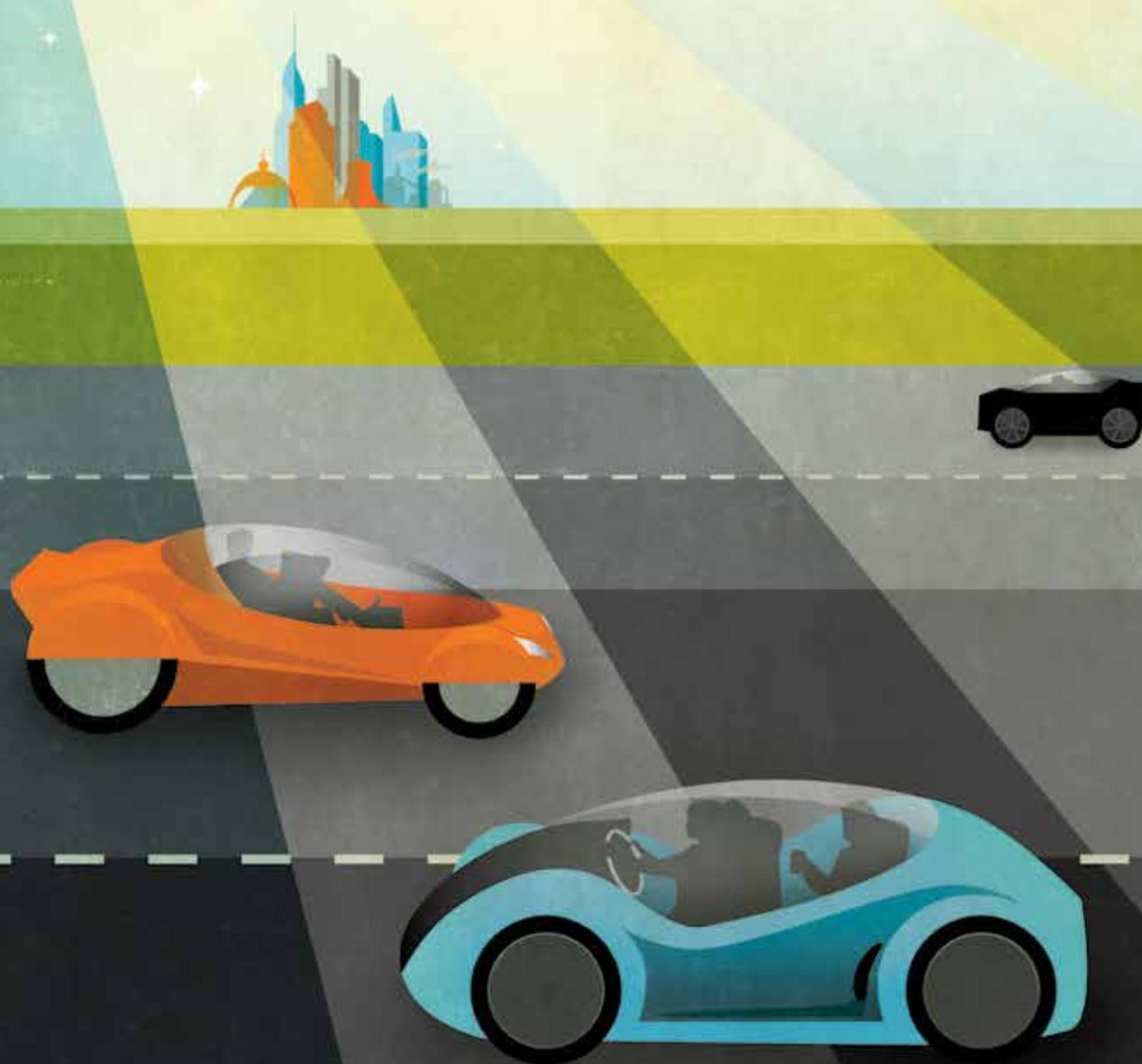


# Insuring the future of mobility

The insurance industry's role in the evolving transportation ecosystem



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# Introduction

**S**INCE the first personal auto insurance policy was written over a century ago,<sup>1</sup> the basic insurance model hasn't changed much: Policies are typically written on a vehicle-by-vehicle basis, protecting the owner and driver if the vehicle is involved in a collision, stolen, or otherwise damaged. It's clear, straightforward, and as established as almost any business practice.

Now, the future of mobility looks poised to upend that model and change nearly everything about auto insurance: who the customers are, what products they demand, and how to market to them. Indeed, as ridesharing, carsharing, and autonomous vehicles increasingly replace traditional models of automotive transportation, insurers may have to rethink their role in the mobility ecosystem and their relationship to drivers, owners, and vehicles. For future underwriting models, insurers will likely need to consider the advent of safer vehicles, new vehicle designs, and new sources of risk and liability. This likely means:

- A decrease in the frequency and, over time, the severity of loss events
- Changes to vehicle repair and replacement costs
- New customer categories and the creation of new insurance products

While widespread availability and adoption of fully autonomous vehicles may be a few years away, carsharing and ridesharing are already gaining traction, particularly among the young or those living in higher-density urban environments.<sup>2</sup> For insurers, shared mobility reduces the number of vehicles per capita, challenges vehicle-centric underwriting,

As ridesharing, carsharing, and autonomous vehicles increasingly replace traditional models of automotive transportation, insurers may have to rethink their role in the mobility ecosystem and their relationship to drivers, owners, and vehicles.

and will likely give rise to large fleet operators, meaning:

- A shift of the product and premium mix for passenger vehicles from individual buyers to commercial buyers
- The expansion of driver-centric policies and introduction of per-use policies
- An increase in the prevalence of self-insurance by larger fleet owners as an alternative to purchased coverage

While demographic shifts are gradual, technology is advancing and social attitudes are shifting at a fairly rapid rate. Ridesharing trips have nearly tripled in five years in the

United States,<sup>3</sup> and six states and Washington, DC, have already authorized the testing of fully autonomous vehicles.<sup>4</sup> With the emergence of a fundamentally different future mobility ecosystem, insurers have an opportunity to shape the auto insurance markets of tomorrow.

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## THE FIRST STEP IN A LONG JOURNEY

The new mobility ecosystem's impact on the insurance industry will be wide-ranging and complex, touching nearly every part of insurers' businesses. This paper provides an overview of our initial thinking about those impacts, but there will be much more to explore as the topic continues to evolve. The effects of this seismic transformation extend far beyond the insurance sector and affect consumers, passengers, corporations, and governments in myriad ways.

We intend to publish further articles that explore additional elements of the future of auto insurance and the future of mobility, and we invite you to join us on this ongoing journey of discovery. You can always find our latest thinking at [dupress.com/future-of-mobility](https://dupress.com/future-of-mobility).

