Ia Ara Aotearoa Transporting New Zealand response to feedback request on

Te Manatū Waka, Ministry of Transports Long-Term Insights Briefing (LTIB);

The impact of autonomous vehicles operating on New Zealand roads consultation document: *27 August 2021*

Ia Ara Aotearoa Transporting New Zealand
PO Box 1778
Wellington
Ph: (04) 472 3877
Contact: Nick Leggett CE

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1. Representation

1.1 Ia Ara Aotearoa Transporting New Zealand (Transporting New Zealand) is made up of several regional trucking associations for which Transporting New Zealand provides unified national representation. Transporting New Zealand members include Road Transport Association NZ, National Road Carriers, and NZ Trucking Association. The affiliated representation of the Transporting New Zealand is some 3,000 individual road transport companies which in turn operate 16-18,000 trucks involved in commercial road freight transport, as well as companies that provide services allied to road freight transport.

1.2 Transporting New Zealand is the peak body and authoritative voice of New Zealand's road freight transport industry which employs 32,868 people (2.0% of the workforce), and has a gross annual turnover in the order of $6 billion.

1.3 Transporting New Zealand members are predominately involved in the operation of commercial freight transport services both urban and inter-regional. These services are entirely based on the deployment of trucks both as single units for urban delivery and as multi-unit combinations that may have one or more trailers supporting rural or inter-regional transport.

1.4 According to Ministry of Transport research (National Freight Demands Study 2018) road freight transport accounts for 93% of the total tonnage of freight moved in New Zealand.

2. Section 1 Introductory comments

2.1 The briefing paper seeks views as to whether the Long-Term Insights Briefing (LTIB) represents a realistic 10 year forward view and appropriate assessment of the policy considerations necessary to cover off the possible introduction of autonomous vehicles into the New Zealand transport arena.

2.2 In many respects the document meets that aim, citing in its formative pages the possible policy developments that need to be considered to support the opportunities that autonomous vehicles (AVs) might bring to the surface transport environment. However, the difficulties of predicting the future state and the uncertainties surrounding the adequacy, or otherwise, of AV technology is also identified, which in our view is a realistic position to take. The document tends to give more weight to

the introduction of light vehicles and other vehicle options likely to be used as personal conveyance, as opposed to AVs deployed in commercial freight situations.

2.3 The statement suggesting that in around 10 years AVs will potentially change the transport sector is a big call, especially when balanced against the drive to introduce a low carbon society supported by carbon neutral transportation options. The two technology solutions are treated as mutually compatible and they may well be for some applications however, for the most part we see each being developed separately, by different research and development enterprises and vehicle manufacturers. The compatibility and technology integration appears at this time to be largely occurring after the low carbon vehicle propulsion systems have reached a certain point of maturity. The Tesla brand of vehicles in particular seems to be a well noted exception but its AV performance appears less successful than its battery propulsion system success. Overall, we accept and understand the primary purpose of the briefing paper is to present a view of the future state applicable to AVs.

2.4 With respect to Transporting New Zealand's comments on the paper, these are framed equally around AV opportunities related to the introduction of goods vehicles operating in the commercial freight transport environment, although from time-to-time we will focus in to the light vehicle area because that's where the initial technology capability is being assessed.

3. Section 2 Feedback commentary

3.1 Page 5 and page 6 allude to specific risks associated with AV technology i.e. hardware and software and cyber-security risks, and an inadequate legislative framework to support AVs, plus the possibility of perverse impacts on society. It is pleasing to see the LTIB cite these issues up front which in our view, suggests instead of jumping to a solutions-based approach, a more conservative assessment based on the actual transition phase should suffice initially for New Zealand's regulatory AV management approach.

3.2 The introduction of AVs in New Zealand will be transitory and occur over time however, the jury is still out on whether freight vehicle AVs can be successfully deployed in New Zealand even considering the 10-year time frame threshold. It is our view the light vehicle AVs are more likely to become an established section within the vehicle market than heavy vehicles.

