Feedback to Consultation Questions – Automated vehicle safety reforms public consultation (Apr-Jun'24)

My background

I am currently residing in Melbourne and now working at an automotive company for two years, as an ADAS (Advanced Driver Assistance System) engineer in regard to safety feature testing and trouble-shooting before putting into the market. ADAS can be regarded as Level 1-2 and even Lv.3 now according to the SAE Automation definition in J3016, whereby we are approaching Level 3/4 in our design roadmap at the moment targeting to launch vehicles that enable drivers hands off and enjoy the ride on autonomous driving in coming years.

Before I came to Melbourne, I was the Head of an automotive R&D centre in Hong Kong funded by the Government, and have been inventing and participating in the testing activities and setup of ADAS features since 2008. With some years working at the commercial side for handling technical problems and customer complaints related to safety, I made a win in bidding and leading the largest Autonomous Shuttle Bus demonstration project in a residential park in Hong Kong with project sum over A$5M under the Smart Traffic Fund by the Transport Department of HKSAR Government in 2022. Besides, I have been participating in various technology conferences (e.g. FISITA world congress, Autonomous Vehicle Technology Expo, etc), forums, workshop and offered training on AV to officers from various government bodies. Besides, I have ever set up the first wireless 5G remote driving apparatus on an autonomous driving platform in Hong Kong while later on we commercialized it into a 5G radio-controlled model car as well. Lastly, we were at the Steering Committee of Autonomous Vehicle Regulatory Framework assigned by the Transport Department of Hong Kong in 2021 while thereafter result in the latest 'Road Traffic (AV) Regulation' under the Road Traffic Ordinance (Cap.3/474), being effective by 1 March 2024. This ordinance covers the aspects of AV certificate, Pilot license, registration & licensing requirements, Testing & operations of AV [(1)].

I am currently a Reigstered Professional Engineer registered in BLA, a member of Engineers Australia, Society of Automotive Engineers (SAE) International of the United States, AAE & member of the Institute of Motor Industry of the United Kingdom. All in all, I am confident that my perspectives would be of global ones covering both customer-oriented, servicers and repairers, government policy and regulation framework, as well as from the design perspective of motor manufacturers and OEMs, so my points of views would be useful in formulating the regulations for AV in the country.

Before responding to below consultation questions, I would like to make a definition of Autonomous Vehicles based on SAE J3016 [(2)], by further sub-classifying the applicable AVs of the proposed ADSL into two different levels – **(AV1) Lv.3 Semi-Autonomous, ready or getting-to-be-ready to market** (current vehicles on road are Lv.0-2 vehicles so preferred not to be included) and **(AV2) Lv.4/5 – Fully Autonomous Driving under all scenarios.** The reason to separate these two AV categories is to better provide different angles to each question because their intent of design would be different thus so as their applications and limitations, even though they can still be named as an ADS.

Making sure the ADS is safe when it enters the market

3. How suitable are the matters we propose to include in an ADSE's safety management system? Should other matters be considered?

- Most requirements listed are suitable, but for some research related stakeholders, 'Financial capacity' may be a weakness which would inhibit ADS development broadly by uni or Unicorn companies, yet liability insurance is mandatory

- Apart from the listed ADSE certification requirements in the paper, I'd add:
  - Cyber-security & hackers-management capabilities – probably it has been included in 'Safety management systems" but I'd recommend to highlight it out as a standalone item. Because an ADS would be a Connected Autonomous Vehicle (CAV), it may arouse hacker's attention and if

authentication protocols are not in place, disasters could be seen as the vehicles may lose controls from ADS or operators;

- AV Safety Management System – this may only apply in the class of **AV2 – Lv.4/5 ADS,** no matter they are OK-to-buy in market or still under research purposes. If AV2 involves commercial use or mass transport purposes e.g. AV buses, the ADSE shall need to build a control centre with service operators who can instantly oversee the inner-compartment situations through 5G (or 5G+ in the near future) network such that the operators can put an emergency halt of the powertrain remotely to stop an event from further deterioration. Besides, regular safety training or refreshment courses to the safety drivers would be required and logged in due course. Adhoc safety audits shall also be required and contained in this Safety Management System.