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# The future of mobility

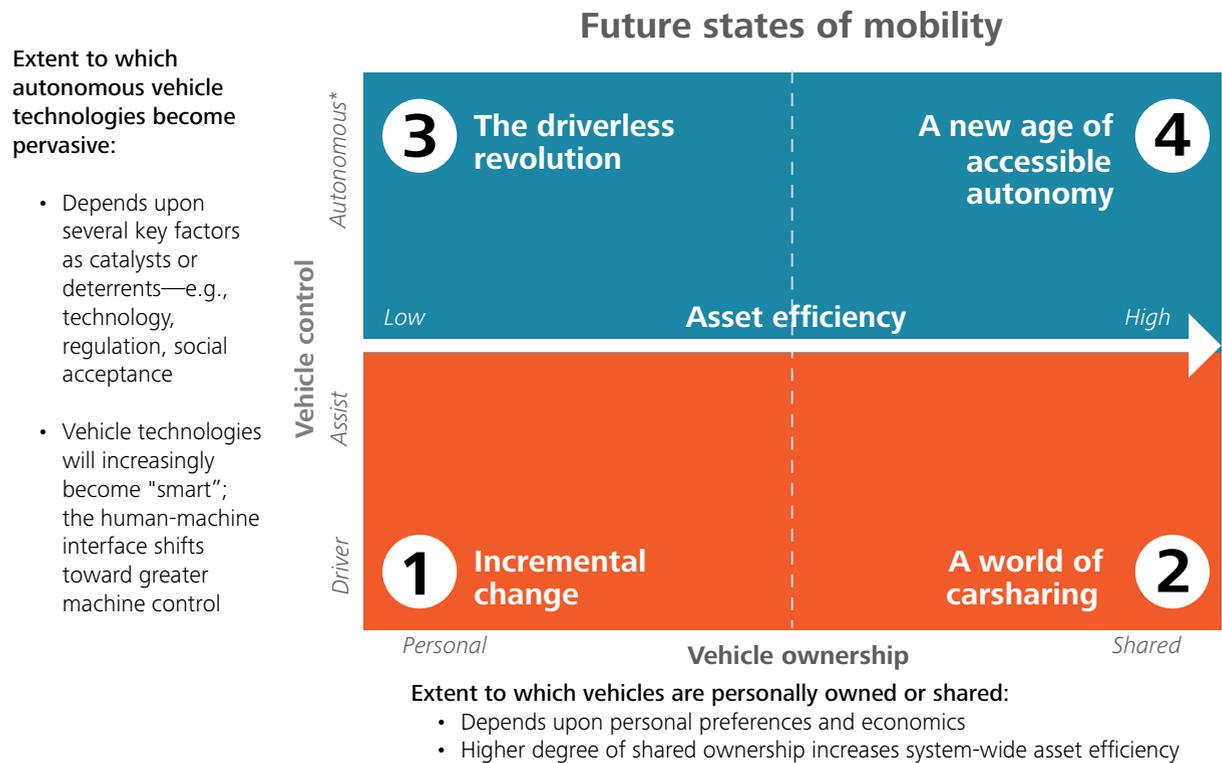
**I**n our article *The future of mobility*, we conclude that four future states of mobility will emerge from the intersection of two key trends, *the emergence of autonomous vehicles* and *shifts in mobility preferences*, giving rise to shared access to transportation (figure 1).<sup>5</sup>

- Future state 1 (personally owned driver-driven vehicles) is the most conservative and emphasizes the large assets tied up in today's system. This vision assumes that the owners of these assets will neither willingly abandon them nor invest in new enterprises with uncertain returns. It sees private

ownership remaining the norm, with consumers opting for the particular forms of privacy, flexibility, security, and convenience that come with having their own vehicles. And it rejects the possibility that, while driver assist technologies may continue to advance, completely autonomous drive will become a reality any time soon.

- Future state 2 (shared driver-driven vehicles) predicts the continued growth of shared access to vehicles, as economic scale and increased competition drive the expansion of shared vehicle services into new

**Figure 1. Future states of mobility**



\*Fully autonomous drive means that the vehicle's central processing unit has full responsibility for controlling its operation and is inherently different from the most advanced form of driver assist. It is demarcated in the figure above with a clear dividing line (an "equator").

Source: Deloitte *Future of mobility* analysis.

geographic territories and new consumer segments. Passengers value the convenience of point-to-point transportation and the demonstrated economic benefits of expansive carsharing and ridesharing networks.

- In future state 3 (personally owned autonomous vehicles), autonomous drive technology proves viable, safe, convenient, and economical, and private ownership continues to prevail. Individuals seek driverless functionality for its demonstrated safety, reliability, and other ancillary benefits, but drivers continue to own cars for many of the same reasons they do today, such as convenience and pride of ownership.
- Finally, future state 4 (shared autonomous vehicles) is the result of a convergence of both autonomous technology and the continued growth of shared mobility. Mobility management companies offer a range of passenger experiences to meet varied needs

at differentiated price points. The earliest adopters are likely to be urban passengers. But as smart infrastructure expands, fleets of autonomous shared vehicles could spread to densely populated suburbs and beyond.

In *The future of mobility*, we make the case that these future states will coexist for an extended period of time (perhaps the next 10–15 years).<sup>6</sup> Change will happen unevenly around the world as different populations will require different modes of transportation. The direction and rate of change also depend on a number of factors, including regulation, social attitudes, technological development, privacy and security concerns, and key stakeholders' level of resistance. In short, insurers will need to modify their product and service portfolios, go-to-market approaches, and business models to effectively meet the unique and distinctive needs of personal and commercial customers in each of the four future states.

# Customers, products, and channels in the new mobility ecosystem

**T**HE future of mobility—in each of the four future states—carries substantial implications for the \$205 billion US auto insurance industry.<sup>7</sup> Each state creates new requirements for existing and new customer segments seeking passenger automobile-related coverage, leading to new products and shifting emphasis

of various sales channels. The size and composition of the market in terms of premiums will change. Insurers will need new operational capabilities to underwrite policies and assess claims in a more technologically advanced and diverse environment. (See figure 2 for a summary of these changes.)

**Figure 2. Stakeholders and insurance products in the future of mobility**

	Future state	Stakeholder model	Stakeholder	Primary coverages
Driver-driven	 <b>1</b> Personally owned driver-driven	Traditional personal auto insurance	 Vehicle owner (individual)	Driver liability, collision, comprehensive
		Fleet (e.g., yellow cab, limo)	 Vehicle owner (commercial)	Driver liability, collision, comprehensive
		Owner/operator (e.g., black car)	 Vehicle owner (individual)	Driver liability, collision, comprehensive
	<b>2</b> Shared driver-driven	Rental	 Vehicle owner (commercial)	Comprehensive, liability (e.g., road worthiness)
			 Vehicle driver (individual)	Driver liability, collision
Autonomous	 <b>3</b> Personally owned autonomous	Personal autonomous vehicle insurance	 Vehicle owner (individual)	Comprehensive, liability (e.g., road worthiness)
			 AV system manufacturer/ OS provider (commercial)	AV product liability
	 <b>4</b> Shared autonomous	Commercial autonomous vehicle insurance	 Vehicle owner (commercial)	Comprehensive, liability (e.g., road worthiness)
			 AV system manufacturer/ OS provider (commercial)	AV product liability

## Customers

Shared mobility and autonomous vehicles introduce new stakeholders that will need the protection of auto insurance but do not conform to today's auto insurance model. In the case of driver-driven sharing in future state 2, for example, a rental car company and driver typically purchase separate coverage based on their unique needs. And for autonomous vehicles, the vehicle is "driven" by an operating system (OS) dependent on a network of sensors, mapping software, and algorithms designed, built, and maintained by a third-party entity that will require new forms of liability coverage.<sup>8</sup> These models of mobility create the opportunity—and need—to unbundle today's all-in-one, vehicle-centric policy that predominates in state 1 (personally owned, driver-driven) and provide coverage specific to the unique needs of stakeholders in states 2, 3, and 4.

**Future state 1** (personally owned driver-driven vehicles): For traditional, vehicle-centric policies, the vehicle owner will remain the primary stakeholder, insuring herself and the vehicle against loss and liability. The automaker will continue to carry liability for product-specific failure.

**Future state 2** (shared driver-driven vehicles): There are three basic stakeholder models: fleet (such as yellow cabs or limos), auto rental companies, and, more recently, ridesharing (in which the owner is also frequently the operator). For fleet and ridesharing models, owners are the primary stakeholders, with policies covering commercial drivers. For rental models, there are two stakeholders: the owner of the vehicle (most likely an auto rental company but potentially an individual) and, in

carsharing, a non-commercial driver. In these scenarios, separate policies may be needed to cover both the owner and the operator.

**Future state 3** (personally owned autonomous vehicles): Multiple stakeholders emerge, primarily the owner of the vehicle, the vehicle's manufacturer for mechanical operational performance, and the entities responsible for designing, building, and maintaining the

hardware and software comprising the autonomous vehicle OS.

**Future state 4** (shared autonomous vehicles): Here, the stakeholders are many: mobility management provid-

ers (the company providing the ridesharing service and the owner of the vehicle—not necessarily the same party), the vehicle's manufacturer, and the OS company.

