



INSURING AUTONOMOUS VEHICLES

AN \$81 BILLION

OPPORTUNITY BETWEEN NOW AND 2025



INNOVATION BRINGS DISRUPTION FOR AUTO INSURERS AND

ABUNDANT OPPORTUNITY

The rapid emergence of autonomous vehicles – with Stevens Institute of Technology predicting that as many as 23 million fully autonomous vehicles will be traveling US highways by 2035 – presents the automobile insurance industry with major challenges, but also with a significant near-term opportunity. In fact, we estimate that the switch to autonomous vehicles will generate at least \$81 billion in new insurance revenues in the US between 2020 and 2025. Converting this opportunity will not be easy, but insurers taking action now will, we believe, have an important first mover advantage, not only over other insurers, but against new disruptors such as automotive manufacturers and over-the-top (OTT) players providing Internet content and services.

Widespread adoption of autonomous vehicles may seem to insurers like something that takes place in the far distant future, but autonomous vehicles are making inroads, and quickly.

The shift to autonomous vehicles will cause dramatic changes in how insurance premiums are generated. With most autonomous vehicles likely to be owned by original equipment manufacturers (OEMs), OTT players, and other service providers such as ride-sharing companies, the number of individual policies will decline, along with revenues from premiums generated by these policies. And, since autonomous vehicles will be considerably safer than vehicles driven by humans, there will be fewer road accidents, leading to reduced pricing for insurance policies. Estimates are that claim frequency could drop significantly when compared to claims for vehicles driven by humans. While insurers of autonomous vehicles will make fewer payouts for claims, this will not compensate them for lost policy revenues.

BEHIND THE NUMBERS

Stevens Institute of Technology developed proprietary models for forecasting the adoption of autonomous vehicle technology, the size of the insurance markets, and the potential new insurance market penetration of the following three new sub-categories: Cyber Risk, Software and Hardware, and Infrastructure. The Stevens team conducted a dynamic forecasting computer-based simulation which considered the consumer purchasing behavior, insurance revenue calculation, automobile market sales, and the new insurance sub-categories. Sensitivity analysis was then applied to the model to account for overall risk and uncertainty. Lastly, using expert opinion price ranges of the three new insurance sub-categories, the future insurance market impact of autonomous vehicles was further investigated.

The estimates of autonomous vehicle market growth from 2020 to 2050 were generated from Stevens' own modeling and analysis and adjusted based on external forecasts. For instance, the estimate of annual sales of 3 million fully autonomous vehicles by 2050 is based on their analysis of NHTSA and other independent forecasts.