3.3 *Advanced Driver Assist Systems (ADAS)*

Page 6 states regulatory agencies don't know how many vehicles have ADAS or how many vehicles or systems are capable of being updated by over-the-air upgrades. We don't see that particular point as a major issue. Arguably, it makes it difficult to identify where ADAS may reduce accident propensity and whether the technology has actually improved safety but in reality, the benefits may be a little less than government expectations, a point we discuss below. The upgrades over the air should not be an issue or the sphere of interest of regulatory agencies. The responsibility to carry out the upgrades should remain within the legal scope of the vehicle dealer community. This is typically the case now with return to base upgrades. Government agencies have no visibility of the software upgrades to present in-vehicle technologies.

3.4 We support a view any performance or AV capability upgrading process, whether at the dealers or over the air, should be captured within a suitable legal framework as there is no doubt liabilities will arise when something goes wrong. This *going wrong* litters the history of Tesla and a few other AV technology suppliers. From various overseas media commentators, it seems some suppliers rely of a level of field testing by vehicle owners before completing the final refinements to their vehicle self-management systems. This is not a particularly desirable approach for New Zealand's road environment and presents in our view unacceptable risks to all road users. The fact that New Zealand has no litigation system for damages means there is the possibility of rudimentary testing occurring with inadequate checks and balances.

3.5 Page 7 cites the introduction of Advanced Driver Assist Systems (ADAS) and the benefits they have brought to safe vehicle operation. However, recent discussion within a Transport Research Laboratory (TRL) project about ADAS (funded by Waka Kotahi NZ Transport Agency) has suggested ADAS system benefits can be overstated. The technology of many of the systems has not fully matured and drivers who use them are known to become safety complacent relying on the system feedback and ignoring their responsibility to maintain situational awareness. It is very easy to succumb to the technology despite the warnings provided by the vehicle manufacturers.

3.6 The variability of performance across many of the systems even within the same vehicle brand range can confuse users. Reliability is an ongoing issue with front facing radars showing fault mode due to the ingress of anything from spiders to snow and leaf debris. Windscreen mounted camera systems that support frontal crash warning and advanced braking systems appear to require periodic recalibration aside from when a windscreen replacement is required. This work often requires the vehicle to be returned to the dealer principal facility as independent workshops often lack the precision equipment to recalibrate the systems to manufacturer's tolerance.

3.7 Interestingly, the sensitivity of a number of these systems can be manipulated by the driver through the driver onboard interface. Frontal crash waring systems can typically have up to three sensitivity settings, even on low value cars. Lane Keep Assist systems can often be switched to off mode, as the incessant warnings to drivers can be distracting. The fact these warnings occur so frequently in a New Zealand context is reflection of inadequacy around lane markings and relatively narrow lane widths.

3.8 It's pretty easy to see from our comments that even the basic driver assistance technologies have some way to go before the technology reaches an adequate level of performance and reliability. Interestingly, the mixed performance of ADAS has not hindered progress in other jurisdictions toward developing AV technology.

3.9 The LTIB is taking the right approach to test the water, both in terms of potential societal impacts and exploring the legislative frameworks necessary to support AVs. One of the keys will be creating appropriate standards of in-service performance and reliability expectations and ensuring adequate safety outcomes if the systems suffer failure during vehicle deployment.

3.10 Despite the progress made with AVs and the number of companies exploring the technology and its application to commercial vehicles, it seems the technology is only

in its infancy, according to our sources.

3.11 The recent flaws of Tesla's AV systems have been well documented in the international media, the latest when a Tesla in AV mode rammed a parked police patrol vehicle; **US Asks Tesla How Autopilot Responds to Emergency Vehicles** Toyota's recent experience hasn't been much better; https://www.stuff.co.nz/motoring/300394471/toyota-suspends-selfdriving-shuttles-after-one-hits-a-paralympian .

3.12 There have been other documented incidences where the technology and AI supporting AVs has come up short. It is simply not intuitive enough. One of the common anecdotes to illustrate the present frailties of the technology is the example of ball rolling out from in front of parked car. The AI has little predictive capability, but the human would intuitively move their foot from the accelerator to the brake in the expectation/anticipation a child might be following the ball.