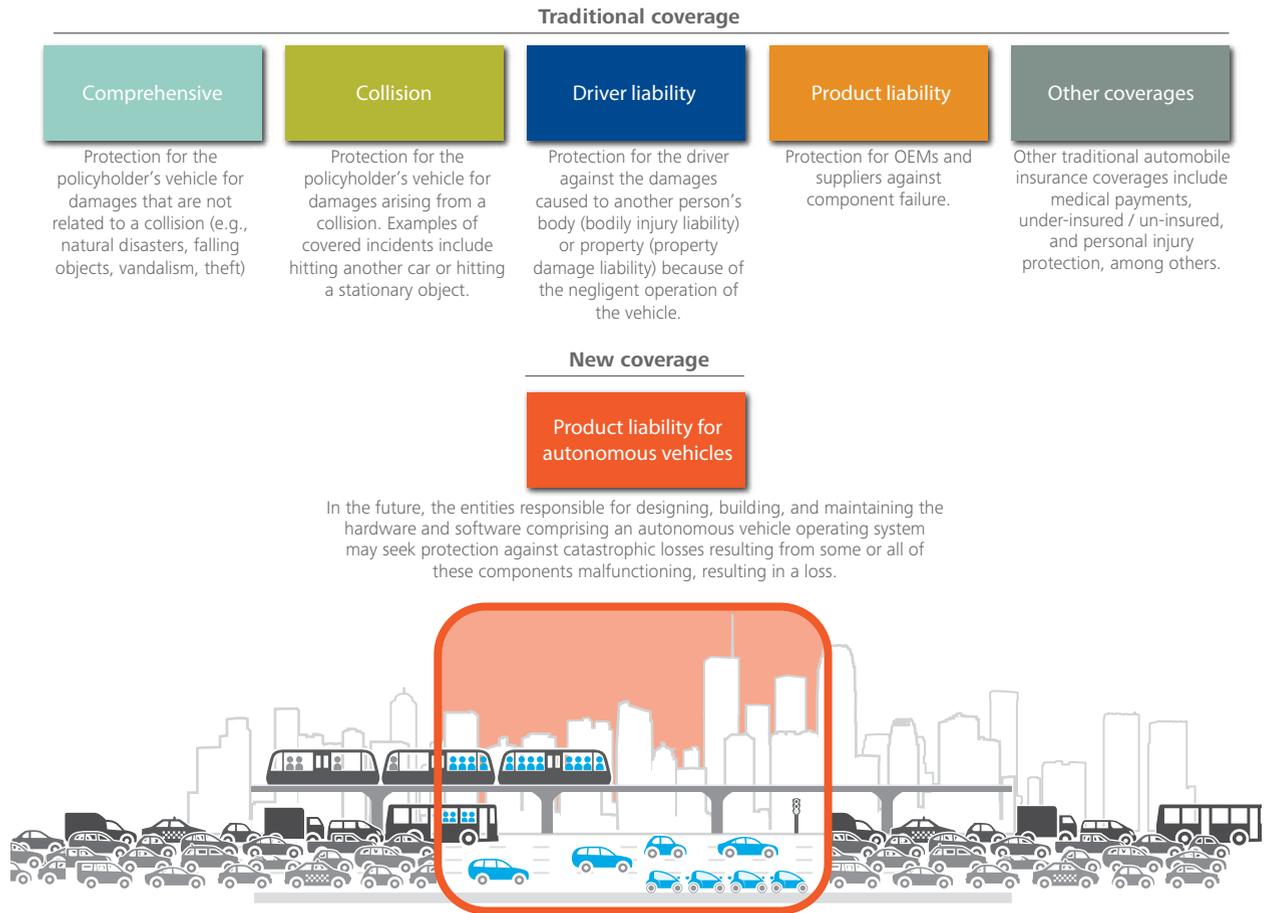
## The size and composition of the market in terms of premiums will change.

## Products

Each new stakeholder in the future mobility ecosystem has unique needs for different forms of insurance protection (see figure 3). The primary components of auto insurance today—comprehensive, collision, liability—will continue in some form, along with new components. Each stakeholder (owner, operator, manufacturer, and OS company) may require only some subset of these coverage components given their unique risk exposure.

**Future state 1:** Policies will likely resemble the all-inclusive coverage bundles offered today. Drivers will still depend on collision coverage to protect against vehicle damage and liability coverage to protect against losses resulting from their actions behind the wheel. The frequency of human-caused collisions will likely decrease with the proliferation of driver assist technologies and self-driving cars, but

Figure 3. Insurance coverage types



Graphic: Deloitte University Press | DUPress.com

any collision between a human-controlled and autonomous vehicle will likely be deemed the fault of the human driver and could actually drive up cost of coverage as this pool shrinks. Owners will also continue to need comprehensive coverage to guard against theft or non-collision damage.

**Future state 2:** For fleet and owner/operator models, all-inclusive commercial coverages will likely remain the norm, and they will continue to require comprehensive coverage to insure vehicles against theft, acts of God, or damage caused by an unknown party (a hit-and-run, for example). Drivers may need only collision and liability coverage to protect the vehicle, its passengers, and others while they are behind the wheel.

**Future states 3 and 4:** For fully autonomous vehicles, vehicle owners (whether a private individual or a mobility management provider) may need comprehensive coverage, even though technological advancements may significantly decrease loss frequency in this category. For example, self-driving cars would be difficult or impossible to steal, and could be programmed to seek shelter in the event of a severe storm or rising floodwaters. OS providers may choose coverage more akin to product liability policies to insure against new sources of risk such as malfunctioning hardware or software, flawed algorithms, or security breaches. Those that self-insure may need stop-loss or other types of catastrophic coverage.

Of course, over time, the amount of and cost of coverage of each insurance component

will likely change with the adoption of autonomous technologies and shared ownership models, and the corresponding impact to loss events' frequency and severity.

## Channels

Insurers have an opportunity to unbundle coverages and repackage them to meet the needs of new customers. Coverage may be incorporated into other products and services or distributed via new channels, and self-insurance may emerge as a dominant model for large shared (both driver-driven and autonomous) vehicle fleets. These patterns will affect the number of policies sold through traditional agents and direct channels. Additionally, the ratio of personal to commercial auto policies will begin to tip as shared vehicles become a greater proportion of the units in operation.

**Future state 1:** In the short and medium term, agents and direct channels are positioned to remain the primary outlets for traditional, vehicle-centric personal auto policies. But as the number and premium of these traditional policies declines, total agency commissions will likely fall as well. Insurers and agents who rely on automobile insurance to drive penetration into other products may need to re-evaluate their strategies.

**Future state 2:** For shared driver-driven vehicles, insurers may look to help these customers reduce their costs by offering coverage for subscription or per-trip fees that the mobility management company can pass along as an added fee to their passengers. Instead of fixed-term blanket coverage, drivers would be covered (and pay) on a trip-by-trip basis; companies such as Zipcar currently employ this model, including insurance in the cost of a trip.<sup>9</sup> There is an opportunity for insurers to forge partnerships with mobility management providers, and they might also consider creating new types of policies that cover drivers across shared mobility service companies or provide additional supplemental coverage

for the driver and a vehicle shared across multiple drivers.

**Future state 3:** Agents and direct channels will likely remain the main outlets for personally owned autonomous vehicle insurance, although they will face long-term challenges similar to those outlined in future state 1 above.

**Future state 4:** Business-to-business relationships will be the primary channel for shared autonomous players (specifically mobility management companies, fleet operators, vehicle manufacturers, or autonomous OS companies). As this segment grows, agencies and brokers with commercial relationships will be better prepared to serve this market than those whose primary customer focus is on the private owner.

Notwithstanding the potential narrowing of traditional channels, shared mobility and autonomous vehicles create fresh opportunities for the sale and distribution of auto insurance. These new channels may require insurers to partner with intermediaries to reach the customer at the point of sale, or to create new business models altogether. For example, insurers could:

- Create instant-quote capabilities to insure carsharing drivers on single trips
- Sell their underwriting expertise as a service to the increasing number of service providers and manufacturers in the shared mobility and autonomous vehicle segments
- Partner with credit card companies to offer ridesharing insurance coverage as part of a core or premium service
- Even explore entering a whole new business by becoming a mobility management provider

Failure to create new products and services and build capabilities to serve these new segments in parallel to the legacy auto insurance

business may result in insurers being precluded from competing for large, profitable opportunities in the marketplace of the future.

