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AUTONOMOUS VEHICLES AND INSURANCE LAW PRINCIPLES

Navigating New Frontiers in Singapore

Self-driving technology will disruptively transform the motor insurance sector, which has for too long been rooted in conventional insurance practices that must now be urgently reconsidered with the advent of autonomous vehicles ("AVs"). This article analyses how traditional insurance law doctrines are likely to interface with the introduction of AV technology. It makes the case that while certain doctrines will wane in importance, others are likely to take on heightened significance. This article then considers the implications of this analysis for the Singapore landscape. The liability regime that Singapore will adopt for AVs is highly likely to be based on the existing motor insurance framework already in place for conventional vehicle collision victims. Given that this existing framework is based on traditional insurance doctrines, it follows that policymakers, legislators and various stakeholders in the insurance industry will have to grapple with the issues analysed in this article and consider how to reformulate these traditional doctrines to render them more relevant in the age of AVs.

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I. Introduction

1 Past statistics have shown that more than 90% of all motor accidents[2] are due to human errors – with intoxication, fatigue, distraction and inexperience being the most likely causes. Visionaries have therefore envisaged that the obvious solution is to simply remove the human element at the steering wheel. This idealistic goal was not achievable decades ago but subsequent advances in sensor technologies and AI have since enabled far-sighted technopreneurs with deep pockets to heed the call for creating the revolutionary autonomous vehicle ("AV").

2 The advent of self-driving technology ushers in a bold new age of futuristic transportation systems. In addition to the original objective of minimising traffic mishaps, the other remarkable benefits that AVs may offer society include:

(a) improving overall co-ordination in road traffic flow with associated fuel savings accruable in general to AVs;

(b) reducing vehicular carbon emissions by ensuring that AVs operate at unparalleled efficacies during optimised computerised driving unencumbered by human foibles;

(c) boosting the popularity of carpooling and ride sharing so as to decrease the total number of vehicles travelling on the roads especially during peak periods;

(d) alleviating the prevailing shortage of public transport drivers by switching to fully autonomous fleets of taxis, buses or trains;[3]

(e) providing mobility for those who are not able to drive due to, *eg*, physical disabilities or health issues;

(f) allowing goods to be transported driverlessly on under-utilised roads throughout the still of the night;

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2 Santokh Singh, *Critical Reasons for Crashes Investigated in the National Motor Vehicle Crash Causation Survey* (US National Highway Traffic Safety Administration, March 2018) <https://crashstats.nhtsa.dot.gov/Api/Public/Publication/812506> (accessed 23 November 2023).

3 Self-driving taxis are already common in Beijing: Shunsuke Tabeta, "Baidu's Self-driving Taxis now a Common Sight in Beijing" *Nikkei Asia* (10 July 2022) <https://asia.nikkei.com/Business/China-tech/Baidu-s-self-driving-taxis-now-a-common-sight-in-Beijing> (accessed 23 November 2023). Germany has pioneered the first self-driving train: "Germany Unveils World's First Self-driving Train" *Livemint* (12 October 2023) <https://www.livemint.com/news/world/germany-unveils-world-s-first-self-driving-train-see-photos-11634002710170.html> (accessed 23 November 2023).

(g) increasing productivity as the time otherwise spent on driving can now be channelled to other activities during the AV ride; and

(h) creating high value jobs in the AV industries (which include those supporting sectors concerned with hardware sensors and automation algorithms).

3 Over the past four decades, the US, Europe and Japan have been the prime movers steadily pushing the frontiers of AV technology. On the one hand, automobile manufacturers (such as Ford, Volvo and Toyota) pursued vehicle automation in stages by incrementally introducing premium effort-saving features and progressively incorporating them into their design upgrades. On the other hand, start-up ventures without any automobile technology base (such as Waymo[4] and Uber[5]) opted to leapfrog the intermediate development stages and built working prototypes with mid-level autonomy that immediately attracted extensive media coverage.