3.13 If we accept it will improve safety, there is a legacy argument AVs safety management system will never be as sophisticated as the human mind, although admittedly in some situations they may be more responsive. Some commentators say that AI, and robotics as an associated field, present as a real risk to humanity and many of the developers of these systems are involved in the AV development sphere.

3.14 These issues and the short comings with technologies are not likely to be resolved quickly. This highlights our significant concern that the technology capability is being oversold as being the panacea to all vehicle crashes. The following extract from an article by Tom Krisher in the Associated Press June 4, 2020 puts the benefits into a realistic context.

"A new study says that while autonomous vehicle technology has great promise to reduce crashes, it may not be able to prevent all mishaps caused by human error.

"Auto safety experts say humans cause about 94% of U.S. crashes, but the Insurance Institute for Highway Safety study says computer-controlled robocars will only stop about one-third of them.

"The group says that while autonomous vehicles eventually will identify hazards and react faster than humans, and they won't become distracted or drive drunk, stopping the rest of the crashes will be a lot harder.

"We're still going to see some issues even if autonomous vehicles might react more quickly than humans do. They're not going to always be able to react instantaneously," said Jessica Cicchino, institute vice president of research and co-author of the study.

"The IIHS studied more than 5,000 crashes with detailed causes that were collected by the National Highway Traffic Safety Administration, separating out those caused by "sensing and perceiving" errors such as driver distraction, impaired visibility or failing to spot hazards until it was too late. Researchers also separated crashes caused by human "incapacitation" including drivers impaired by alcohol or drugs, those who fell asleep or drivers with medical problems. Self-driving vehicles can prevent those, the study found.

"However, the robocars may not be able to prevent the rest, including prediction errors such as misjudging how fast another vehicle is traveling, planning errors including driving too fast for road conditions and execution errors including incorrect evasive maneuvers or other mistakes controlling vehicles.

"For example, if a cyclist or another vehicle suddenly veers into the path of an autonomous vehicle, it may not be able to stop fast enough or steer away in time, Cicchino said. "Autonomous vehicles need to not only perceive the world around them perfectly, they need to respond to what's around them as well," she said.

"Just how many crashes are prevented depends a lot on how autonomous vehicles are programmed, Cicchino said. More crashes would be stopped if the robocars obey all traffic laws including speed limits. But if artificial intelligence allows them to drive and react more like humans, then fewer crashes will be stopped, she said.

"Building self-driving cars that drive as well as people do is a big challenge in itself," IIHS Research Scientist Alexandra Mueller said in a statement. "But they'd actually need to be better than that to deliver on the promises we've all heard."

"Missy Cummings, a robotics and human factors professor at Duke University who is familiar with the study, said preventing even one-third of the human-caused crashes is giving technology too much credit. Even vehicles with laser, radar and camera sensors don't always perform flawlessly in all conditions, she said.

"There is a probability that even when all three sensor systems come to bear, that obstacles can be missed," Cummings said. "No driverless car company has been able to do that reliably. They know that too."

"Researchers and people in the autonomous vehicle business never thought the technology would be capable of preventing all crashes now caused by humans, she said, calling that "layman's conventional wisdom that somehow this technology is going to be a panacea that is going to prevent all death."

3.15 We appreciate we haven't dealt directly with the questions raised in section 2, but we want to caution against the over selling the technology. The fact that New Zealand is a technology taker means this country relies heavily on the overseas testing and supply side capability for suitable AV vehicles to be introduced. Success here will require comprehensive vehicle capability testing against suitability designed international standards.

3.16 Page 9 refers to potential policy impacts on Māori which is an interesting point to raise. Some US commentators have argued that AVs are racist vehicles because the lidar and camera detection systems cannot detect coloured skin tones as easily as they detect white tones, the corollary being, dark skin toned individuals are more likely to be run down by an AV than white individuals.

