institute, January 29, 2015, <http://www.iihs.org/iihs/sr/statusreport/article/50/1/1>.
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