4 There are different levels of vehicle automation that reflect the continuum from total human control to fully computerised self-driving. The J3016 Standard[6] compiled by the Society of Automotive Engineers spells out six levels. Conventional vehicles with drivers handling the full suite of driving-related tasks are labelled simply as Level 0 (which is essentially a default placeholder denoting no automation). Limited technology enhancements thereafter permit automobile manufacturers to offer piecemeal driver-assist options like automatic emergency braking, intelligent self-parking or adaptive cruise control for their premium lines of conventional vehicles; these are viewed as operating merely at Level 1 (for assisted automation) or Level 2 (for partial automation) because manual driving must resume whenever these add-on functions are being disengaged. On the contrary, the semi-AV pegged at Level 3 (where automation is tangibly evident but only on a conditional basis) is designed explicitly for the purpose of self-driving under certain conditions. However, the still-maturing technology requires a driver to be on stand-by to take over the steering wheel when prompted by the automation software during sudden exigencies. As for

4 Waymo, which started off as Google's self-driving project, now manufactures self-driving hardware developed in-house for use in their AV prototypes.

5 In an ambitious effort to minimise the need for drivers in ride-sharing fleets, Uber invested heavily in self-driving vehicles from 2015. After a series of problems, however, Uber's AV research unit was eventually acquired by Aurora (a Silicon Valley start-up).

6 "Taxonomy and Definitions for Terms Related to On-road Motor Vehicle Automated Driving Systems J3016_201401" *SAE International* <https://www.sae.org/standards/content/j3016_201401/> (accessed 23 November 2023).

the promising Level 4 (signifying high automation) which is currently not yet available for mass distribution, the AV should be able to self-drive under designated conditions with no anticipation of driver intervention. When the enabling technology ultimately allows for the attainment of the topmost Level 5 (which epitomises full automation), the AV will then be capable of driving itself regardless of any condition and there is no expectation of driver involvement at all.

5 With a well-developed road infrastructure paving the way for integrated digital maps and predictable driving scenarios,[7] Singapore has been actively involved in the testing and deployment of AVs since 2015. In fact, KPMG's 2020 Autonomous Vehicles Readiness Index ranks Singapore as the top country (among the 30 jurisdictions selected for the survey) in terms of preparatory measures for AV adoption.[8] In 2016, Singapore experimented with the world's first autonomous taxi service which operated in the one-north business park that has also been designated as a high-tech hub.[9] In 2018, the Port of Singapore Authority started to employ driverless trucks in platoon formation to transport goods from one port terminal to another along a 10km route on the West Coast Highway.[10] Plans have already been announced for residents of selected districts in Punggol, Tengah and Jurong to be able to board self-driving buses for their first- and last-mile commute trips in the near future.[11]

6 In this unchartered frontier, the ground-breaking transformations introduced by AV-related technologies will raise multiple insurance concerns that must be addressed. Traditionally playing a central role in the compensation of traffic-accident victims, the compulsory motor insurance regime in Singapore – borrowed in large part from the UK,

7 Benjamin Cheong, Justin Lee & Keith Wong Kaixian, "Is the Current Legal Framework in Singapore Sufficient to Protect Humans from Autonomous Vehicles?" (2018–2019) 36 Sing L Rev 224.

8 *2020 Autonomous Vehicles Readiness Index* (KPMG International, 2020) <https://assets.kpmg/content/dam/kpmg/es/pdf/2020/07/2020_KPMG_Autonomous_Vehicles_Readiness_Index.pdf> (accessed 23 November 2023).

9 Annabelle Liang & Dee-Ann Durbin, "World's First Self-driving Taxis Debut in Singapore" *Associated Press* (25 August 2016) <https://apnews.com/article/2eff588f37b249b5b8e4bb3b94969e6f> (accessed 23 November 2023).

10 Zhaki Abdullah, "Driverless Trucks may be Tested in Singapore Soon" *The Straits Times* (11 January 2017) <https://www.straitstimes.com/singapore/transport/driverless-trucks-may-be-tested-here-soon> (accessed 23 November 2023).