Finally, self-insurance may also pose a risk to traditional insurance companies. The largest shared vehicle fleet owners and autonomous vehicle manufacturers may choose to self-insure similar to large commercial transportation and logistics companies today. The extent to which this will reduce overall premiums

depends on the scale and concentration of the players. Insurers with the scale, relationships, and willingness to offer stop-loss or other forms of catastrophic coverage policies may see this business-to-business channel increase in volume and importance. Additionally, regulators may require such policies to ensure coverage in the event of mass correlated loss events resulting from the malfunction of driving systems, such as a hacking incident.

# Where will premiums go?

**W**E have discussed how the evolution of customers and products will transform the current passenger automobile insurance industry, and the likelihood of new opportunities arising to meet the needs of new customers and new and expanding models of mobility. To help quantify those changes, Deloitte's actuarial practice modeled how the future of mobility might impact loss events and total premium.

In the new mobility ecosystem, shifting customer needs and improvements in vehicle safety will likely reduce, reallocate, or eliminate a substantial amount of today's insurance premiums. Over time, several key factors drive these anticipated changes:

- A reduction in the total number of vehicles, as consumers adopt carsharing and ridesharing

New opportunities will arise to meet the needs of new customers as new and expanding models of mobility become more widely adopted and increasingly mainstream.

- A reduction in claim frequency, as vehicles equipped with either partially autonomous or fully autonomous capabilities comprise a growing portion of the fleet
- A shift away from personal auto to commercial and product liability-type insurance for shared autonomous vehicles

At the same time, new opportunities will arise to meet the needs of new customers as new and expanding models of mobility become more widely adopted and increasingly mainstream.

The following charts display the projected impact of the future of mobility on vehicle miles, frequency and severity of loss events, and total premium need.

The estimate of premium need assumes that the fundamental insurance equation is in balance. That equation is stated as:

$$\text{Premium} = \text{Losses} + \text{Loss Adjustment Expenses} + \text{Underwriting Expenses} + \text{Underwriting Profit}$$

All charts show the potential effects of the future of mobility on the markets for personal vehicles and the commercial transportation of people (rental cars, taxis, carsharing, and ridesharing). They do not include commercial trucking or delivery services, or account for the effects of self-insurance or alternative sources of coverage.

For more on our approach, please see the "Methodology note" at the end of this article.

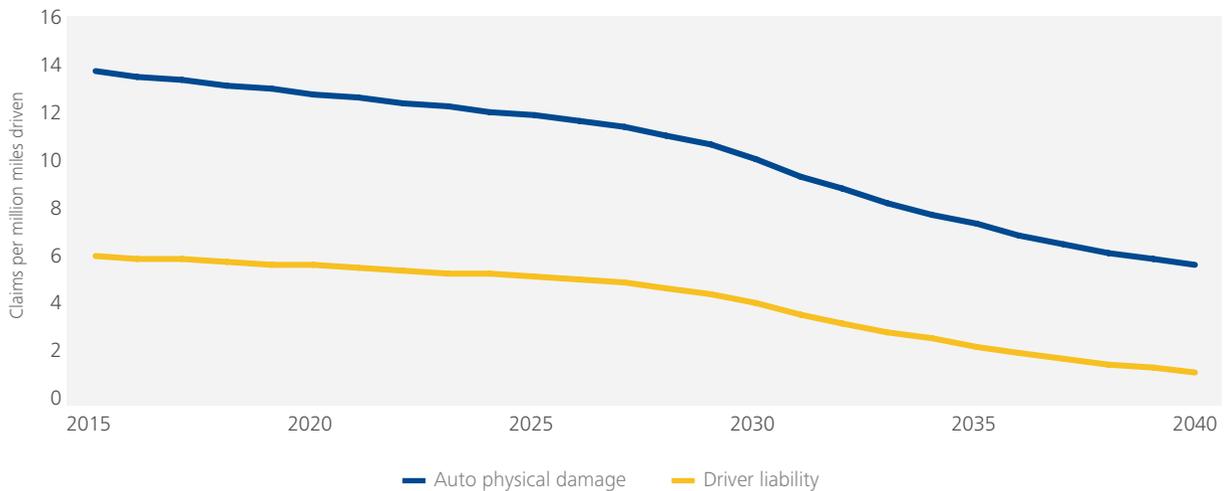
## Frequency and severity

The frequency of loss events on a per-mile basis will decrease as driver assist technologies, such as automatic emergency braking and forward collision warning, proliferate and become more advanced. That trend is expected to accelerate once fully autonomous vehicles become available and are adopted.

Correspondingly, the frequency of both auto physical damage (APD) and driver

liability claims will decline on a per-mile basis as technology advances reduce human error (figures 4 and 5). This effect will vary by vehicle type: Cars with more autonomous features will see greater reductions than those without. It will also vary by region—more densely populated urban areas, where analysts expect autonomous vehicles to proliferate first, will see a greater relative decrease than rural areas. In the most extreme case, in which

**Figure 4. Projected frequency of claims by coverage type**

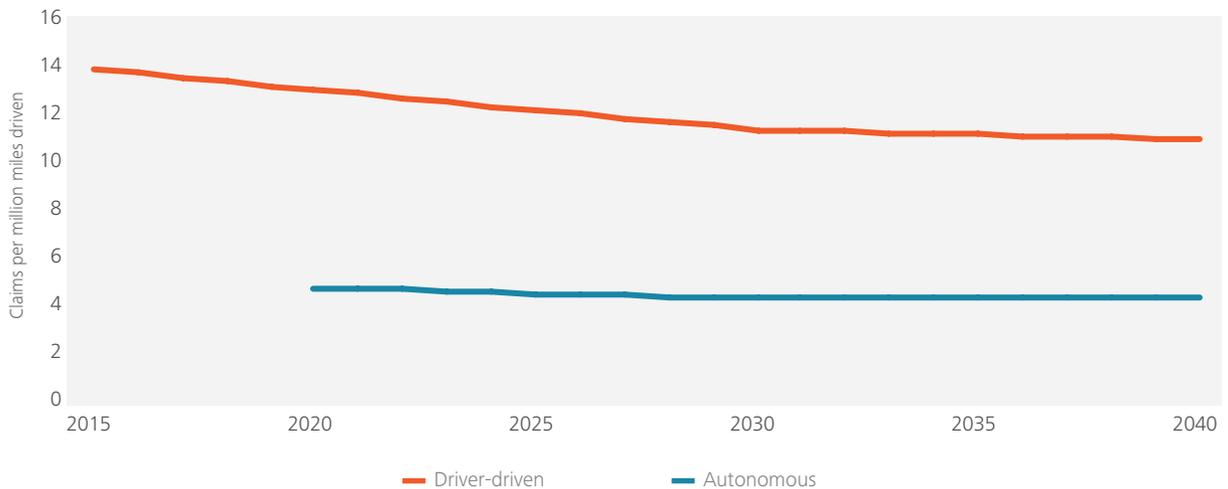


Note: The proliferation of driver assist technologies and fully autonomous vehicles will reduce frequency of claims.

Source: Deloitte Future of Mobility actuarial model preliminary findings.

Graphic: Deloitte University Press | DUPress.com

**Figure 5. Projected frequency of claims by vehicle type**



Note: Frequency of claims for driver-driven vehicles will decrease over time as vehicles equipped with driver assist technologies become more advanced and fully autonomous vehicles replace older vehicles.

Source: Deloitte Future of Mobility actuarial model preliminary findings.

