Michael Hookham, Manager – Transport & Commercial Motor, Vero Insurance – Presentation to NZILA 9th August 2017 *Autonomous vehicles*
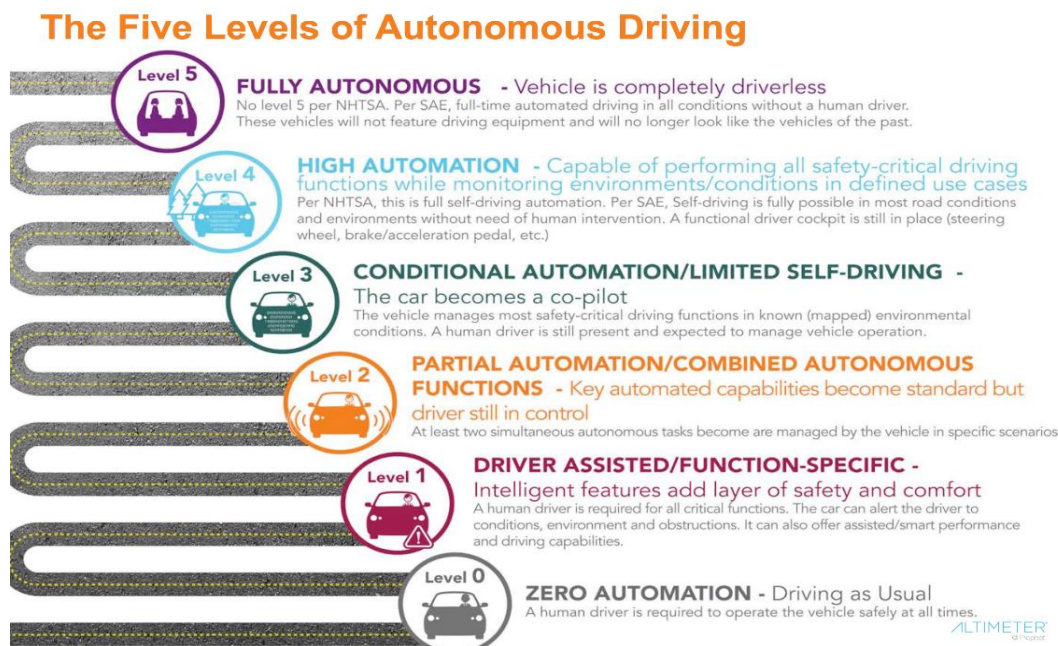
What are autonomous vehicles?

For many years, there have been a number of safety features incorporated into vehicles such as parking sensors, reversing cameras, radar cruise control and self-park features.

Until recently these features have generally been promoted as driving assistance packages and require a degree of driver intervention to function.

Technology has now allowed for these features to operate autonomously, or with minimal driver interaction.

This illustration by Brian Solis shows the 6 levels of Autonomous vehicle features, ranging from zero being completely driver operated to 5 - fully autonomous features[1]. Currently the market is around level 2 but moving rapidly.

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[1] Brian Solis: An Introduction to the 5 Different Levels of Self-Driving Cars :
http://www.briansolis.com/2016/12/leveling-introduction-levels-defining-route-fully-autonomous-vehicles/

Andrea Busnelli's article explains that a modern high-end car contains around 100 million lines of code, and this is expected to increase to 200-300 million[2]. Now a F-22 fighter jet has less than 2 million, so this does create the potential for glitches to occur. Just consider how many times you need to reboot your computer or restart your phone – it's the most common solution to software fixes. Software also provides an easy avenue to assign blame when something goes wrong.

A work colleague recently brought a 11-year-old European car, and when it was plugged into the diagnostic computer it had pages of faults – while they suggested to be meaningless and were cleared – they must have had some meaning?

This technology creates the opportunity for a big improvement in driver safety, crash reduction and reduced claims costs – but only when they work correctly, operated in the manner that they are intended, and in the environment, they are designed for.