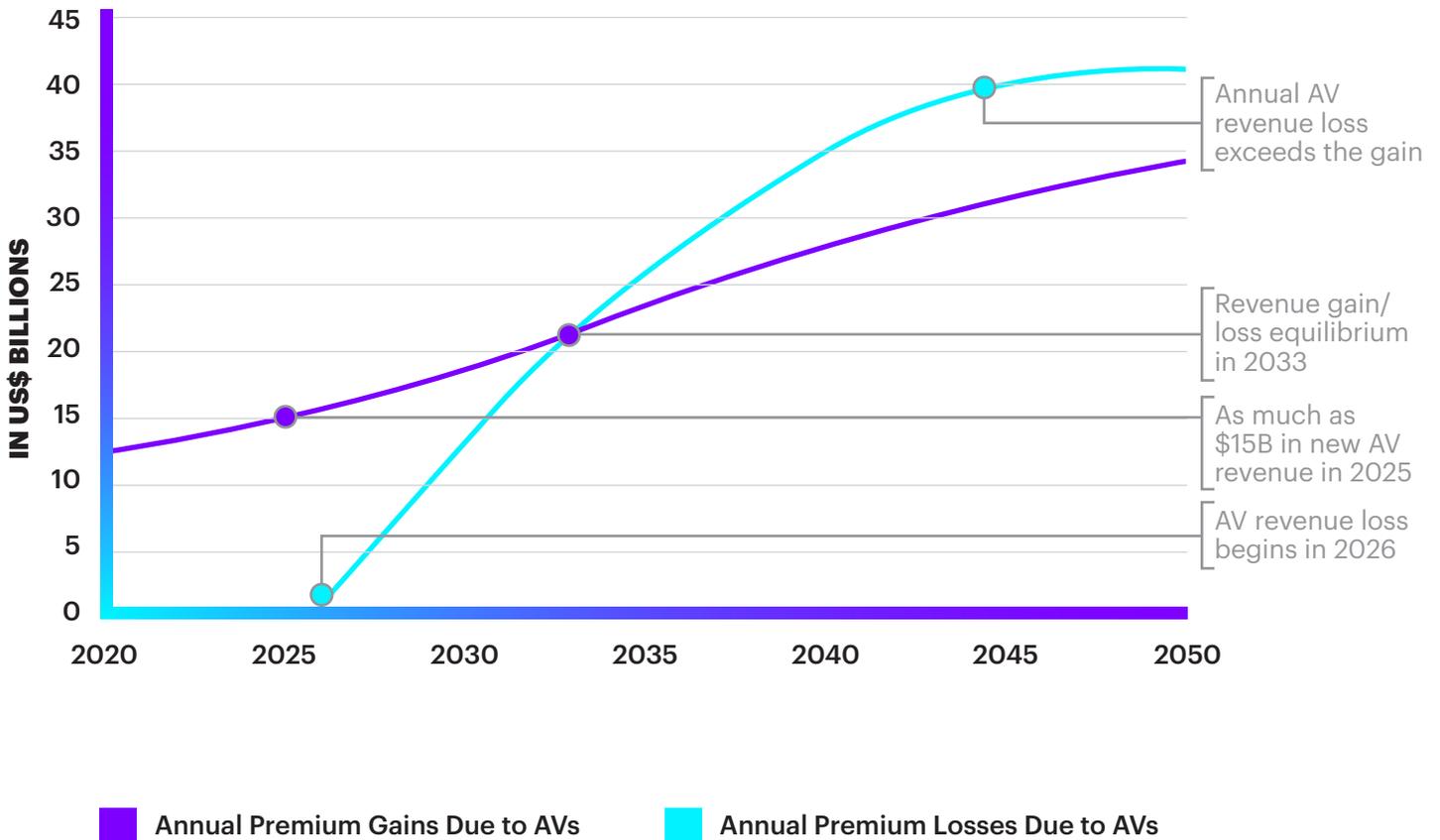
AUTO INSURANCE PREMIUMS COULD DROP BY AS MUCH AS \$25 BILLION BY 2035

We agree that the revolution in autonomous vehicles poses serious and fundamental risks to the traditional insurance business model. Our conservative estimates are that, by 2026, insurers will begin to see auto insurance premiums drop due to the rollout of autonomous vehicles; by 2035, the reduction could be as much as \$25 billion, or 12.5 percent of the total market. However, models designed by Accenture in

collaboration with Stevens Institute – illustrated in Figure 1 below – indicate that these decreases will be offset by new insurance product lines centered upon autonomous vehicles. These new revenues could be in the range of \$15 billion annually by the year 2025 and as much as \$23 billion in 2035, although by 2033 lost premium revenues will begin to outweigh the gains from new insurance product lines.

Figure 1. Estimated gains and losses in insurance premium revenues caused by autonomous vehicles (AVs)

IMPACT OF AVs ON INSURANCE PREMIUMS (ANNUAL GAIN VS. LOSS)