4. Are there are other matters that the law enforcement and emergency services interaction protocol should account for?

- Frankly speaking, from the point of view per being an automotive technology developer, OEM or researcher, the current roadmap for **AV1 - Lv.3** ADS has not yet included this law enforcement or emergency services respondent behaviour so far, e.g. slowing down when coming across police cars, ambulances, fire engines, life rescuers, etc. Currently, we are still only relying on the sensors on-board (i.e. cameras, millimeter radars, Lidars etc) in the Lv.1-3 autonomous driving. Unless more advanced wireless method, e.g. V2X (Vehicle-to-everything) protocol is developed, this behaviour requirement will not be satisfied. In my experience, C-V2X (Cellular-V2X) methodology[3] using either PC5 or Uu interfaces, would supplement the sensor technology blindspot by allowing those law enforcement or emergency services vehicles to emit wireless information or command messages to on-coming Connected ADS using cellular-based network and request them to slow down until they are out of the zones;
- Otherwise, if C-V2X infrastructure or service is not in place, ADS should pop up a warning message at cluster to alert the driver or fall-back driver for the detected 'Emergency services vehicles nearby' by the image recognition technique in frontal camera(s) or Lidars. Corresponding request from ADS is to have a driver or operator to take full control of vehicles until leaving the zone;
- It is a good idea to provide clear work instructions or training for the first responders how to stop the automation of an ADS after an event, but usually from the designer angle, such ADS should be able to quit the automation function once collision or autonomous brake event is triggered, which will then request the driver to manually reset it before coming back into action. On the other hand, since most ADS would be congenitally built on an electric vehicle platform, therefore instead of thinking how to handle AV could be thought of another way in 'how to handle an EV after accident from fire or electric shocks'. We should equip the law enforcer or emergency services to understand what are the potential dangers for an EV on collision,.

Keeping the ADAS safe when it is on-road

5. Do the proposed certification procedures for aftermarket installations of an ADS adequately manage safety risks, or should other matters be considered?

a) The entry requirement for registering as an ADSE is maintained to be stringent already, and the challenges for converting a typical motor vehicle into ADS is not so straightforward and needs the cooperation of the motor vehicle manufacturer to release the authentication of CAN protocols in controlling the motor vehicle by the ADS Control Module (or namely Autonomous Drive Control Module). Underpinned by the fact that the technology contents involved would be quite extensively professional in electrical/electronic/automotive/machine learning/data science, personally I think the proposed legislation has already put good control over aftermarket modifiers on ADS, and even those current OEMs or contractors for AV unicorns or Robotaxis (e.g. Hexagon, TierIV, Waymo, etc) would be registered before conducting any AV business or modifications within Australia. Even though the modification works are to be conducted outside

Australia, AV should also undergo special AV homologation and registration procedures to ensure the post-motor-manufacturer modification has complied to local road ordinances.

6. Are there other modifications that should be considered significant? Is there other information an ADSE should provide when seeking authorization for a significant modification?

- Notwithstanding, as aftermarket modifications would mean "small-scale production" or adhoc tailor-made conversion of AV from a typical ICE or EV motor vehicle, it should undertake a pre-reregistration motor inspection or undergo an AV trial test before getting an AV motor license or ADS license. This is different the typical homologation process for a mass production vehicle, e.g. Tesla Model 3 with Autopilot function, which only needs one single homologation application for one single variant and then the approved homologation certificate will be applied to all the other same variant vehicles to be sold in the market. Instead, the aftermarket modifier should demonstrate evidence of getting technical support from the manufacturer of the original motor vehicle platform for their understanding and willingness to release the X-by-wire control protocols, or what risks behind;

- On the contrary, every post-motor-manufacturer modified ADS should be tested individually in a geo-fenced AV testing ground for some ADS capabilities. A reference example can be referred to Singapore's first autonomous vehicle test centre set up by CETRAN (Centre of Excellence for Testing & Research of Autonomous Vehicles – Nayang Technological University, NTU)[(9)] together with the Land Transport Authority (LTA) of the Singapore Government in 2017.

7. What are your views on the proposed additional AVSL measures to manage the safety risks of repairs, maintenance and modifications? In your response, please consider:

a) Are the risks arising from repairs to an ADS different enough to the risks arising from repairs to a conventional vehicle to require additional regulatory measures?

The roadworthiness or functional safety checks on a conventional motor vehicle would rely mostly on visual inspection, lubrication, OBDII diagnosis for DTC codes in trouble-shooting and road testing. Since an AV would usually be built on a conventional vehicle platform, all these safety check-boxes shall be followed. However, for the ADS functionality check, it is not so straight forward to simply use visual inspection, an ODBII diagnostic tool or replacing parts can settle. If sensors are replaced, calibration and compliance checks have to be done. As each AV modifier may have different work procedures, it is better to have a Professional Registered Engineer, probably in new category of Autonomous Driving Engineering, to sign off a repaired vehicle for **AV2 – Lv.4/5.** For **AV1 – Lv.3**, senior grade technicians, under appropriate training and internal certification, are required to conduct the Autonomous Driving functional safety checklist and sign off. These sign-off papers should be well maintained and documented, even though they are not to be submitted to any regulatory bodies unless an incident is involved which requires a specialist investigation thereby. The ADSE will then be requested to provide these documentations.

b) Is express authorization of repairers, maintainers and modifiers a suitable approach to manage the risks of unqualified parties working on an ADS?