11 See "Autonomous Vehicles" *Land Transport Authority* <https://www.lta.gov.sg/content/ltagov/en/industry_innovations/technologies/autonomous_vehicles.html> (accessed 23 November 2023): "For the next phase of AV deployment, LTA will pilot the deployment of autonomous buses and autonomous on-demand shuttles in Punggol, Tengah and the Jurong Innovation District in the early 2020s."

being the progenitor jurisdiction – rests on the public policy of ensuring adequate coverage for all victims suffering personal injuries due to unfortunate mishaps on local roads. With the evolving capabilities of AVs challenging the orthodox foundations of motor insurance, it is imperative to review the underlying doctrines which apply to AVs. In the age of AVs, the driving risk profiles will be completely altered and the blame for accidents can no longer be summarily attributed to human errors. Given the winds of change whipped up by these disruptive innovations, this article seeks to analyse the salient insurance issues thrown up during the commercialisation of cutting-edge AVs (marketed as having been outfitted with Level 3, Level 4 or Level 5 capabilities). It will suggest the way ahead for motor insurance to be reconceptualised in Singapore's driverless ecosystem.

7 Part II of this article will explore how, as self-driving progressively becomes the norm, the existing insurance doctrines (which were not designed to address the novel risks introduced by AVs) will have to evolve in order to grapple with all these unfamiliar risks. Part III of this article will consider the implications of the analysis in Part II for the Singapore AV landscape. Part III will give a brief overview of the current AV landscape in Singapore before examining the issue of determining liability for accidents involving AVs. To date, Singapore legislators have yet to decide which liability regime Singapore ought to adopt. While the question of which liability regime will work best for Singapore is not the focus of this article,[12] it will be touched on briefly as the type of regime Singapore chooses to adopt will have ramifications for the impact of the analysis in Part II. In any event, the liability regime that Singapore will adopt for AVs is highly likely to either work in tandem with or overlay the existing motor insurance framework already in place for covering conventional vehicle collision victims.[13] It follows that the analysis in Part II will be highly relevant for Singapore policymakers and legislators as they consider how to reformulate these traditional doctrines to meet the unique challenges posed by AVs.

12 Indeed, this question has been extensively discussed in Singapore Academy of Law, Law Reform Committee, *Report on the Attribution of Civil Liability for Accidents Involving Autonomous Cars* (2020) (Co-Chairs: The Honourable Justice Kannan Ramesh & Charles Lim Aeng Cheng).

13 The SAL Law Reform Committee has suggested that the preferred approach may be to retain the existing system with some modifications: "Given Singapore's long-established negligence-based liability regime and the potential transition costs entailed in adopting [a] wholly new model, the more productive approach may therefore be to retain the existing system, but make targeted modifications to import the desirable features of product liability and no-fault liability." See Singapore Academy of Law, Law Reform Committee, *Report on the Attribution of Civil Liability for Accidents Involving Autonomous Cars* (2020) at Executive Summary, para 23 (Co-Chairs: The Honourable Justice Kannan Ramesh & Charles Lim Aeng Cheng).

II. Impact of autonomous vehicles on insurance principles

8 Motor insurers have thus far been offering policies to cover conventional vehicles as well as rudimentary AVs operating at Level 1 or Level 2. The time is ripe for them to develop new or modified insurance products specifically tailored for more advanced AVs equipped with automation facilities prescribed for Level 3, Level 4 and ultimately Level 5.

9 Hitherto, the focus of motor insurance has been on the conventional vehicle's human driver bearing responsibility for accident risks. There is now a pressing need to revisit the various insurance principles in order to account for the unprecedented absence of a human being at the steering wheel. The anticipated impact of driverless technology on each of the core insurance principles will be analysed in turn under the ensuing sub-headings.