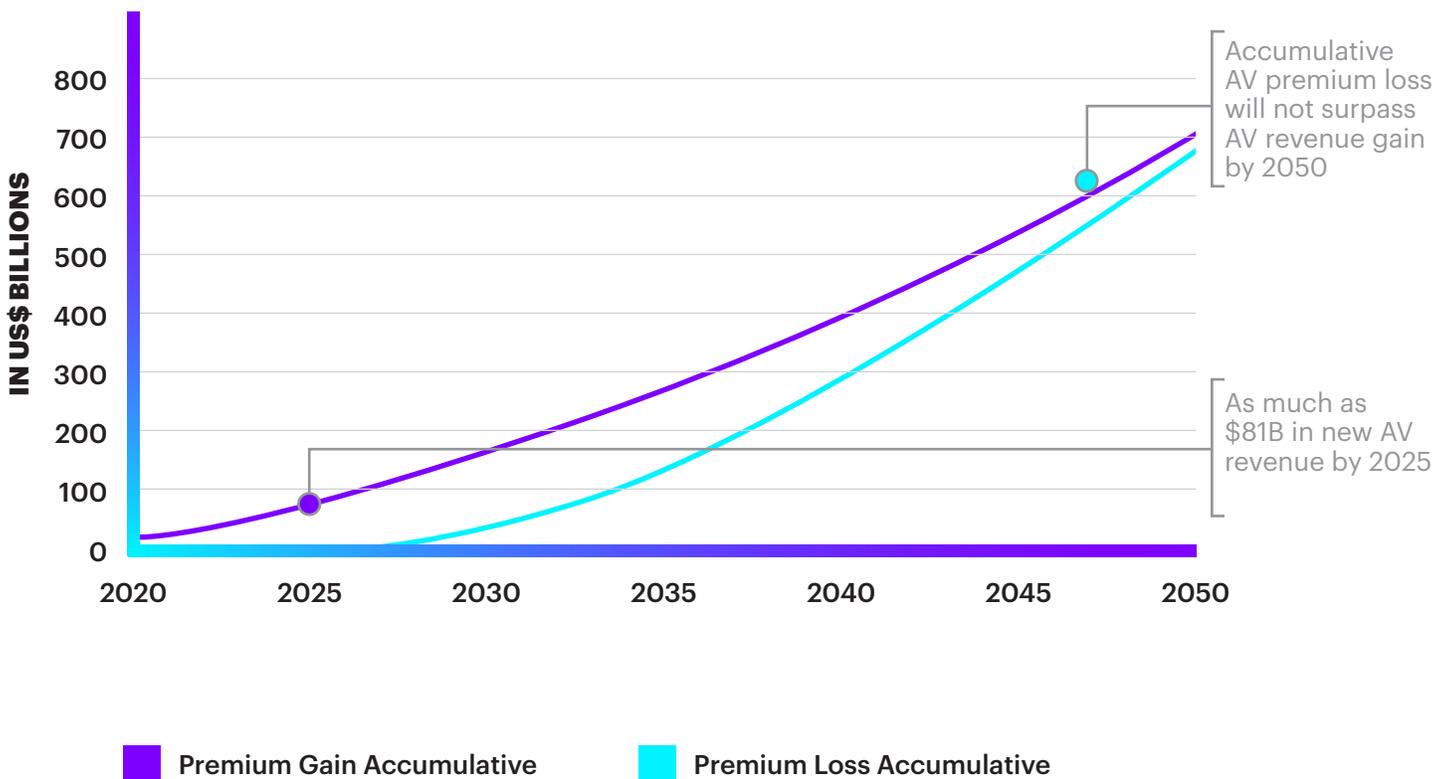


As seen in figure 2 below, the cumulative value of potential new revenues is enormous. It totals as much as \$81 billion by 2025 and, because of the gains that can be realized in the years up until 2025, the accumulated premium loss will not surpass the forecast gains until 2050. For insurers, the great opportunity is within the next decade, but this potential can only be realized through rapid action.

These potential revenues cannot be characterized as easy pickings or low-hanging fruit. To seize this opportunity, insurers will need to change and adapt their business models, and to do so quickly. Those insurers that come to terms with marketplace realities and pivot in the right direction have a much better chance of enjoying long-term success than those that adopt a “wait and see” posture, hoping that the pace of change will be slower than anticipated.

Figure 2. Aggregated revenues from new premiums

AV INSURANCE PREMIUM GAINS VS. LOSSES (ACCUMULATIVE AMOUNT)