If express authorization is just simply transferring the responsibilities from an ADSE to the authorized repairer, maintainers or modifiers, this is only a bureaucratic approach to find someone ultimately put into jail instead of the original culprit. Unless proof of adequate training, clear repair work procedures and technical support are provided, 'qualified parties' would still post risks in the ADS system stability and AV functional safety performances.

c) What is an appropriate balance between the level of control or discretion an ADSE has over who it authorizes to work on its ADSs, and the level of responsibility placed on either the ADSE or the repairer, maintainer or modifier doing that work?

Taking CAN signals from an automotive maker as a reference, CAN will be separated into highly-authenticated control-command CAN signals and low-authenticated read-only ones. The former only allows authorized engineers, with the software security keys, to unlock some or all of the functions depending on which key files or levels of authorization they belong to so that they can do modification and send commands to different electronic control modules (ECM) in operating different functions under the X-by-wire technology. The un-authenticated CAN signals are open for public, drivers or typical garage workers to view and understand the current vehicle status, to clear DTC codes, whereby they could not re-configure the modules or cause significant changes in the system configurations thus there is no critical impact on the vehicle performance.

Similarly, for ADS it is the responsibilities of ADSE to dedicate what levels of approval they would allow the repairers, maintainers or modifier to conduct the work procedures on behalf, while the later parties shall follow the work instructions closely in due diligence to perform their duties correctly and professionally. Both ADSE and repairers/maintainers/modifiers share the same portion of responsibilities as the later also serve as a representative on behalf of the ADSE, after their certification or training, even though they may not be in direct employment relationship.

d) Should the AVSL require that an ADSE not unreasonably withhold authorization, and that it share necessary information? For what reasons should an ADSE reasonably be allowed to withhold authorization?

There needs a balanced point in the disclosure of information and how to define the necessity. For example, ADS shall rely on advanced artificial intelligence algorithms in analyzing the data picked by the sensors, doing filtering and data science works, then make the Autonomous Driving (AD) decision for operating the steering, powertrain, braking etc functions of the AV in order to mobilize the vehicle. Since these techniques are all the intellectual properties of the ADSE, whereby most of them are not open source, it is obviously in a commercial world such information may not be viable for sharing out.

As mentioned before, ADSE can control the vehicle configuration accessible rights by using different levels of authentication e.g. CAN security keys with different rights. If the repairers, maintainers or modifiers attempted to override or jail-break in these authentications, or do not satisfy the certification requirements either proprietary or generic ones released by the ADSL later on, withdrawal or withholding authorization seems to be inevitable.

e) Should the AVSL include safety duties for repairers, maintainers and modifiers of ADSs? If so, how suitable are the proposed elements of the safety duty on repairers, maintainers and modifiers?

Yes, it should, but it's difficult to state all the safety items as different ADS developers would have different safety concerns based on the motor platforms they are working onto. Another limitation would be the availability of appropriate testing facilities. For an instance, if the vehicle has a collision damage then after body repair, the sensors e.g. Lidar, millimeter radars, cameras etc would have been dismantled and re-installed in different orientations. Apart from calibrations, a road test is definitely required to ascertain all the AD functions perform satisfactorily. The lack of such AD testing grounds, or designated routes with geo-fencing, the repairers may not completely perform the 'safety duties' ideally written down by the AD developer or ADSE. So I would suggest initially, the proposed elements should not be widely covered but better in generic scope which can be easily facilitated.

f) How may the proposed additional measures for repairs, maintenance and modifications affect business models for both ADSEs and repairers, maintainers and modifiers?

Taking EV repair as an example, not all the garages or workshops are qualified for repairing high tension components of an EV. Qualification or certification usually would require certain levels of training and repair hours, Continuous Professional Development (CPD) hours accumulated per year, EV repair tools or ISO audit on the safety equipment and procedures. All these are additional investment and would discourage some conventional repairers from taking a part in the new business cake, or can only take part in the repairing of low-tension or conventional components e.g. tyre replacement, lubrication. For ADS business, we may take the same approach but that also imply a shortage of manpower in repairing critical ADS systems or long waiting time is expected, if AV becomes more and more prevalent to conventional vehicles.

8. Are there measures we should consider to manage the consumer impacts of an ADS being disabled due to suspension, cancellation or surrender of certification?