Graphic: Deloitte University Press | DUPress.com

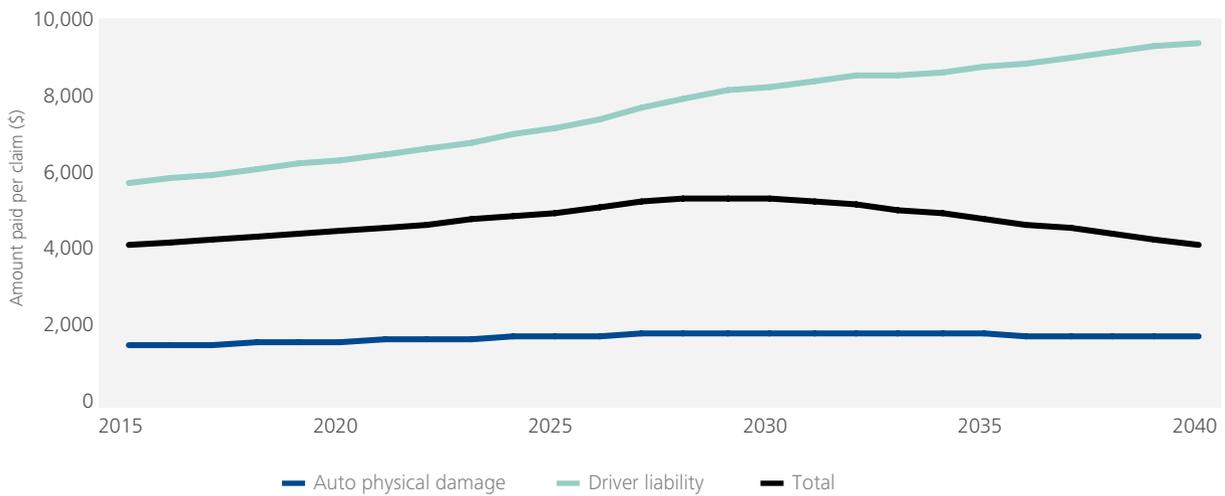
broad, large-scale autonomous vehicle adoption is achieved, the bulk of human-caused accidents—and their related claims—could be nearly eliminated.

The average total cost per claim will rise initially but could potentially decrease as fully autonomous vehicles proliferate (figures 6 and 7). The severity of physical damage claims will increase in the short term, as advanced technologies tend to make repairs more complex

and require more expensive OEM replacement components. This will be offset over the longer term as shared autonomous vehicles become more widely adopted, as these vehicles may be significantly cheaper and more utilitarian than today’s vehicles.

Driver liability claim severity is projected to continue to trend upward because of medical inflation. In addition, shared vehicles will need

**Figure 6. Projected severity of coverage by coverage type**

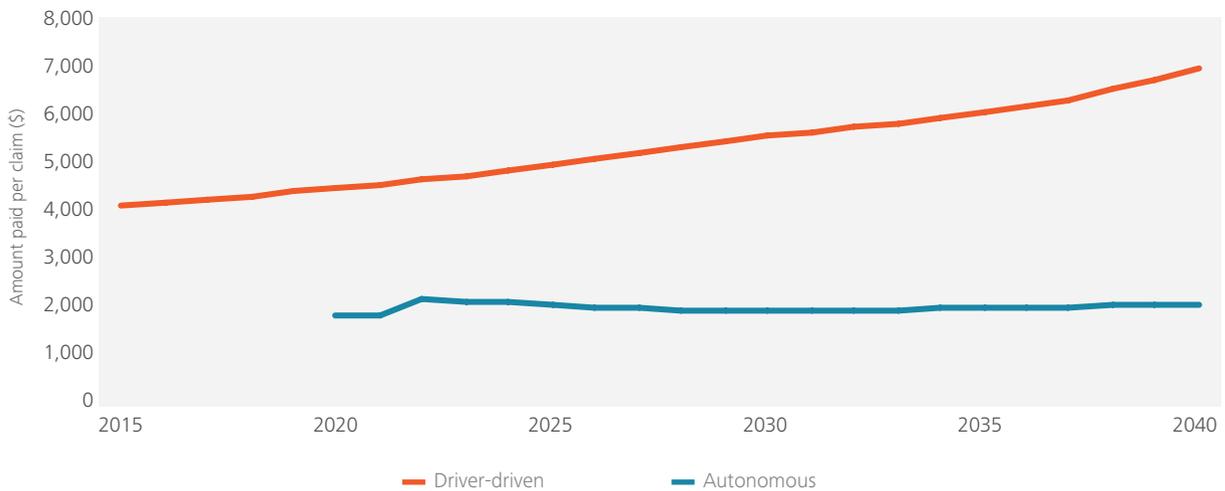


Note: Driver liability and APD claims are assumed to trend upward due to inflation in the early years; liability remains higher than APD because of the nature of those claims (for example, bodily injury losses are more severe than damage to a vehicle). As fully autonomous vehicles proliferate, total claim severity could actually decrease as the number of severe liability claims decreases.

Source: Deloitte Future of Mobility actuarial model preliminary findings.

Graphic: Deloitte University Press | DUPress.com

**Figure 7. Projected severity of claims by coverage type**



Note: Includes both liability and physical damage claim costs. Severity for driver-driven is expected to trend upward over time due to various economic effects, such as medical inflation and increasing auto repair costs. Severity trend for fully autonomous vehicles is flat because of the estimated reduction in driver liability claim frequency.

Source: Deloitte Future of Mobility actuarial model preliminary findings.

Graphic: Deloitte University Press | DUPress.com

to be insured using commercial auto policy forms, which tend to come with higher limits.

In total (driver liability plus physical damage), claim severity could actually begin to decrease as fully autonomous vehicles proliferate. Because of their advanced safety features and collision avoidance capabilities, autonomous vehicles could reduce claim frequency involving third parties by up to 90 percent compared to human-driven vehicles,<sup>10</sup> skewing total claim severity toward less severe APD claims over time, resulting in an overall decrease in total claim severity.

### Total premiums and policy types

We project that over time, total auto insurance premium need could decline by up to 30 percent from current levels. This decline is driven by two primary factors: the reduction in frequency of loss events and the decline in the total number of vehicles due to the efficiencies of vehicle sharing.

The mix of coverages will also change as self-driving cars become more common. The amount of driver liability and collision coverage required will decrease. At the same time, an opportunity will emerge in product liability insurance for autonomous vehicle manufacturers and shared mobility providers.

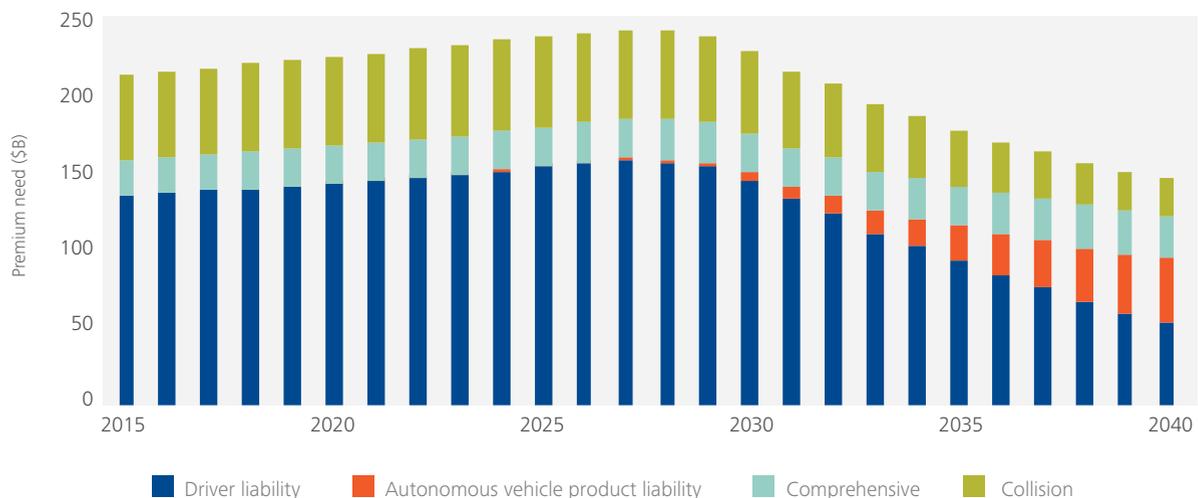
As future state 4 grows, the increased number of autonomous shared vehicles will eventually begin shifting the mix away from personal and toward commercial lines insurance (figures 8 and 9). As automakers introduce self-driving cars, product liability policies are expected to increase as liability shifts from the human driver to the autonomous vehicle system. This shift will come at the expense of personal auto policies, which will probably decline.