A. Erosion of justification for non-disclosure

10 The insurance doctrine of non-disclosure (*uberrima fides*) stipulates that the insured is under a duty to disclose all material circumstances to the insurer before the insurance contract is concluded. According to s 18(2) of the Marine Insurance Act 1906,[14] "every circumstance is material which would influence the judgment of a prudent insurer in fixing the premium or determining whether he will take the risk". Common law has also introduced an additional requirement of inducement[15] which the Singapore courts appear to have since embraced.[16] Any breach by the insured of this utmost good faith duty will in principle allow the insurer to avoid the contract.[17]

11 After the advent of digitally-facilitated technologies, however, the rationale for imposing the duty of disclosure on the insured (particularly in the consumer regime) is no longer that compelling: insurers have nowadays been empowered by Big Data and the Internet of Things to seek on their own initiative the material information they require in order to perform risk evaluation (or claims processing when losses subsequently

14 2020 Rev Ed. It is accepted that s 18(2) is not limited to marine insurance and also applies to general insurance; see *Lambert v Cooperative Insurance Society* [1975] 2 Lloyd's Rep 485. See Yeo Hwee Ying & Chia Yaru, "Morphing Duty of Good Faith and Disclosure: Lessons for Singapore" [2018] JBL 425 at 428–430 for a discussion of the sweeping reform measures adopted in UK during the preceding decade, with the UK Parliament finally enacting two long-overdue statutes in 2012 and 2015.

15 *Pan Atlantic Insurance Co Ltd v Pine Top Insurance Co Ltd (No 2)* [1995] 1 AC 501.

16 See *Tan Yi Lin Cheryl v AIA Singapore Pte Ltd* [2021] SGHC(A) 23 and *UMCI v Tokio Marine & Fire Insurance Co (Singapore) Pte Ltd* [2008] SGHC 188.

17 Marine Insurance Act 1906 (2020 Rev Ed) s 18(1).

occur). This is so especially for AVs and conventional vehicles equipped with telematics sensors (that routinely collect and wirelessly transmit readings on a diversity of real-time parameters such as driving speed, idling time, braking patterns, distances travelled and accident data). Moreover, telematics devices are capable of reporting when a vehicle has travelled outside a designated zone – known as geofencing – and strayed, *eg*, into unsafe regions. Since motor insurers are able to turn to telematics[18] as a convenient source of data on driving behaviour when assessing the risks to be underwritten, they henceforth do not have to remain dependent on the vehicle owners (as the primary source) to divulge all material circumstances. Indeed, the sheer amount of data that modern technologies have enabled motor insurers to gather on the risk profiles of both drivers and vehicles is staggering[19] and far outstrips what could usually be garnered via the disclosure duty traditionally imposed on the insured. In fact, the asymmetry-of-information[20] justification that most insurers were previously wont to employ in their defence is arguably no longer valid (for not only AVs but also properties with web-connected sensors). In any event, s 18(3)(b) of the Marine Insurance Act 1906[21] spares the insured from having to disclose any materials already known to the insurer (*eg*, via onboard telematics or online platforms).

12 Furthermore, insurers of AVs will find it problematic to rely on non-disclosure to avoid contracts.[22] As vehicle control is transferred

18 It is presumed that motor insurers are legally entitled to access the information available from vehicle telematics. For Singapore's position, see s 2 and First Schedule, Pt 3, para 2 of the Personal Data Protection Act 2012 (2020 Rev Ed).

19 This naturally raises issues relating to data protection and misuse of information accessed by insurers, *eg*, the EU issued the General Data Protection Regulation (available at <https://gdpr-info.eu/> (accessed 23 November 2023)) to regulate the access and use of personal data by organisations and businesses during their routine operations (such as risk underwriting and claims processing by insurance companies).

20 Asymmetry of information refers to the imbalance between two parties in their respective knowledge of information relevant to the transaction being negotiated. Such imbalance typically implies that the party with greater material knowledge enjoys a competitive and (in most cases) unfair advantage over the other party. See the classic case of *Carter v Boehm* (1766) 3 Burr 1905 at 1909 where Lord Mansfield highlighted: "Insurance is a contract based upon speculation. The special facts, upon which the contingent chance is to be computed, lie most commonly in the knowledge of the insured only."

21 This provision states: "In the absence of inquiry, the following circumstances need not be disclosed: … any circumstance which is known or presumed to be known to the insurer. The insurer is presumed to know matters of common notoriety or knowledge, and matters which an insurer in the ordinary course of his business, as such, ought to know."