It would be better if a service pledge of how many days can the customer gets a response on the investigation process, and the expected time frame for closuring a case study of suspension, cancellation or surrender of certification, which results in deactivation or unavailability of the ADS functions.

9. For how long should ADSEs be required to retain data? Should there be different periods for different types of information?

A reference can be taken to the new Road Ordinances (Autonomous Vehicles) just come into effect in Hong Kong this year(1) . For non-sensitive non-massive information e.g. safety driver records, maintenance logs, daily/weekly/monthly routine checks (if for AV buses as a commercial service), etc such data shall be retained for seven years. For sensitive or massive files e.g. CCTV footage, CAN logs for vehicle status, operations, sensor feedback etc, such data for any incident investigation is better to be retained for 60 -90 days, whereby archive does not constrain only to local storage devices but can do so wirelessly or by cloud storage.

10. Are there risks associated with information management that are not covered in these proposals?

I have no inputs in this regard.

11. What are your views on the proposed additional AVSL measures to manage the safety risks of remote operation of a vehicle with an ADS? In your response, please consider:

I have developed the first trial of remote driving set up using a connected autonomous vehicle in Hong Kong using dedicated 5G mobile network with the support from a 5G network provider to enable the higher bandwidth in LTE -V alike at the trial for both 4K real-time video streaming for remote driver as well as remote operation control of the vehicle at a geo-fenced location.

Basically, we have to define clearly what remote operations we want to specify.

For remote driving, currently it usually happens for off-road situations e.g. mining or desert because the extreme weather conditions may not favour the operation (by a driver) for long time, or even work under risky conditions (lightning, thunder storms) while a remote driver can sit inside a covered space with well air-conditioning to control several machines sequentially without jumping physically from one to another. The benefits not only relate to safety protections but can also provide a better work environment for the operators, reduce the risks or accidents for having occupants physically attending in situ. In addition, remote driving can enhance the work efficiency even to 7/24 non-stop operations by different shifts away from the mining or dumping sites saving travelling time and break rest time. **In fact, remote driving is facing a significant problem that the drivers cannot get any dynamics feedback from the vehicle platform** through the remote controlling platform. For example, a physical driver in the driving compartment would slow down a vehicle when going across a bump or loophole, or can have a good sense of wheel grip from the steering wheel when turning a curve because the he can feel the dynamics feedback when he sits inside the compartment. On the contrary,

for remote driving, you may not be able to get the feedback instantly and precisely thus we can only see remote driving is suitable in remote areas as mining or dumping sites whereby there are fewer vehicles in proximity and a remote driver would not be hurt even if the remote controlled vehicles have collisions. Notwithstanding, some ADS passenger vehicles or buses, even though not at off-road situations, would have a telecommunication device plus remote Emergency Button function such that the operators at the control centre overseeing the operations for an ADS fleet (usually AV buses) would be able to talk to the passengers and stop the ADS operations remotely with abilities to control the steering and gas/brake in emergency situations. Even though this is not a frequent interference case for the operators to step into the control of an ADS remotely, it is still categorized as remote driving in this regard as it involves major vehicle operations using the X-by-wire technology in ADS design. So it is advised that on-road remote driving should be covered under AVSL, while for off-road (e.g. mining site remote operation) they can be under separate considerations thus no need covered in the AVSL.

For remote ADS assistance, it usually happens for remote parking whereby the driver is outside of the vehicle but can participate in the control of certain vehicle operations e.g. the parking movement using a Smartphone Apps - to move in or out of a parking bay, or call for a parked ADS to come to the pick-up point outside a shopping mall within a short mile[(5)]. Some designs would enable reversing into home garage[(6)] which enables the occupants leave the vehicle before entry into the garage and let the vehicle drive and park itself after machine learning the usually possible parking maneuvers in tight slots under ADS assistance. This is similar to currently available automated parking with driver's control inside the car for automated parallel or perpendicular parking in or out of a parking bay[(7)]. These functions are not regarded as Lv.4 automation but Lv.3, thus it is recommended not to be covered under the scope of ADSL.

Notwithstanding, for some auto-park functions outside a valet carpark building or space, the driver gets off the ADS and request it to run on-street Autonomous Driving in order to search for an on-street parking spot or even just drive and wander without parking until the occupants call for it to pickup somewhere away from the previous drop-off spot, it should be considered as a Lv.4 or 5 activities because the ADS controls the AV completely on its own. Obviously, this should be within the ADSL coverage as the vehicle can run by itself even for a short distance.

Meanwhile, for some other body control functions without the vehicle motion, e.g. pre-heating/cooling of the passenger compartment before the driver/passengers enter into the vehicle, lower the windows, remote starting the engine of an ICE or put the power on (Accessory mode) for an EV, is also enabled nowadays using a mobile App remotely. Yet this kind of body control remote operation, not involving a vehicle in motion, does not need to be under the control of AVSL.