4. Section 3 Scope of LTIB

4.1 This section discussed the potential commercial benefits of the AV technology in the context of land-based transport, referencing the various levels of autonomy of standard SAE J3016. We acknowledge there are range of tests of commercial trucks taking place in different jurisdictions however, these tend to be vehicle manufacturer closed loop investigations where the vehicle service application and environment

they operate in within the scope of the testing evaluation phase is tightly managed.

4.2 However, we also note some transport media articles are citing integration issues with human labour, in other words, how well is the human effort going to integrate within the transport task. The closed loop evaluations are based on predictable and established routes but the reality is the genius of trucking is its inherent flexibility and ability to deploy at short notice without return to base.

4.3 The LTIB also suggests that autonomous trucks could offset the demand for drivers but the fear in other markets is the transition time frame is more likely to exacerbate the lack of drivers, as new comers may see truck driving as a sunset employment role with little future.

4.4 If we now turn our attention to the operational environment that being firstly, the infrastructure and secondly, the communications connectivity functionality and their limitations across parts of New Zealand, the picture of opportunity for AVs is probably less promising. The LTIB offers little comment on these aspects. New Zealand has an internationally acknowledged demanding infrastructure with steep gradients and numerous and tortuous routing and plethora of network characteristics, including many variations of lane width and road and lane delineations. In some cases, road markings are non-existent. The government's recent announcement to invest heavily in road improvements for local roads and the primary network should help offset the short comings nltp@enews.nzta.govt.nz

4.5 In the vehicle telemetry space real time connectivity to base is necessary to facilitate automated freight transport options. In our response to the Infrastructure Commission's June 2021 discussion document, we offered the following comments. We are of the view they are just as valid in the context of the AV scenarios outlined in the LTIB.

Vehicle interconnectivity; technology infrastructure capability

Modern commercial vehicles now and into the future are connectivity dependant. The new in-cab driver support technologies together with vehicle operating systems and vehicle safety management systems imbedded in the cab are highly reliant on telemetry providing information back to the vehicle's operating base and to the company dispatch team. Interfacing with customers with ETAs and real time vehicle status is equally important. The success of these systems is entirely reliant on seamless connectivity across NZ.

With the potential development of autonomous trucks advancing and eventually becoming available to market, connectivity takes on an even greater importance. In NZ the application of full autonomy appears unlikely for heavy duty truck freight applications but semi-autonomous and driver assisted autonomy may well become more normalised especially where the routing of the vehicles is routine. For these vehicles to be successfully deployed they need an environment where it's possible to rely on reliable connectivity and data transfer networks. RTF is not entirely sure NZ's connectivity status is at a level to support these vehicles operating using their autonomous or self-reporting features. NZ's topography and road geometry is well recognised as particularly demanding so it may be likely that even employing some level driver assisted autonomy maybe pushing the technology capability to its effective limits.

5. Scope summary

5.1 We accept there are a number of the elements correctly identified in the LTIB but suggest the importance of the road network and infrastructure characteristics and vehicle inter-connectivity are not particularly well recognised as important features relating to the introduction of AVs. Since they are fundamental as to whether AVs are actually a real proposition for New Zealand, they need to be considered accordingly.

5.2 Furthermore, we suspect the 10-year horizon for freight vehicles operating in a commercial environment unrestrained by manufacturer surveillance and oversight is somewhat optimistic given the comments on the challenges that we read in the international trucking media.

6. Section 4 the content of the MOT LTIB

6.1 Section 4 appears to address all the relevant issues taking a topic-centred and progressive approach. An overall comment is the first sections (1-3) of the LTIB offer commentary on AV opportunities, but play down the short comings and risks. Section 4 takes more reasoned approach, outlining a series of consistent objectives that need to be considered in an AV policy development framework. One point to be applauded is the MoT's invitation from the UN to take part in a working group charged with setting appropriately sanction standards for AV operation. We agree that is an important and critical aspect that should enable New Zealand to formulate the legal and policy environment that meets vehicle user and public safety expectations concerning safety and AV system reliability.