Most car crashes are, in one way or another caused in part by Human error, and there are many articles in the marketplace that support the reduction in frequency and severity of motor related accidents through autonomous vehicles.

I recall learning to drive and going on a course for students through school. This was in white Toyota Starlets where the instructors taught how to pulse brake, steer out of a skid and other similar basic functions. Many of these skills are no longer required as the cars do it themselves.

It was not that long-ago ABS were only available on high end cars and its only in the last 10 to 15 years it has become a standard feature. Yet how many people know how to use it correctly.

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[2] Andrea Busnelli's : Car Software: 100M Lines of Code and Counting, 2014:
https://www.linkedin.com/pulse/20140626152045-3625632-car-software-100m-lines-of-code-and-counting/

I attended a drive day where you had to accelerate in a straight-line brake as hard as you could and steer between the cones. It was surprising the number of people that lifted off the brake as soon as the ABS started to kick in and drove through the cones. Relate that to the features of autonomous vehicles. How many people will instinctively take over the controls of the vehicle when they think it might be going to crash. In many cases, it will be designed to crash, just with the best outcome, but where the driver intervenes who will be at fault - the operator of the vehicle.

Who will be responsible for the decisions the cars make? No programmer would take on the responsibility for making moral judgements. How could the car determine to drive off a cliff injuring the driver or hit a bus full of passengers causing more casualties. It may ultimately have to decide who lives and dies. These decisions surely could only be made by the Government or if at all?

Current motor insurance is fairly basic, it covers damage to the vehicle and the driver's legal liability to 3rd parties. What impact will this have where the driver may not be liable.

As driverless vehicles with increased autonomous functions become more common on the horizon it will have a dramatic impact on motor vehicle insurance. Changes to policy coverage and claims response will be required along with the entire aspect of liability and who could be held responsible for any potential recoveries.

Traditional motor insurance will not be how it is now. It will no doubt be more heavily geared towards liability cover, and any potential recoveries. The challenge is who will accept liability or negligence?

While the reduction of driver error may reduce frequency, the cost to repair these highly technology based vehicles could be very high. This could result in severity increasing. Would this impact on the

cost of motor vehicle insurance? It would be entirely dependent on the who would be responsible for the costs (or liability) associated with the damage. Where there is a possible guaranteed recovery, this could potentially reduce the costs, however it may also require drivers, or vehicle owners to ensure that they have appropriate liability coverage in place.

Blame could be more easily identified. Data collected through vehicles (which is already common practice) has the potential for tailored and very specific Underwriting. This would allow for a policy performance to be much more easily managed through a disciplined Underwriting approach but also the assignment of which vehicle was at fault.

It also raises the question for ACC – essentially a no-fault cover system, however when fault could be much easier to assign what will happen?

Also, who is responsible when these features fail, are used incorrectly or are not in an environment for correct functionality. Is it the car, the operator, the owner, the software developer, the vehicle manufacturer, the government or local councils that provide the signs for the vehicles to operate?

While the cars may be ready to go, the infrastructure will take a long to be able to support the technology.

At a recent vehicle launch the NZ representative commented that Autonomous vehicles will be ready to go much quicker than much of the infrastructure they require. Cars will be required to read international road signs and road markings, but as we know in NZ so many rural roads have neither of these.

Also raised is the question that if an incident happens in an environment that has been altered – who is liable. If the councils or Government provide the signs and road markings, but someone steals the sign who is liable? The driver, the car or the council.

Also, for example, what would happen where a non-autonomous vehicle takes out a road sign, and the following autonomous vehicle has no sign to follow and crashes – is the first driver legally liable for the damage?

So, the two issues are: who is responsible for the vehicles technology and functions, and who is responsible for the infrastructure these vehicles rely on.

How will the insurance provided for these service operators dovetail into the motor vehicle insurance of the vehicle owner or manufacturer? Will manufactures be willing to take on the risk of the independent garage that has worked on a car that their programmer has coded?