For remote monitoring, it does not limit to ADS vehicles but can be built or retrofitted to any vehicle types which would not have remote operations or impact on the vehicle operations. Usually, this relate to dashcam streaming, DTC code and vehicle status reading remotely for fleet management, GPS tracking, cargo delivery status, etc. This does not need to be under the control of AVSL as well.

a. How are companies using or planning to use remote operations as part of ADS deployment, and what business models are likely to be used? Which parties will have an influence on the safety of remote operation?

If ADS are targeted for **AV1 – Lv.3** operations, in principle there will be (safety) driver in place thus there is no need to have remote driving in place. Since the driver is responsible for all acts and behavior of driving thus he is wholly responsible for all events even though ADS assistance are in place. The current business model can be followed i.e. manufacturer holds the ADSE role and in case of any failure or accident. The owner (or driver) who sends the remote parking requests remotely through whatever means, is also an operator which has the secondary level of responsibility in ensuring the safe operation of the ADS.

On the other hand, for a particular ADS function e.g. remote parking no matter the driver is inside or outside of the vehicle, once he is just a request sender to command for remote parking while all the other auto parking actions are conducted automatically without the monitoring or engagement of an operator, then it is an ADS

decisive action and should be covered under the ADSL. Similarly, for **AV2 – Lv.4/5** operations, the ADS is deemed to be driverless and the business model is more tending towards a global promotion of **Mobility-as-a-Service (MaaS)** instead of the current provider (manufacturer)-and-buyer (owner/driver) business model thus obviously the manufacturer or fleet of AV services is the ADSE, while the passengers are playing an inactive role thus they would rarely bear any responsibilities if they obey to the usage rules as a passenger. However, for remote operators e.g. operator at a control centre, usually acting on behalf of the ADSE, would also be involved in the safety operations of the ADS.

b. Do you agree with the proposed scope of remote operations to be managed under the AVSL, and if not, which forms of remote management do you consider should be managed under the AVSL?

As mentioned in the very early beginning to this question feedback, "Remote driving" operations on-road and ADS assisted functions without driver's instantaneous control should be monitored under AVSL, while other remote driving off-road or in geo-fenced sites e.g. mining / dumping sites can be excluded from AVSL for sake of flexible technology applications away from on-road transport. Similarly, auto-parking functions under driver's control and monitoring should not be covered under AVSL.

c. Should an ADSE have responsibility for the safety remote operation performed to support its ADS? Should we consider other models for allocation of safety responsibility for remote operation?

Similar to above question, for remote driving on-road or with ADS assistance not under driver's instantaneous control, ADSE will be the ultimate responsible party for safety. The remote controller (if any), should receive appropriate training and therefore represent on behalf of the ADSE, will be the secondary responsible persons.

Otherwise, if an ADS offers the remote driving function to the driver who is not under the employment or contracting by the ADSE, obviously the driver himself should bear the act of a typical driving action and should take up all responsibilities on the vehicle behavior but there should be reminder or warning to the driver taking control of the vehicle about this responsibility issues even though the vehicle is ADS equipped.

d. What duties should be placed on an ADSE or on other entities for remote operations?

For remote parking under ADS assistance or remote monitoring, as they are recommended not to be covered by AVSL (except on-street parking spot searching under Autonomous Driving), there are limited responsibilities by the manufacturer or ADSE as they have less impact to the general public.

For remote driving and remote parking that runs autonomously without the monitoring of a driver, the ADSE should conduct the tasks mentioned in the "Safety risks to be managed" in the consultation paper.

e. Should remote operators be subject to a safety duty, or any other requirements, under the AVSL?

Yes, as they also contribute to the outcome of remote driving (excluding monitoring), they should be subject to the control under AVSL.

f. What specific skills or proficiencies should be required of remote operators?

Apart from the basic requirements of a conventional motor driving license, a special driver license catered for Autonomous Driving assisted purpose should be designed and demonstrate the specific skills of a remote operator in terms of:

1. Understanding the design and operation principles of the ADS including the sensing system, AD computer and critical systems e.g. drive-by-wire, steer-by-wire, brake-by-wire, electric motoring, parking brake operations, body control operations e.g. window & door opening & locking, etc;
2. Able to diagnose remotely the DTC code transmitted from the ADS vehicle and trouble-shoot. If not, should be familiar with the procedures how to handle a safe slow-down or pulling off from the road for physical road side assistance;

3. Accumulate a certain remote driver history record similar to a pilot in a certain period of time, in order to demonstrate his abilities over real-world remote driving instead of trained driving hours using a simulator;
4. Other add-on capabilities if more additional tasks are put e.g. towing, hoisting when parked

g. Should the AVSL require that remote operations centres be located in Australia? What are the advantages and disadvantages of this?