Insurers and their distribution channels are likely to begin seeing personal lines sales slip slightly over the next decade. With shared vehicle adoption (especially near term while vehicles remain driver-driven), the rate of decline in personal lines is projected to increase quickly—and permanently. Insurers without a strong commercial lines underwriting capability today may be at a significant disadvantage when the tipping point arrives.

### Product mix

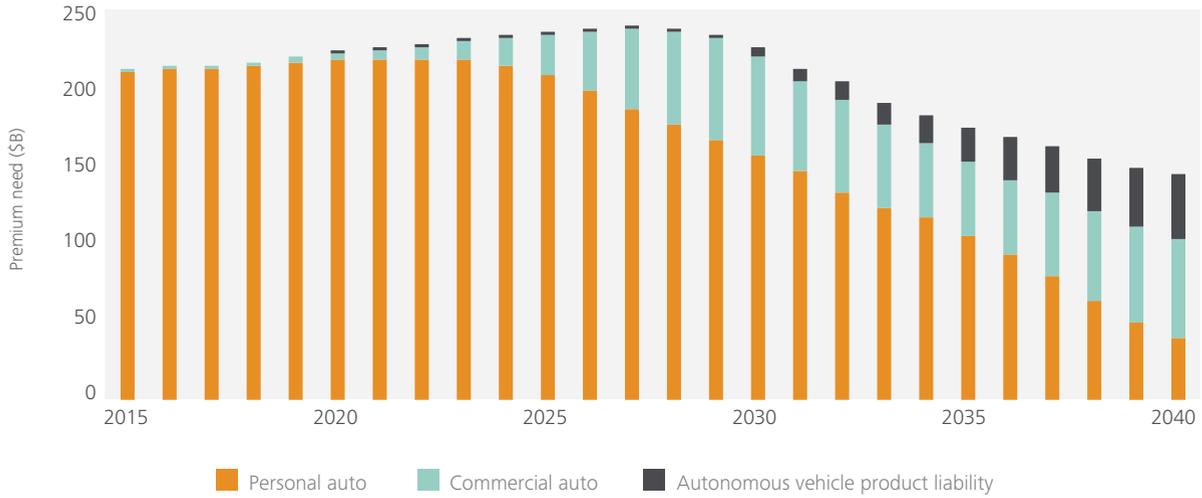
As mobility shifts across the four future states, it will drive change to the product mix: Demand for traditional auto insurance policies is projected to decline, as demand for shared vehicle policies rises (figure 10). Eventually, policies for personally owned driver-driven

**Figure 8. Premium need by coverage type**



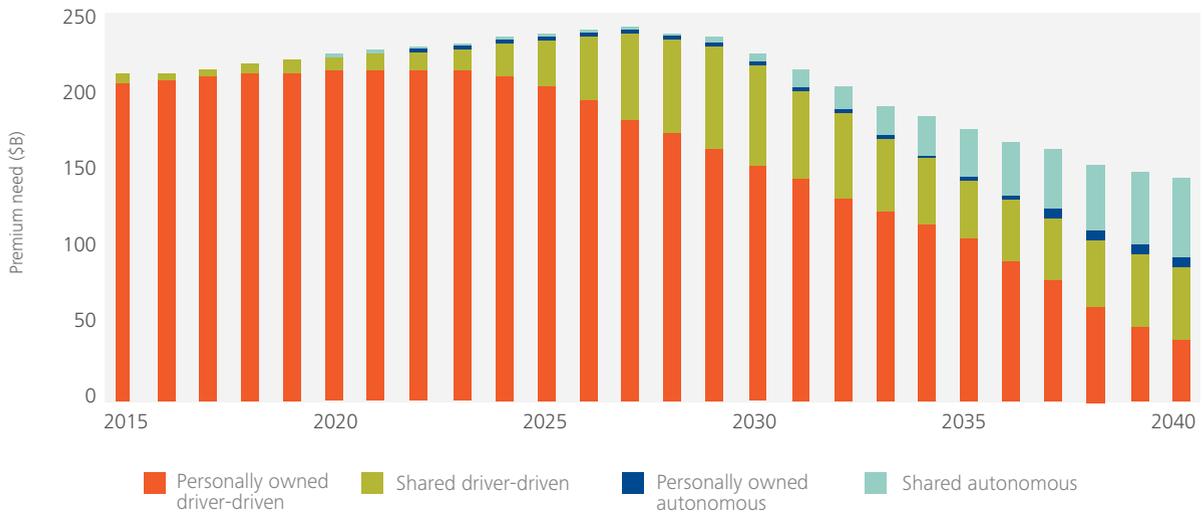
Note: Premium estimates do not account for the effect of self-insurance by large commercial fleets or vehicle manufacturers  
 Source: Deloitte Future of Mobility actuarial model preliminary findings.

**Figure 9. Premium need by product type**



Note: Premium estimates do not account for the effect of self-insurance by large commercial fleets or vehicle manufacturers  
 Source: Deloitte Future of Mobility actuarial model preliminary findings. Graphic: Deloitte University Press | DUPress.com

**Figure 10. Premium need by vehicle type**



Source: Deloitte Future of Mobility actuarial model preliminary findings. Graphic: Deloitte University Press | DUPress.com

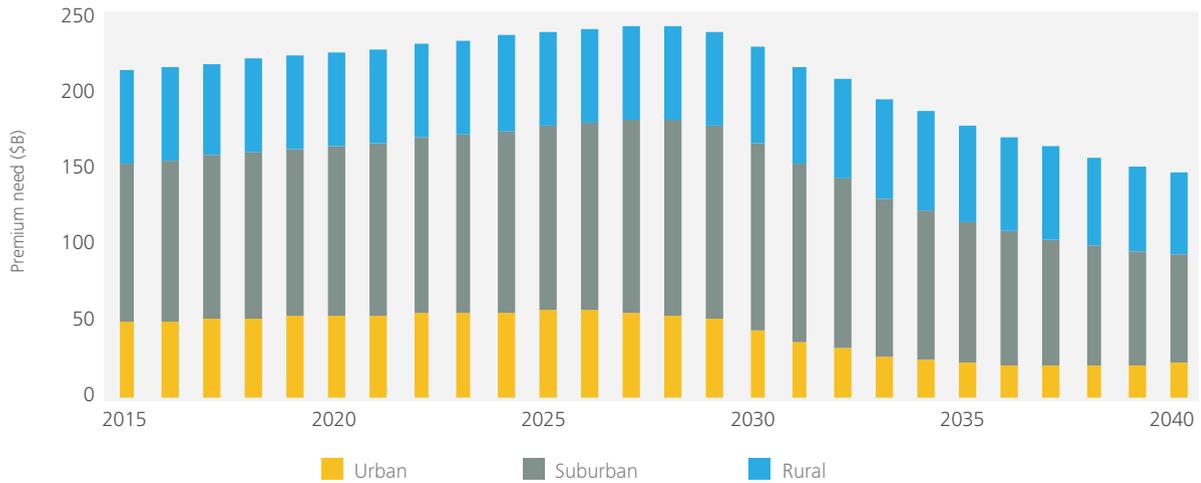
vehicles will not comprise a significant portion of the total market, while the need for shared autonomous vehicle coverage will grow quickly as these vehicles begin to account for a greater portion of total passenger miles.

### Regionality

The rate and degree of change is expected to be uneven across geographies, with urban areas generally adopting new models of mobility

more quickly than rural areas. Following the improved loss experience expected with autonomous vehicles, the amount of premium in urban areas will likely decline first, followed by suburban areas, and then rural areas (figure 11). Regional insurers should assess the rate of change in their portfolio, while national insurers may choose to focus on building their brand and book in more densely populated geographies and determining whether geographic vehicle preferences could skew loss experience.

**Figure 11. Premium need by geography**



Note: Adoption of shared and autonomous vehicles will likely be slower in rural and suburban regions, keeping premiums higher for a longer period relative to denser urban areas.  
 Source: Deloitte Future of Mobility actuarial model preliminary findings.

Graphic: Deloitte University Press | DUPress.com

## A NOTE ON PROFITABILITY

Insurers can generate a profit in two fundamental ways: ensuring that rates are adequate to cover expected losses and expenses (*underwriting income*), and through the investment returns on policyholder-supplied funds (*investment income*).

