The Testimony of

Michael Stienstra, FCAS, MAAA
Actuary - QBE North America
Casualty Actuarial Society's Automated Vehicle Task Force - Chairman

California Department of Insurance Informational Hearing on Autonomous Vehicle Insurance Issues

September 15, 2014

I would like to thank the California Department of Insurance for hosting this hearing and for my invitation. I am an actuary at QBE North America, a Fellow of the Casualty Actuarial Society, and the chairman of the Casualty Actuarial Society's Automated Vehicle Task Force. While both my employer and the CAS are supportive of my presence, the following statements and views only represent my own opinions; they do not reflect the opinions of my employer or of the Casualty Actuarial Society.

In order to better understand the risks the public and the technology faces and the role that actuaries and the insurance industry can play, I would like to focus on three issues:

1. An analysis of the risk environment surrounding the technology

In order to understand how safe the technology is and the hurdles it must overcome, an automated vehicle specific risk profile is required. A 2008 National Highway Traffic Safety Administration Report, which found 93% of automobile accidents to be caused by human error, has often been taken to mean that automated vehicles will eliminate 93% of accidents. However, this report was never intended to be applied to automated vehicles. A more robust, automated vehicle specific analysis of auto accident causation is required to estimate the technology's expected accident reduction. The Casualty Actuarial Society Automated Vehicle Task Force has re-evaluated the data underlying that 2008 Report to identify and quantify the hurdles automated vehicles must overcome. While the CAS will be releasing the full report soon, an overview of the analysis along with my interpretation of the results follows.

1a. Risk Environment Profile Restated

The following risk factors were identified as potential hurdles that could disable the technology or reduce the technology's effectiveness. Under either circumstance, the presence of the technology may not have prevented the accident.

According to numerous reports, automated vehicles cannot operate in inclement weather. Therefore, the technology would have been disabled in twelve percent of accidents, and the accident would have still occurred. Twelve percent of accidents also involved a vehicle issue, such as a braking system failure, or an inoperable traffic control device. While most of these issues proved to be minor and were not the cause of the accident, their presence, when combined with a more disengaged driver, may still result in an accident. Combined, 21% of accidents involved at least one of these issues that would potentially have disabled the automated vehicle technology or caused an error in its operation.

Overcoming these issues does not guarantee a corresponding reduction in accidents. Behavioral issues might pose an even greater threat to the technology's safe operation. Despite seat belts' availability, safety, and legality, one in seven adults still refuses to buckle up. Similarly, the safety, availability, and even legality of automated vehicle technology will not guarantee its safe usage. Drivers who prioritize speed over safety may disengage a law-abiding automated vehicle, negating its impact. Drivers may also need to stay alert and engaged for certain partially or fully automated systems to be operated safely. An increase in automation may be accompanied by an increase in risky behaviors such as distraction, sleeping, and alcohol consumption. In total, over 30% of accidents involved a driver action that may limit an automated vehicle's effectiveness. Combined, almost half of all accidents (49%) in NHTSA's report had a technological, infrastructure, or behavioral factor that would have limited or eliminated an automated vehicle's potential to prevent the accident. The implications of this study are two-fold:

- First, the technology's safety will depend on a number of non-technological external factors, such as the driver's behavior and operable infrastructure.
- Second, policymakers have the ability to improve the technology's safety. For example, better infrastructure maintenance that reduces potholes and inoperable traffic control devices might improve the technology's safety. Additionally, driver training programs or automated vehicle only lanes might increase the likelihood the

technology is used safely. At some point in the technology's development, removing the driver from the equation may actually reduce the accident risk.

2. The calculation of an appropriate safety benchmark

It is likely that manufacturers, regulators, and the public will eventually ask some derivation of the question: "is the technology safe" or "how safe is safe enough?" Answers to either question will require the calculation of a safety benchmark to compare automated vehicles' performance against. As accident rates differ across many factors, a single global benchmark is unlikely to be applicable. Accident rates likely differ across numerous factors such as city driving vs. rural driving, rush hour vs. night time, and teenagers vs. adults. There may also be a need to differ between the average accident rate and an as yet undefined "safe driver" accident rate. The "safe driver" rate may need to exclude accidents and miles driven by teenagers and the elderly, inebriated drivers, and drivers who are engaging in other undesirable behaviors. Auto insurers' data and rating plans can help regulators determine what benchmarks should be established. The data and rating plans can also be used to calculate the different benchmarks. However, the industry may need to become a more engaged partner to provide this service.

In order to estimate the technology's relative safety, the technology's expected failure rate must be calculated. The DMV's requirement in 227.46 to report all disengagements only provides one half of the failure rate equation. The number and type of miles are also required to estimate the failure rate. Additionally, the calculation must adjust for different "disengagement strategies" and other potential factors that may make a disengagement an inaccurate proxy for future fatal errors. Even if California does not intend to establish its own safety definitions, as evidenced by the DMV's response to Professor Peterson's question on Section 227.24, a more robust data reporting requirement will help federal regulators to do so. A transparent safety definition also protects responsible companies and consumers against an irresponsible company rushing its product to market.

3. The liability system to determine fault and compensate claimants

As long as drivers hold most of the responsibility for driving, auto insurance can continue to ensure automobile accident claimants are compensated fairly and efficiently. However, as vehicle automation increases and the technology shoulders more of the driving responsibility, more of the risk may be transferred to safety and liability systems that handle manufacturer errors. This system faces a number of hurdles that may prevent it from efficiently handling an increased number of claims. I would like to offer three observations on this topic.

3A. NHTSA's regulatory process alone cannot provide sufficient protection for manufacturers and consumers

Dawson vs. Chrysler (1980) shows that abiding by NHTSA's regulations is not a sufficient defense in a negligence suit; and the illusory park issues in Ford vehicles in the 1970's and in Chryslers in the 1990's shows that known risks will not always be fixed in a timely manner.

3B. Budget

Personal auto insurers currently spend approximately $60 billion per year on expenses to sell policies, quantify risk, and determine fault. This is 400X more than NHTSA's $150 million annual vehicle safety budget.

3C. Incentives

The auto insurance industry has an incentive to accurately quantify the accident risk and settle auto accident claims. Insurers can lose money if they understate a risk by charging inadequate premiums or if they overstate the risk and lose the business due to overstated premiums. Insurers' business models are also highly dependent on their claim settlement practices. Product safety regulators and independent agencies do not face the same financial risks insurers do from their risk evaluation efforts. Manufacturers, who often purchase excess liability insurance, face a different economic optimization equation when addressing products liability claim issues and potential settlements.

4. Recommendations

The breadth of potential issues is accompanied by an equally large number of potential solutions. However, it is important that the policies not get too far ahead of the technology. Instead, I recommend the California Department of Insurance take the steps necessary for the policies to develop alongside technology. I believe that actuaries and the insurance industry, properly engaged, can help quantify risks, establish safety benchmarks, and ensure claimants are compensated fairly and efficiently.

At this time I recommend only developing a system that will enable the right research to be conducted by the appropriate parties. I believe that a robust, transparent, and collaborative testing approach that involves regulators, manufacturers, and the insurance industry can allow risks to be identified and quantified and allow potential solutions' benefits to be weighed against their costs.

Thank you for this opportunity.