In terms of technical feasibility, currently only 5G or 5G+ mobile network can entertain the high bandwidth, Ultra-low latency and high capacities which is critical for HD video streaming and low latent command message transmission for control and feedback of the driving operations. Even though it is said that 5G operations can mean the remote controller can be anywhere round the globe under network coverage, there are other factors that may slow down the ultimate uplink and downlink speed, including geographical locations and IP allocations. It is therefore highly recommended Remote Control Centres to be located inside the nation, or better in the same state, for better and secure network quality. Besides, in case of any emergency or road side assistance requests, ADSE can send rescue team or contractors on site at the earliest time to reduce the impact to other road users.

The only draw back for this requirement would indicate a higher labour cost of running against the availability of well-trained qualified personnels for remote drivers. A study case can be taken for remote hotline operators now almost contracted out to Indian cities for more economical running. Otherwise, for local high-end skilled works, it is better to retain inside the nation.

12. Should an ADSE be required to ensure certain technical information is provided to consumers to inform purchasing decisions?

First thing first, I do not consent to the statement in the consultation paper pn P.34, "…Once the AVSL is in force, when a level 3 ADS is operating, such monitoring would not be required because an ADSE would be responsible for the safe operation of the vehicle…". According to SAE levels of automation, it was said that most of the time a Lv.3 vehicle would drive by itself when the automated driving features are engaged, but one condition that the driver still needs to pay attention and monitor the situation as the cluster or dash would request driver to take over control (e.g. auto steering, lane keep assist, adaptive cruise control, intelligent speed assist) when certain data or corresponding inputs on road are not clearly identified or recognized by the ADS systems. This is the same situation that even an ADSE have provided certain technical information to the general public or customers, the roles of responsibilities were still not clearly understood.

It is highly recommended that for **AV1 – Lv.3** vehicles, the drivers would still be responsible for the safe operations of the vehicles all the time, no matter ADS functions are engaged to assist or actively control, as finally the manufacturer would allow manual ultimate control to take over the vehicle's operations at any time. Therefore, instead of providing any technical information, alerts or reminder statements have to be clearly displayed inside the vehicles, or a signature record of reading and understanding such clauses of statements for identification of driver's responsibilities should be undergone during the new car delivery whereby the salesman have to debrief and explain to the customers for what these systems are and what the drivers need to know about the automated functions and limitations. Yet it would be beneficial if the ADSE can provide regular software updates, recall or rework program details proactively to the customer since the start of the vehicle ownership.

On the contrary, for **AV2 – Lv.4/5** vehicles, since the driver's monitoring or engagement is not compulsory while the ADS can handle all the operations itself, it is therefore necessary to provide related technical information e.g. sensor specifications, certificates of compliances, cyber security performances etc to enable the customer understand any hidden subscription or technical support services in order to enable the ADS being functional from time to time, and the subscription base e.g. mileage-based, time-based or data-size-based and so on.

13. Should the AVSL include offences in relation to misrepresenting vehicle capabilities?

This is more alike a sales and marketing regulations so I would suggest to align with the current Australian Consumer Law & Fair Trading Act in practice.

14. Are there other measures needed to address consumer risks?

Nil.

How people will interact with an ADS

15. What are your views on how we should approach laws for human user obligations in vehicles with highly or fully automated driving features? In your response, please consider:

a. Which types of vehicle control and seating configurations are being considered or developed by industry for vehicles with highly or fully automated driving features? Can vehicle control/seating design help to determine the obligations for users of these vehicles?

For highly automated (Lv.4) or fully automated (Lv.5) ADS, it does not mean they will eliminate the steering wheel, brake & gas pedals for intervention. Even though nowadays most body control commands can be sent through wirelessly by a Smartphone Apps, the vehicle dynamics control would still require a dedicated device or component to handle the control. Some AV developers may hide the steering wheel, foldable into somewhere under the dash, can still allow driver or operator's intervention by a special request, while we can see in the current market that the steering wheel shape can no longer be limited to a round shape but a yoke steering wheel[8] which is favored by the ADS fundamental 'steer-by-wire' technology.

Since Lv.4/5 ADS may drive itself, it is no longer compulsory for the first row of seats being arranged to face to the front but can be re-arranged for different purposes. However, it is expected SAE or ECE would drive and release a practice guidelines on this. ADSL can leave a room for inclusion on this in the future no need to fix it at this stage.