In the case of personal auto insurance, the duration of the liabilities (for example, the time between first notice of loss and subsequent claim closure) is relatively short-term, so the investment income potential, while not insignificant, is muted.

This makes it all the more important to ensure that the underwriting and rating process is robust enough to compete in the personal auto insurance market and to generate an underwriting profit. Not surprisingly, expected losses make up the largest component of premium. With the expectation that accident frequency will decrease as automakers equip more and more vehicles with advanced driver assist technologies and as autonomous vehicles become more widely adopted, losses should decline as well.

However, insurers that have priced their business adequately now could see higher short-term profits depending on how quickly loss experience improves. Granted, how long that can be sustained is questionable—since personal auto liabilities are relatively short-tailed, improved loss experience will hit ratemaking analyses quickly. Not only will regulators likely push for insurers to reduce rates due to system transparency—the market should re-equilibrate to favor vehicles with autonomous features. Insurers that are able to adapt their underwriting guidelines and rating algorithms to better attract and price favorable risks and account for these new technologies stand to gain the most.

In addition, insurers cannot ignore how expenses might change—for instance, decreasing claim frequency could lead to reduced claims-handling staff. The cost of acquiring and underwriting business, either through agencies or direct distribution, usually varies as a percentage of premium. Operating expenses pose a potentially greater challenge, since they are typically fixed and do not vary with premium. Declining premium volumes will likely force insurers to reduce overall staffing to remain competitive.

# Building capabilities to thrive as mobility evolves

**I**NSURANCE operations will also need to evolve to serve new products, customers, and channels and to address the technological advancements enabled through the future mobility ecosystem. To help realize both top- and bottom-line growth, insurers should create new products and services aligned with the needs of customers in the four future states. They will need to build expertise in new systems and technologies. They will need to more quickly and accurately price risk and underwrite policies. And they will need to leverage new sources of data throughout the insurance value chain. While market change may be incremental at first, a set of unique sales, underwriting, and claims processing needs are already beginning to take hold. Insurers are well advised to start planning now and developing strategies to lead the market, rather than pivoting later in response to changes. The latter may be risky, especially in an environment as dynamic as this one.

## Underwriting

In the new mobility ecosystem, underwriting will demand increased data sophistication and technical know-how. New classes of data will be available to assess and underwrite risk. Autonomous vehicle systems may be diverse in performance and, correspondingly, risk. And the underwriting and sales processes may become more intertwined, requiring specialized knowledge or systems.

The amount and variety of data on policyholder behaviors available to insurers are growing quickly, a trend that will only continue as vehicles and the transportation ecosystem

become increasingly connected.<sup>11</sup> Today, usage-based insurance policies enabled by telematics devices are becoming more common as consumer demand grows and the enabling technologies proliferate.<sup>12</sup> As the volume of data increases, insurers will likely require greater levels of analytical sophistication in order to compete. Insurers that can effectively correlate data on policyholder behavior to the probability of loss events will have a competitive advantage in pricing, while those that cannot may take on too much risk relative to the premiums collected. Additionally, insurers may find these new data classes to be hugely valuable in building new customer experiences and offering value-added services, such as coupons, smart routing, or other benefits directly or through third parties.

Along with analytical expertise, insurers should develop technological and operational capabilities to handle the challenges of insuring tomorrow's self-driving cars. A range of companies are testing autonomous vehicle technologies, but no standard has emerged for the hardware and software components that comprise these systems, meaning that multiple systems or standards could potentially coexist in the marketplace. Each hardware and software configuration may vary in performance and, by extension, have a unique risk profile. Hardware components may have different failure rates and performance capabilities, and older models may perform worse than newer ones. Autonomous vehicle algorithms and software may perform at different levels depending on road or weather conditions. And these vehicles may be vulnerable to hacking based on the security of the network and

software. To effectively price policies, underwriters will need to understand and build risk models based on an estimation of these various factors.<sup>13</sup>

Underwriters with specialized knowledge and systems may become even more important in the insurance sales and relationship management process. For example, underwriters who understand specific vehicle systems may help insurers advise commercial buyers on the expected performance of a vehicle before it is acquired. And shared mobility policies, purchased by passengers on a trip-by-trip basis, could require near-instantaneous quote generation. Insurers that can quickly and accurately assess and price risk, and then offer policies to customers via a mobile application, for example, may be able to build loyalty and capture market share.

## Claims

Claims handling will also be affected by the emergence of new technologies and data classes. Insurance carriers should prepare for changes to when and how customers file claims, how parties determine fault, and how fraud is detected. Connected and autonomous vehicles will require claims adjusters to acquire new technical expertise—but they can also make adjusters' job easier by facilitating more precise evaluation of claim events' severity and cause.

With autonomous and connected vehicles capable of precisely, automatically, and rapidly detecting and reporting the cause of an accident or vehicle damage, insurers should prepare their IT infrastructure to receive and interpret this data for claims processing. For

shared driver-driven vehicles, claims—especially those not involving a serious collision—may be reported by the vehicle owner instead of the driver, and not necessarily at the scene of the claims event. In the interim, insurers may need to work through the carsharing provider to locate the driver to further investigate the event, which could increase the complexity and time required to complete claims investigations.

Autonomous and connected vehicles will generally contain an array of sensors that can capture substantial detail about a loss event and, ideally, make the determination of fault clearer. With the equivalent of advanced “black boxes” that can be remotely monitored, forensics on the loss event and the ability to identify the source of the operational failure will likely be more accurate and efficient than today's claim process. Automakers and OS manufacturers, too, may be able to use this data to defend themselves against liability claims for loss events involving self-driving cars.

Fraud will presumably always be an issue, but sensor data may make it more difficult by helping adjusters determine when claims may be fraudulent. For example, in a rear-end collision, claims investigators could determine the speed of the vehicle at the time of impact; this could provide evidence that bodily injury claims, such as whiplash, are exaggerated or improbable. Today, analysts estimate between 13 and 17 percent of claims paid to be fraudulent,<sup>14</sup> resulting in excess payments of between \$6 billion and \$8 billion annually. Every incremental 10 percent reduction in fraudulent claims could result in industrywide savings of up to \$800 million.<sup>15</sup>

# A strategy for the future of mobility

**E**VERY insurer, of course, recognizes that change is coming. But many do not yet have a strategy for how to approach these changes or capitalize on the new opportunities that the transition to the new mobility ecosystem will create. Insurers today should analyze their preparedness by evaluating the impact of the future of mobility on their current books of business and identifying and experimenting with alternative products, channels, and business models. For example:

- What is their current market position in personal and commercial lines?

Currently, 6 of the top 18 personal lines carriers offer limited commercial auto product elements and could find themselves needing to build capabilities or partnerships in this segment.

- How likely is shared mobility to take hold in the primary markets and regions they serve?
- How quickly will their current and/or future customer base adopt self-driving cars?