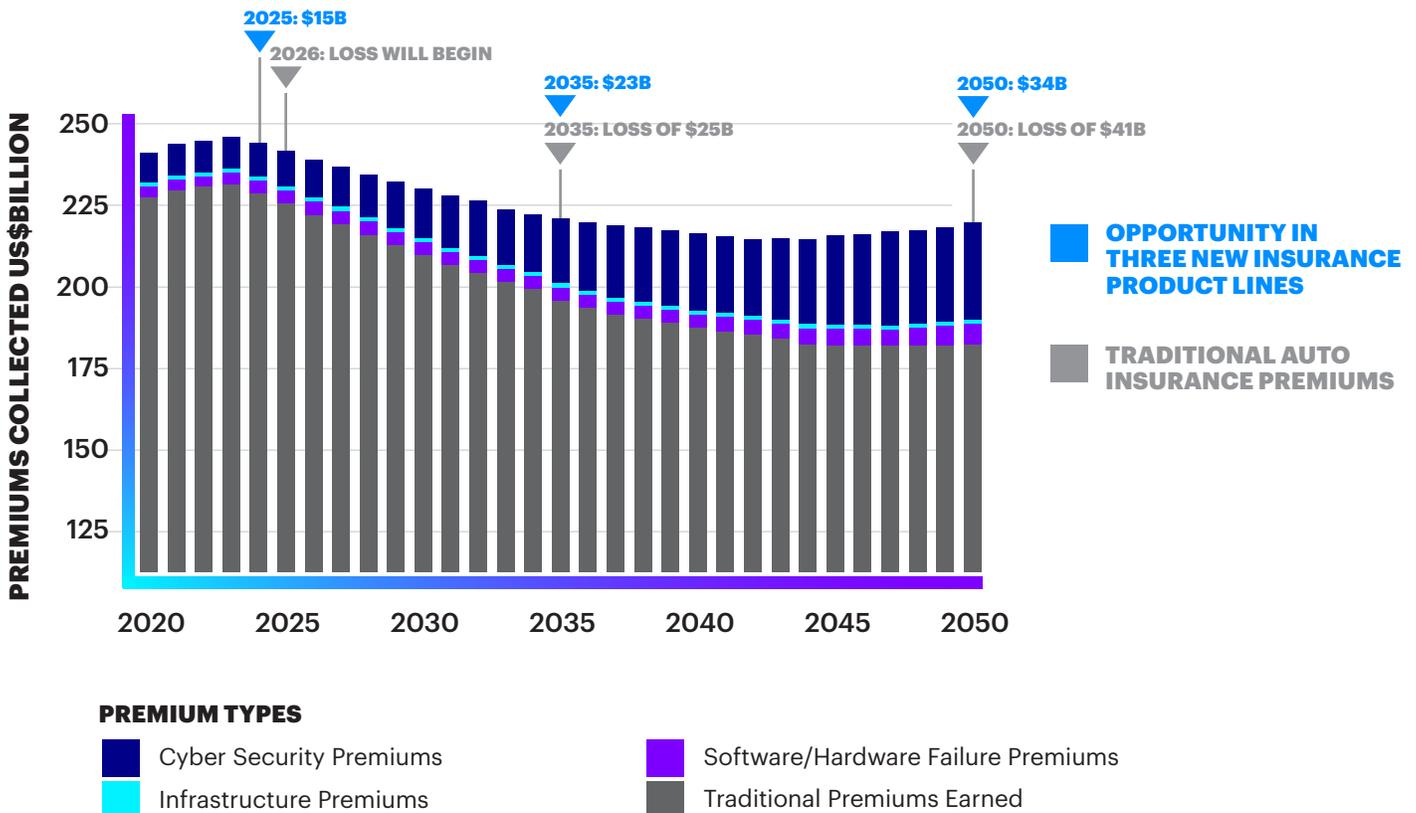
CHAOS CREATES OPPORTUNITY

The revolution in autonomous vehicles presents opportunities for insurers in three key areas:

1. Cyber security
2. Product liability insurance for sensors and/or algorithms
3. Insuring against infrastructure problems

As seen in Figure 3 below, the largest opportunities by 2025 will be in cyber security (\$12 billion) and product liability (\$2.5 billion). Infrastructure insurance is a smaller and more specialized opportunity representing approximately \$0.5 billion in potential premiums.

Figure 3. Opportunity map



CYBER SECURITY

The opportunities here include protecting against vehicle theft, unauthorized vehicle entry, and the use of “ransomware” to hold vehicles hostage until payments are made to unlock software controls. Insurers will also be writing policies to protect against criminal or terrorist hijacking of vehicle controls through hacking. And, with many cars serving as connected devices, insurers will offer protection against identity theft, privacy invasion, and the theft or misuse of personal information. The cyber security model was based on benchmarks of cyber security spending in the US information technology sector.

PRODUCT LIABILITY

Insurers will write policies to cover manufacturers’ liability for communication or Internet connection failure as well as for the potential failure of software – including software bugs, memory overflow, and algorithm defects – and hardware failures such as sensory circuit failure, camera vision loss, and radar and lidar (light detection and ranging) failures. Liability coverage will be needed not only by OEMs but by their tier 1 and tier 2 suppliers as well. The product liability model was based on historical automotive software and hardware failure rates, using National Highway and Traffic Safety Administration (NHTSA) data.