The arrangement of vehicle control layout and seating is only an attribute which does not mean or indicate any obligation by its users or passengers by all means. Yet improper usage or handling of these attributes would cause different levels of risk, just like putting a baby seat in the first row of seats with airbag, which would happen still by some users while the manufacturers have clearly specified this is a dangerous act if the airbag would be deployed.

b. In vehicles with higher levels of driving automation that are configured with manual driving controls, should there be specific requirements about seating position when the ADS is engaged? Do you support any of the options identified, or propose any other options?

During the time moments that ADS can operate and drive itself, there is no limiting seating positions or arrangement once other safety considerations that comply to current or future ECE or other new car assessment programmes e.g. airbags and seat belt constraints. However, then manual driving is requested, they should sit the same way as inside a conventional Lv.0-3 motor vehicles to perform their driving and monitoring duties in due diligence.

c. How should licensing requirements apply to users of vehicles with highly and fully automated driving features with accessible manual controls? Do you support any of the options identified, a combination of options, or propose any other options?

Reference can be taken to the Hong Kong Road Ordinances (Autonomous Driving). For anyone operating an Autonomous Vehicle, a special driving license category is required by attending appropriate training or

authorized by the AV owner or ADSE. In Hong Kong, this category is named as “Special Purpose Vehicle”. There is no harm in further differentiating this class from other SPV, by say AV driving license.

d. How should drug and alcohol restrictions apply to users of vehicles with highly and fully automated driving features? Do you support any of the options identified, a combination of options, or propose any other options?

The existence of AV may also help to serve as a chauffeur service to those who have drunk or taken drugs (probably for medical purposes), yet they should not be allowed to take the role of driver or sit in the place of a driver seat, unless the manual vehicle control is not accessible making them to be a passenger only. Identification lights outside of the vehicle e.g. at the roof top for differentiating whether a vehicle is under the mode of manual driving or Autonomous Driving can favor law enforcer to check any drunk or drug events happen for drivers of an ADS.

e. Do you think there should be a requirement to always have a person capable of driving travelling in a vehicle with highly or fully automated features? Why or why not?

In fact, for automated remote or valet parking, there would exist time moments when there is no occupant inside the car. Tesla also have on-street parking automated driving features that allow the AV to drive itself without any occupant inside on the road, yet there are still disputes or risks that it may have if no safety driver or a capable person to take over the control.

For **AV2 – Lv.4/5**, unless the ADS is equipped with remote driving under the real-time monitoring or intervention by an operator (at the control centre, for an instance), it should always require a capable person top take over the control should there be any manual driving control being accessible. Besides, alike in some regions or countries, you can find the red ‘Emergency buttons’ near the engine compartment on a commercial bus. It is advisory to have similar Emergency buttons for Lv.4/5 at the exterior body of the AV in order to enable anyone to stop the ADS movement perform abnormally or under risks.

f. Do you support permitting a person seated in the driving position in vehicles with highly or fully automated driving features to undertake secondary activities? Do you support any of the options identified, a combination of options, or propose any other options?

For anyone taking the driver seat position in the orientation and posture alike as for a driver in a conventional motor vehicle, he should not undergo any secondary activities so as to align with current driving rules in conventional motor vehicles. Otherwise he or she should take the other seats, or the driver seat should be under a non-driver mode such that the driver is not operating the vehicle but by the ADS itself. Different lights can be used at outside roof-top to facilitate other vulnerable road users or law enforcement officers to know whether the AV is under manual driving or ADS control.

g. How should non-dynamic driving task obligations be assigned or shared in vehicles with highly and fully automated driving features? Do you agree with our analysis?

This discussion is fundamentally challenging existing road ordinances. So under current regulations, if a vehicle is stopped without any movement in front of red traffic lights, can the driver touch or use mobile phone for messaging or calling? If not, anyone sitting in the driver seat should behave alike a driver in a conventional motor vehicle no matter the AV is under motion or static.

16. Do you support third-party interference offences being included in both the AVSL and state and territory law?

Yes, especially when AV would require wireless connection, or namely ‘Connected Autonomous Vehicles’ (CAV), hacking or interference by third-party would cause disasters to ADSs and ruin the whole road user community. Therefore such offenses should be included in AVSL nation-wide and state-wise.

17. Do you support the proposed automated vehicle regulatory framework as a whole, and are there any barriers to its implementation?

Alike the adoption of EV in different nations to explicitly mention the ban dates of conventional Internal Combustion Engines (ICE), there should be a driving force to transit motor registration from non-ADS, ADAS to Lv.3,4 & 5 ADS in a global approach. Australia can leverage other countries in the effective commencement of the AV regulatory framework.