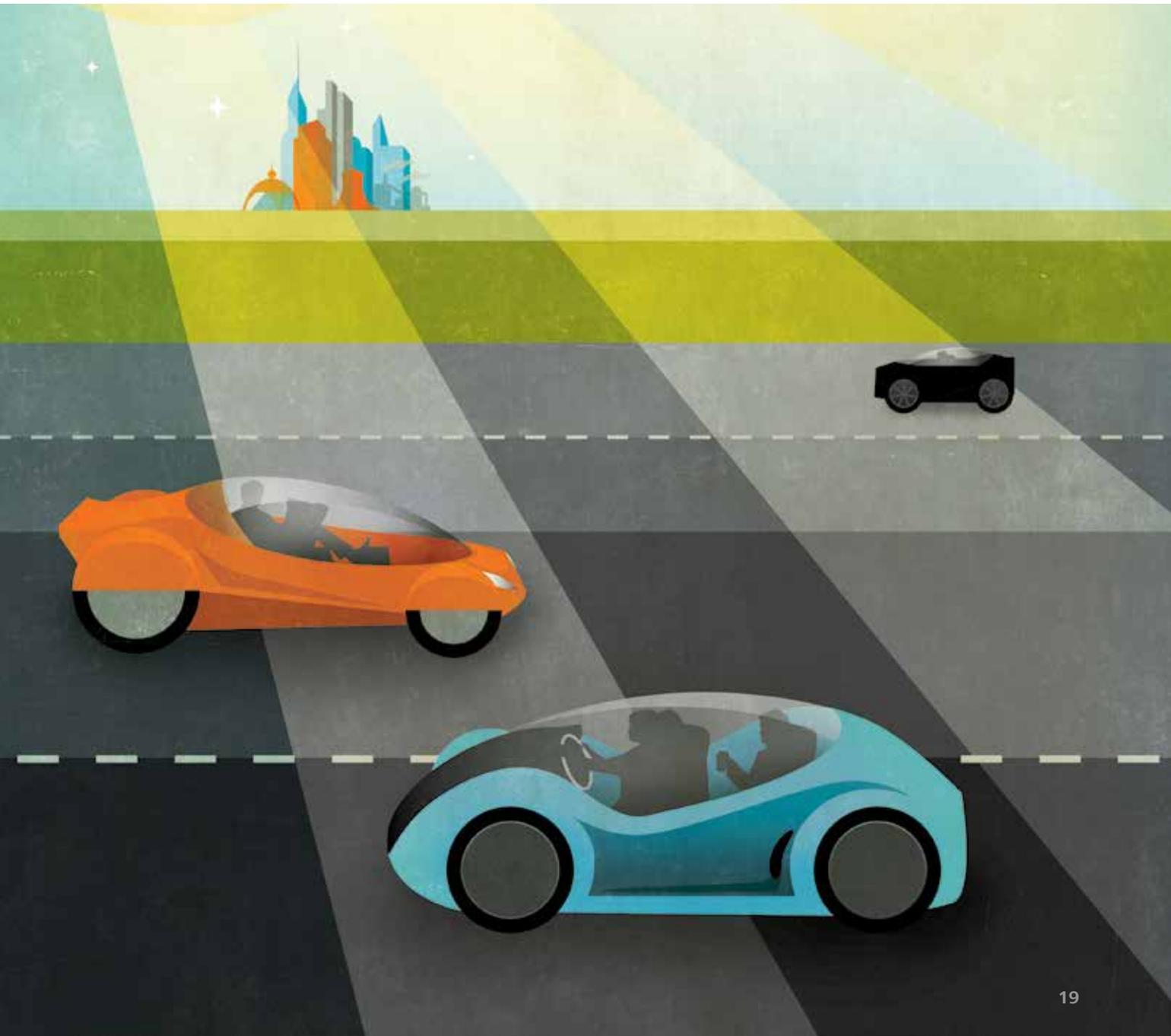
Reviewing a portfolio with a fresh lens and developing a perspective on the future and associated timing is a critical first step in moving forward. This view will help insurers identify gaps in current and planned offerings—and where and when opportunities to bring new products to new markets may exist. For instance, carriers with few commercial offerings may find themselves scrambling to replace personal lines premium as they shift to commercial and autonomous system product liability policies. Currently, 6 of the top 18 personal lines carriers<sup>16</sup> offer limited commercial auto product elements and could find themselves needing to build capabilities or partnerships in this segment.

Shared mobility is expected to happen faster in more densely populated geographies than rural areas. The favorable economics of carsharing and ridesharing may result in early adoption among urban dwellers, young people, and even lower- and middle-income households, meaning that insurers with portfolios concentrated on consumers in these demographics should consider creating a range of products for shared mobility consumers.

Likewise, autonomous vehicle availability and adoption may vary by market segment and region, with urban and higher-income

segments likely to be the first to own self-driving cars. Early adoption is less likely among some customer segments—for example, those who drive performance or utility vehicles (such as pickup trucks used off road). Insurers should evaluate the probability of adoption to understand when policyholders might transition to autonomous vehicles. As noted above, we envision earlier and more widespread adoption of autonomous vehicles in the form of shared mobility (future state 4).

Insurers should also assess their ability to support new customers and business models by evaluating their own operational capabilities; they will need to evaluate their technology, talent, and culture and determine readiness for the changes on the horizon. Carriers that embrace change and pursue self-disruption will likely have an early advantage in shaping the insurance market of tomorrow.



# Preparing for the new mobility ecosystem

**T**HE changes discussed here—shared mobility and autonomous vehicles—may seem distant, but the timeframe for adoption could shrink surprisingly quickly as the technology accelerates and social acceptance grows. In our view, insurers shouldn't wait to begin experimenting with how they intend to capitalize on these changes.

**Evaluate the potential impact:** Insurers should analyze the order of magnitude of the future of mobility's impact on their current business based on different scenarios. If a carrier writes mostly personal lines, the impending changes can significantly affect the revenue stream and customer engagement model. An analysis will give management a more empirical understanding to help leadership build a consensus around the degree of urgency required to make the transition to the new mobility ecosystem.

**Engage with new classes of data:** Connected and autonomous vehicles will present insurers with entirely new classes of data about where, how, and when a vehicle is being driven. To price policies effectively, insurers should understand these data points' risk implications and correlation with losses. Today, data garnered from existing telematics solutions can give carriers significant experience building, testing, and refining risk models and customer segments. Given the volume of data required to comprehensively validate these models, insurers that become early adopters by collecting and analyzing this data may gain a significant competitive advantage.

**Build cross-sector relationships:** The future mobility ecosystem will increasingly

integrate the activities of automakers, technology companies, insurers, mobility management providers, and the public sector. While products and distribution models for shared mobility and autonomous vehicle insurance are not yet fully defined, they are beginning to take shape as all of these stakeholders assess the future. Insurers that work with or through these players can position themselves strategically as new channels and customers emerge. Auto insurance will remain an essential product, but as the market evolves, insurers will likely need to leverage partnerships to gain broader and more diversified access.

**Embrace innovation:** Insurers that focus solely on new product development—which competitors can easily replicate—will likely not establish an enduring advantage. By contrast, carriers that innovate across their businesses and build “fit for purpose” operating models have an opportunity to position themselves for longer-term relative success. This innovation should include a re-examination of existing business models, platforms, product and service portfolios, and customer experiences to meet emerging needs and provide a differentiated and unique experience.

In the future mobility ecosystem, all four future states will have a significant impact on the auto insurance industry and, more broadly, the property and casualty industry. While no one can pinpoint or predict a tipping point away from traditional personal auto, the implication for the insurance sector is clear: In the coming decades, the market for auto insurance will move substantially and permanently toward policies for new models of mobility.

While daunting, these changes bring a plethora of new opportunities. Insurers that have the ambition, capabilities, and resources to lead the transformation to the future of mobility are not only expected to survive, but thrive.

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## METHODOLOGY NOTE

To understand how the insurance market would likely change in the future of mobility, Deloitte's insurance actuarial practice conducted in-depth modeling of the four future states. Beginning with assumptions about total miles driven and adoption rates of particular types of mobility, the model developed and analyzed premiums based on the fundamental insurance equation:

$$\text{Premium} = \text{Losses} + \text{Loss Adjustment Expense} + \text{Underwriting Expenses} + \text{Underwriting Profit}^{17}$$

Each component is modeled separately based on P&C combined industry data<sup>18</sup> and assumptions about shifts to these components in the future. The model does not contemplate investment income or impacts to premium due to the insurance cycle's hard and soft markets.

Losses and loss adjustment expenses are based on the projected annual miles driven and associated frequency and severity expectations for each type of vehicle. The model factors in projected changes to claim frequency and severity over time due to a number of factors.

Underwriting expenses are projected assuming that historical expense ratios of the P&C auto insurance industry are indicative of future expense ratios. The underwriting profit provision was selected upon reviewing multiple insurers' rate filings.

For ease of understanding, we are presenting point estimates, but each calculation has both higher and lower bounded results depending on the assumptions made about the speed of technology adoption, the frequency and severity of loss events, and nature of coverage required in the different future states. In short, estimates should be considered preliminary and are based on a highly uncertain future trajectory; like all models, results would change if the underlying assumptions are modified. The model in its current form fully accounts for the major trends that will affect the insurance marketplace in the coming years.<sup>19</sup>

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