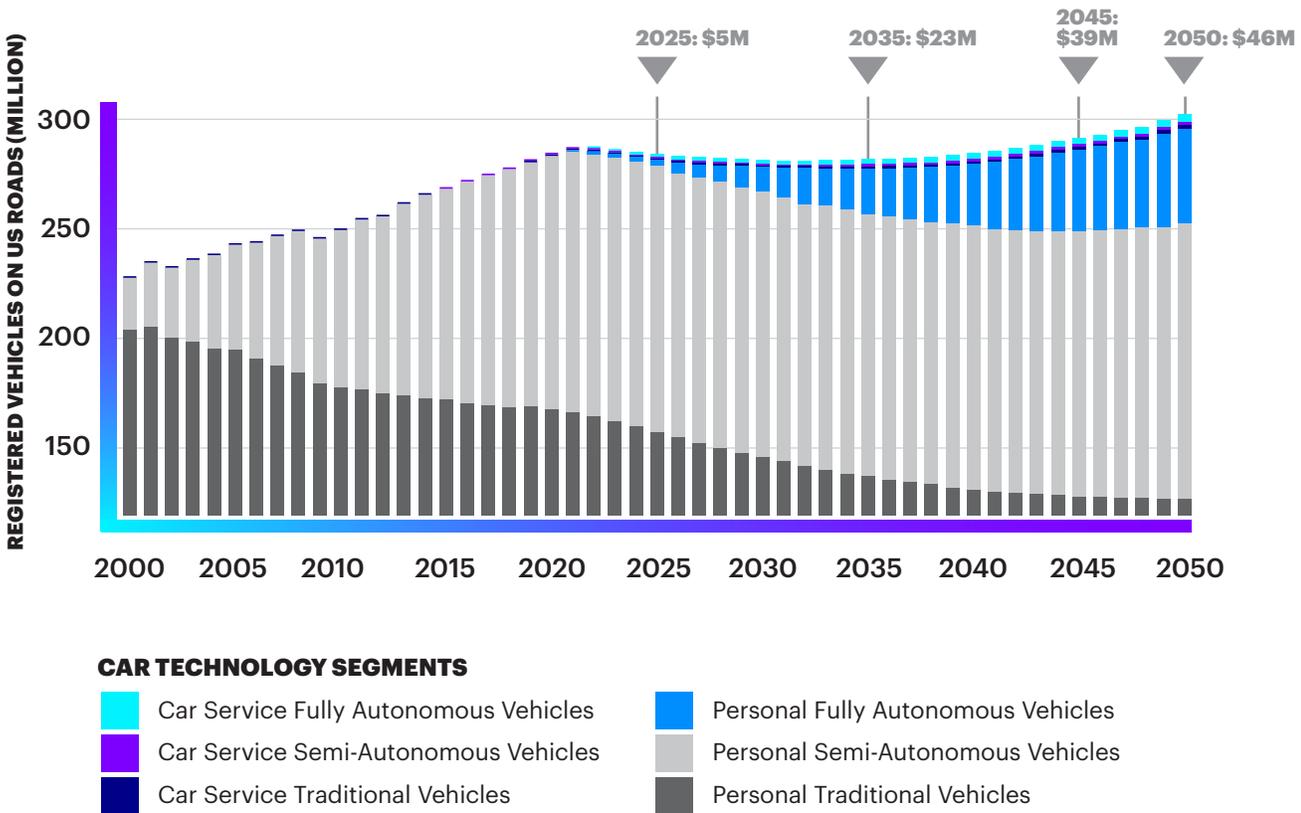
INFRASTRUCTURE

Autonomous vehicle manufacturers and/or service providers will need to shoulder responsibility for the infrastructure put in place to control vehicle movements and traffic flow. This will include cloud server systems (which can malfunction, become overloaded or suffer interruptions from outside factors); failure of external sensors and signals; and communication problems originating at the system level. The infrastructure model is based on the number of traffic lights in urban and rural areas of the US.

As autonomous vehicles shift the industry focus from personal ownership and liability to commercial and product liability, the biggest payers of new premiums will become OEMs, technology giants and governments. In addition, there may be other revenue opportunities related to managing risk connected with new products and services indirectly related to autonomous vehicles.