6.2 *Ensuring safety is key driver behind AV deployment*

Safety has many faces and, in this section, the LTIB covers these off appropriately. However, the jury is out, as mentioned above in our comments as to how achievable the crash reduction will actually be following the introduction of AVs. The accident reduction potential is clearly based on some heroic assumptions. The mixed vehicle future alluded to for the foreseeable future arguably limits the crash reduction potential of the technology, an important point made in the LTIB text.

6.3 *Understanding the impact on social outcomes across different populations.*

Some literature reviews have suggested AVs will introduce more of the population to personal mobility solutions which in turn increases network investment demand and leads to more urbanisation not less. The LTIB raises issues around AV accessibility and the potential for pricing and affordability constraints locking certain population groups out of the market. This is a particularly valid comment and any alternative technology options, such as home learning or working from home, is entirely dependent on affordability and access. What is becoming evident (even under Covid-19 restrictions) is working from home is far from an ideal option and if it becomes the norm, retail as we know it will atrophy.

6.4 *Highlighting possible implications for jobs and training industry*

The discussion here is an important one. We commented on this aspect above and the potential for reducing interest in truck driving due to suggestions it's a sunset occupation. There are some transportation tasks that don't lend themselves to AV operation especially those related to the primary production sector. Unfortunately, driver trainee applicants are unlikely to make an adequate distinction between urban

transportation tasks where some applications of AV might operate comfortably, and hinterland transportation where the occupational task is significantly more complex. This could leave the rural and primary sectors with insufficient drivers, so the AV solution to labour shortages becomes a problem instead of a solution. Coupled with more complex vehicles required under an AV scenario is the demand for highly skill technicians to repair the vehicles.

6.5 *Understanding the demands AVs could put on our physical and digital infrastructure*

In our comments on Section 3 we covered off these issues which appeared absent from the early part of the LTIB so we pleased to note they have been recognised. The importance of these aspect cannot be over stated.

6.6 *Understanding the impact of consumer preferences on AV deployment*

This is more about understanding where the demand for AVs will come from e.g., commercial vehicle opportunities or private and personal conveyances. There is probably a good case to look at the truck and transportation opportunities within that group of vehicles because we suspect the car and personal mobility market will basically take care of itself.

6.7 *Understanding the importance of the Artificial Intelligence and Human-Machine Interface*

The unknowns of this aspect are outlined in the LTIB text but even within the simple explanation provided, the issues are complex and uncertain. There has been some research conducted in Europe which showed commercial drivers had a propensity to disable vehicle systems because of the belief that the AI and ADAS systems were impacting on their skill and position and personal esteem in their cohort truck driver community. They saw these systems as threat and not benefit to their role as drivers.

6.8 *Highlighting the implications of data privacy and cyber security*

This is another of the important aspects that represents some risks to acceptance, perhaps no different to social and community surveillance that exists now. New Zealanders by and large are completely unaware of present government sanctioned surveillance capabilities already operating.

However, it is critical to the introduction of AVs that privacy aspects are well publicised so individuals can make an informed choice about whether AVs present a personal threat or benefit.

7. Summary comments

7.1 All seven areas are important in their own right.

7.2 We suggest understanding the physical and digital infrastructure demands is of primary importance, but this will need to be assessed across a number of AV market penetration scenarios so the economy doesn't over-invest prematurely. Consumer preferences can be coupled with social impact outcome assessment and integrated with employment implications and training demands.

7.3 Some of the technical aspects such as cyber security and understanding the human machine interface maybe be considered together.

7.4 We suggest that the Ministry carry out a comprehensive literature review covering the seven topics to get a flavour of where other jurisdictions are at. As the LTIB intro states, New Zealand is a technology taker and it's better to have the benefit and experience of watching others take the initial steps into the AV environment. New Zealand is a small country that lacks economy of scale to be able to withstand the financial impact of making an unresearched and incompletely evaluated decision for what appears a relatively expensive technological step with only marginal benefits.