The largest barriers would be from the misconception from the general public that AV or ADS are dangerous not reliable. Another would be the motor insurance companies how they welcome this technology and put the premiums and handle the accident claim results from AV.

Managing automated vehicle safety before the regulatory framework is in place

18. Are measures needed to prevent vehicles with an ADS from being provided to the market before the automated vehicle regulatory framework is in place? Which option or options is most suitable?

As there is still an accessible vehicle control in place for Lv.3 ADS, it is still manageable and require a (safety) driver to take over the responsibilities as a driver for Lv.0 – 3 vehicles. So selling AV 1 vehicles would not require the AV regulatory framework in place.

Whereas when Lv.4/5 vehicles come to the market, it is necessary that the AV regulatory framework has to be ready and mature enough. An option would be progressive adoption of higher ADS requirements and ADSE responsibilities by several stages. An analogy would be the tightening emission standards in different stages/years in order to push motor tail gas emissions to be less and less. One-time cut-off strategy is obviously violating general public's acceptance and change of driving or transport culture. A time frame of 10-15 years seems to be optimum.

19. Is it necessary to restrict aftermarket installation of an ADS, or use of an ADS to approved trials only, before the automated vehicle regulatory framework is in place?

An ADS would require three major components in automated driving, i.e. perception, localization and AI control. All these areas require professional expertise tailored for Autonomous Driving thus aftermarket is not a foreseeable workable and profitable business model. However, in order to avoid discouraging the development of ADS, I would suggest not to restrict but manage the certification and qualification of work skills. An example is to have a Registered Professional Engineer, or more rigorously, a Chartered Engineer, to sign off after reviewing all required modification documents, wiring diagrams, testing results etc. Another possibility is to align all aftermarket modified ADS to undergo geo-fenced AV testing as part of the type approval process. Identical process should be required for a mass production ADS which only requires to go through once under the same testing process. It is highly suggested the state governments' transport authorities, either by running themselves or contracted out to R&D centres or certification bodies, to build and provide such AV testing facilities and procedures alike the CETRAN in Singapore[(9)] .

20. What are the barriers to more complex and large-scale trials in Australia? How could trial arrangements be improved? Should there be provision in the AVSL for interim certification to support trials?

First of all, a geo-fenced testing ground has to be located or built. Usually large-scale trials would be linked to mass transport e.g. taxi fleet or bus services. A good demonstration and trial showcase can be referred to the automated transport means inside the Olympics Games[(10)] . It may be a good opportunity if AV regulatory framework is ready before Brisbane 2032 Olympic Games to show case different ADSE operations and

enhanced mobility technologies to Aussie and the world. Yet geo-fenced area like the athletic village would be better than demonstration at open public roads.

All in all, I am interested and experienced in driving autonomous technologies in the past few years. I can be reached by phone calls or emails and looking forward to any opportunities in contributing to the Autonomous Driving localizations and adaptions in Australia. Welcome for questions and connections.

References

[1] Road Traffic (Amendment)(Autonomous Vehicles) Bill 2022, Road Traffic Ordinance (Chapter 374) under Legislative Council Brief in Hong Kong - https://www.legco.gov.hk/yr2022/english/brief/tlbcr156282019_20221201-e.pdf

[2] SAE J3016, "Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles, *Society of Automotive Engineers International* - J3016_202104: Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles - SAE International

[3] "How V2X Will Be a Game Changer for Public Safety", The Police Chief, *International Association of Chiefs of Police* - https://www.policechiefmagazine.org/how-v2x-will-be-a-game-changer

[4] "Introduction to Cellular V2X", *Qualcomm Technologies Inc* - https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/c-v2x_intro.pdf

[5] Audi Remote Park Assist Plus, https://www.youtube.com/watch?v=xUSLZD_OgI4

[6] BMW Connected Drive – Automatic Garage Parking, https://www.youtube.com/watch?v=Yh4iTLzglbM

[7] Ford Active Park Asist 2.0 – Parallel and Perpendicular Parking, https://www.youtube.com/watch?v=LNxWjQQAk-U

[8] Toyota and Lexus to offer 'steer-by-wire' system in Europe from 2024, *Drive,* https://www.drive.com.au/news/toyota-lexus-steer-by-wire-system-europe-from-2024/

[9] CETRAN – The Centre of Excellence for Testing & Research of Autonomous Vehicles – NTU, https://cetran.sg/cetran-test-center/

[10] Toyota's innovative mobility solutions taking Olympic transport to ne heights in Tokyo, *International Olympic Committee*, https://olympics.com/ioc/news/toyota-s-innovative-mobility-solutions-taking-olympic-transport-to-new-heights-in-tokyo