As seen in Figure 4 on the next page, personal vehicle ownership will continue to represent the majority of vehicle ownership, although (taking account of population growth) per-capita ownership levels will decline. Services for ride sharing or car sharing such as Uber and Zipcar will continue to grow. In the chart in Figure 4, the “Personal Traditional Vehicle” is owned and operated by an individual, while the “Personal Semi-Autonomous Vehicle” is a transitional vehicle which, while incorporating some autonomous driving features, is still owned and operated by an individual. The “Personal Fully Autonomous Vehicle” is a self-driving vehicle owned and used by one person, while the “Car Service Traditional Vehicle” is either 1) owned by a fleet company and operated by many people (as with Zipcar) or owned by one person and used by many people (as with taxi companies and Uber-type services). The final category, “Car Service Fully Autonomous Vehicle” is a self-driving vehicle owned by a fleet company and used by many people.

Figure 4. Autonomous vehicle adoption forecast



THE AUTONOMOUS VEHICLE TIPPING POINT

Autonomous vehicles are evolving rapidly and are currently between **Level 0** (in which the human driver controls everything, including steering, brakes, throttle and power) and **Level 1** (in which most functions are still controlled by the driver, but some, such as braking or parallel parking, can be done automatically by the car). The next phase is **Level 2** or “Modern Plus” in which at least two vehicle functions – such as cruise control or lane-centering – are automated, but the driver must be ready to take control of the vehicle.

FUTURE STAGES WILL INCLUDE

Level 3: Partial Autonomy – Drivers are still necessary, but are not required to continuously monitor the vehicle as in previous levels.

Level 4: Full Autonomy + Human – The vehicle performs all safety-critical driving functions and monitors roadway conditions for an entire trip, with the option for the human to take over driving at any time.

Level 5: Full Autonomy (No Human) – There is no option for human driving (that is, there is no steering wheel or other controls).

EARLY MOVERS HAVE THE MOST TO GAIN

In our view, insurers who act now to explore the opportunities presented by the autonomous vehicle revolution will be best positioned to capture new revenues. Early mover advantage is particularly important in light of the blurring of industry boundaries. Automakers are experimenting with packages that offer insurance as well as maintenance services to prospective buyers, potentially taking market share from traditional industry players. It is worth noting, however, that, while the OEMs are acting as an insurance distribution channel, the actual policies are written by insurance companies working in partnership with the OEMs.

Autonomous vehicles and related technologies such as vehicle telematics will generate vast quantities of proprietary driver data. As OEMs and technology companies explore the vehicle insurance market, they will also be looking for opportunities to control and monetize this data in the development of analytics and highly personalized offerings made directly to customers through built-in vehicle communications channels.

WHAT INSURERS SHOULD BE DOING NOW

The threat posed to traditional automobile insurers by the rapid evolution of autonomous vehicles is real, but so is the \$81 billion opportunity represented by new forms of cyber, product liability and infrastructure insurance. Early mover advantage will go to insurers getting a jump on actuarial modeling, the development of new product offerings, the creation of new distribution channels and the formation of partnerships with new premium payers – all critical elements of success.



TO GET AHEAD OF COMPETITORS AND GAIN AN EARLY MOVER ADVANTAGE IN THIS SECTOR, INSURERS SHOULD CONSIDER THE FOLLOWING INITIATIVES

1

DEVELOP NEEDED EXPERTISE IN BIG DATA AND ANALYTICS

Although there will be a struggle for control of data generated by autonomous vehicles and the communications and software systems that support them, market participants with the ability to collect, organize and analyze this data will have inherent advantages over those with less developed capabilities.

2

BEGIN THE ACTUARIAL AND MODELING PROCESS

The introduction of partially autonomous safety features has already changed the safety profile of newer vehicles. For example, autonomous emergency braking systems that direct instantaneous deceleration and braking of a vehicle are directly responsible for a 15 percent reduction in frontal crashes. Insurers should adapt current actuarial and modeling techniques to be ready as vehicles add more and more autonomous features, including the “tipping point” at Level 3 when human drivers become largely optional.