Both will have impact on what type of policy will respond, and who will be responsible, and will there be any recoveries available? This has potential impacts on the motor landscape – right down to industry agreements such as knock-for-knock.

What's the knock-on effect for the Insurance industry? With more autonomous vehicles the services garages provide to customers to meet the needs of the vehicles will change. Petrol stations will be redundant and there will be a raft of new services being provided in the marketplace to repair features not even yet introduced.

Many manufactures are hinting they will take on the liability if one of their vehicles crashed, however its yet to be tested. Just consider the VW emissions scandal. This was one of the world's largest and most trusted vehicle manufactures involved in one of the largest cover up's in recent times[3].

You may have been aware of the Ford Explorer issues in America where the Police Force using these vehicles are being overcome with vehicle fumes and in some cases passing out and crashing. All

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[3] Clifford Atiyeh: Everything You Need to Know about the VW Diesel-Emissions Scandal: https://blog.caranddriver.com/everything-you-need-to-know-about-the-vw-diesel-emissions-scandal/

vehicles have been pulled from the fleet, and one driver is suing Ford. However, Ford has come out to say it may be caused by modifications made to the vehicle after it has left the factory.

So, this raises the question of who will actually be quick to put their hand up and accept blame or liability when there could be millions or billions of dollars at stake?

Also, will whoever is assigning blame get it right?

Malcolm Gladwell and Panoply Media ran a series called the "the Revisionist history" tells a story called "the blame game"[4]. Essentially Toyota and Lexus in America were fined billions of dollars, and paid out further billions in compensation for sticky accelerators causing death and injury. It was a widespread belief that the technology in the vehicles code failed causing unintended acceleration. Touching on the earlier point given the amount of computer code in a vehicle, it's easy to assume it was the car that failed.

What his story tells is of human error where in a moment of panic you can think you are doing the correct thing – in this case hitting the brakes, when in reality the wrong pedal being the accelerator is pushed leading to an accident. It is a horrific story but does raise the point.

One comment of Eddie Alterman from "Car and Driver" included who was a car expert in Malcom Gladwell's podcast that rings true is "people expect the car to take care of them and behave in a way that will protect them be completely flawless and save their lives under any circumstance" (need to find source)

Cars need attention and skill to be operated safely. Human intervention with any complex machine can change how it behaves.

Vehicle ownership may change as people no longer require to have access to a vehicle 24/7 – but how about the type of vehicles? How

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[4] http://revisionisthistory.com/episodes/08-blame-game

will the weekend boaty get their boat to the boat ramp, or the holidayer tow their caravan around? Will the family that required 3 car seats be on-board around the logistics to organise this.

Imagine the potential for the trucking industry where they no longer require truck drivers, and can operate 24/7 without the concern for maintaining log books or restricted driving hours. The potential increase in profit would be significant. But would you be comfortable with mac truck following you with no driver?

Consider the impact on the environment – car parks will no longer be required, what could be used for this space – could it lead to higher density living? What political and social implications could this have?

Is this what people want? – cars that control how we move around, and take away what many view more than just a form of transportation - in many instances its part of someone's identity!

Moving on to what would happen to Motorsport, Formula 1 races, Rallying, go carting, the V8 races. It may ultimately come down to who can develop the fastest car and best program, rather than the skill of the driver.

So, in summary there is much more to be done around who will ultimately design the decisions the cars have to make, who's responsible for the infrastructure, and where liability will fall could determine the types of policies that are designed and offered.

The potential for cost saving is significant, but is it something people really want or are ready for?

Malcolm Gladwell final comments from his podcast[5] were;

"Driving is a complicated and dangerous act, and ordinary people may not be negligent, they just make genuine mistakes, a car does what the driver tells it to do".

From the points covered off today, maybe this will change to "the car will just do what the programmer tells it to do?"

* This presentation represents personal views and not necessarily reflect the views of the organisation.

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[5] http://revisionisthistory.com/episodes/08-blame-game