3

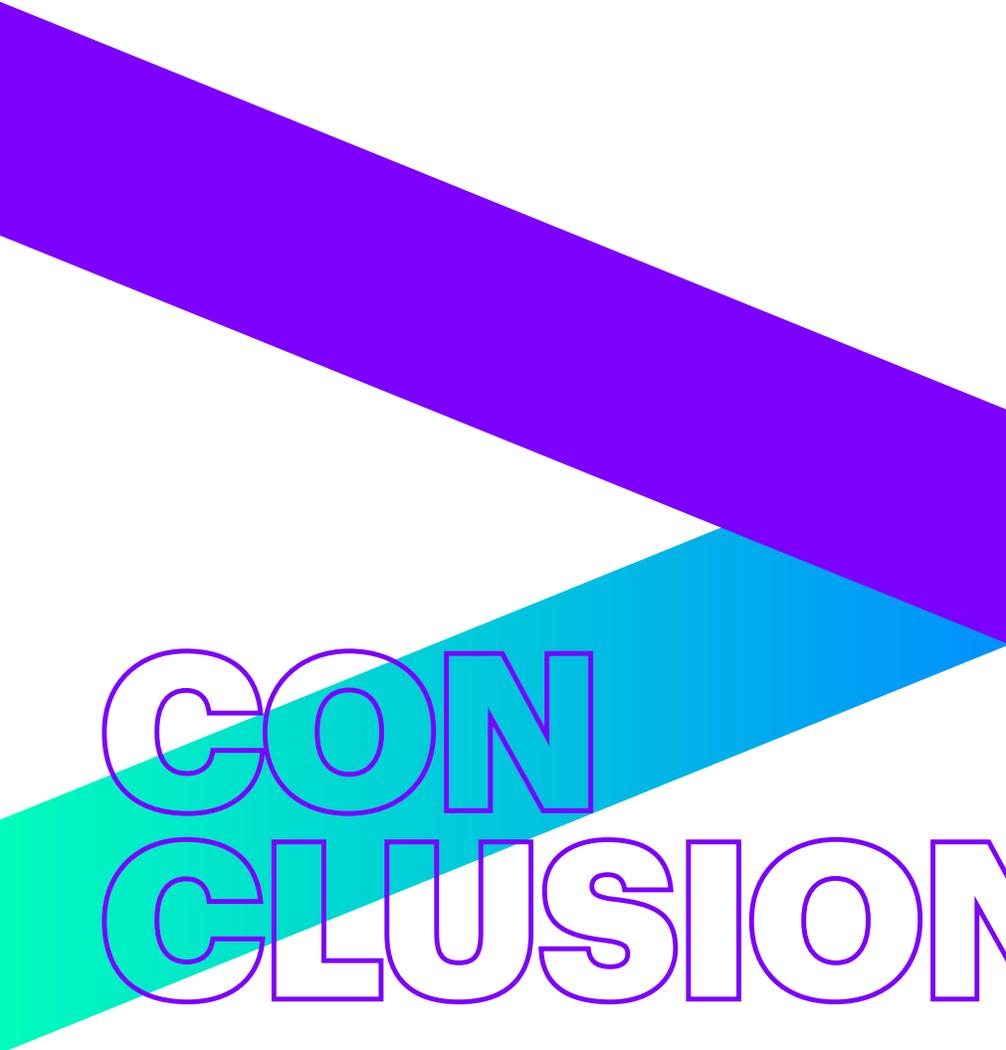
EXPLORE THE PARTNER ECOSYSTEM

To participate effectively in the autonomous vehicle environment, insurers will need to collaborate with OEMs, providers of communication and software systems, governments at multiple levels, and many other entities. Insurers not doing so already should be actively identifying and mapping out potential ecosystem partners.

4

THINK ABOUT NEW BUSINESS MODELS

Depending upon the opportunities pursued, insurers whose revenues derive primarily from personal automobile policies (insuring thousands of small risks) may have to transform themselves into large commercial insurers writing policies on a small number of very large risks. Thousands of auto insurers will be replaced by a much smaller number of commercial carriers. For the remaining players, this will entail major changes in areas including product development, policy administration and distribution.



CON CLUSION

The rate of adoption for autonomous vehicles can be debated, but there is little doubt that such vehicles will eventually predominate the world's highways. Automobile insurers should embrace, rather than fear, the future. Our research and modeling conducted in conjunction with Stevens Institute indicates that there will be a significant opportunity for insurers in the near- to mid-term (over the next five to ten years) as the need for cyber insurance and product liability insurance on

vehicles outpaces the decrease in individual premium revenues. Taking advantage of this shift will require a major cultural adjustment for auto insurers, as well as close interaction with regulators and other policymakers. However, insurers taking preemptive steps now to convert this opportunity will be in a much better position to succeed as the autonomous vehicle revolution continues and the world shifts, however gradually, to this new mode of transportation.

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