22 Hence, there is greater urgency for Singapore to pursue insurance law reform by enacting legislation to bring the local position in line with that in the UK (which already abolished the disclosure duty in the consumer regime and replaced it

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from human drivers to self-driving algorithms, so are the risks. For AVs categorised as Level 4 or Level 5, human risk factors will become much less pertinent for insurance purposes while vehicle risk factors will become far more prominent. For this reason, no AV insurer will still be able to resort to the well-rehearsed assertion that human factors are material in having an effect on a prudent insurer's mind when assessing risks or fixing premiums. Moreover, asserting that human factors have induced the particular insurer to make the policy on the relevant terms will not be so straightforward. Firstly, underwriters (whose guidelines the courts have been willing to take into account)[23] are unlikely to continue considering human risks against this backdrop. Secondly, underwriters have customarily been disinclined to give discovery of their guidelines which in future will even be more zealously protected as trade secrets given that selected portions are based on proprietary AV records.[24]

13 Nevertheless, there will exist certain situations where human factors may remain material to AV insurers. The following scenarios serve as illustrations of when the duty of disclosure continues to be relevant:

(a) An AV equipped with only Level 3 capabilities may, when exigencies arise, request for vehicle control to be relinquished to a standby driver. The driving habits and other risk factors of any human occupant (including the AV owner) who has been designated to sit at the steering wheel will consequently be of interest to the insurer when underwriting risks. In view of this, younger drivers ought to be charged lower premiums because, statistically speaking, they have shorter reaction times[25] when responding to emergency prompts by the automation software to take over vehicle control (often at short notice). Militating against this consideration, however, is the observation that younger drivers generally tend to be more reckless[26] – this is

with an inquiry approach on the part of the insurer). See Singapore Academy of Law, Law Reform Committee, *Report on Reforming Insurance Law in Singapore* (February 2020) (Chair: Simon Goh Keng Yeow), which recommended reform in line with the UK position.

23 See *Mohammed Ashfaq v International Insurance Co of Hannover PLC* [2017] EWCA Civ 357 at [19] and *Tan Yi Lin Cheryl v AIA Singapore Pte Ltd* [2021] SGHC(A) 23.

24 James Anderson *et al*, *Rethinking Insurance and Liability in the Transformative Age of Autonomous Vehicles* (RAND, 2018) at p 16 <https://www.rand.org/pubs/conf_proceedings/CF383.html> (accessed 23 November 2023).

25 Matija Svetina, "The Reaction Times of Drivers Aged 20 to 80 During a Divided Attention Driving" (2016) 17(8) *Traffic Injury Prevention* 810.

26 Allan Williams, "Teenage Drivers: Patterns of Risk" (2003) 34(1) *Journal of Safety Research* 5; Brian Jonah, "Accident Risk and Risk-taking Behaviour Among Young Drivers" (1986) 18(4) *Accident Analysis & Prevention* 255.

especially of concern when they experiment with the novel features of different AV models.

(b) An AV (whether marketed at Level 3, 4 or 5) is designed to perform only the functional self-driving tasks but deciding where to go (as well as when to start moving) rests with the human occupant whose risk profile will thus be material to the insurer; *eg*, the insurer will charge higher premiums if there is a history of the AV being directed to busy road networks notorious for traffic hazards or, in the worst-case scenario, insurance coverage may be refused if the owner tends to park in neighbourhoods ridden with car thefts. Of relevance too is the fact that the UK's AV statute exempts the insurer from liability to the human occupant who initiated self-driving when the resulting "accident … was wholly due to the person's negligence in allowing the vehicle to begin driving itself when it was not appropriate to do so".[27]

14 Vehicle factors, in contrast, can be readily covered by standard technical questions[28] about the AV (like level of self-driving autonomy, history of software glitches and adequacy of cyber-protection measures). For the purpose of actuarial profiling, insurers will have no option but to develop entirely new skill sets and in-house expertise for them to fully evaluate the safety profiles of the different AV models available for sale. Since it is superfluous for the insured to provide details on such vehicle-related risks (which are in general covered by standard maintenance terms), insurers will find less opportunity to invoke the non-disclosure defence when attempting to reject AV owners' claims for compensation.

15 Indeed, all these vehicular risks underline the fact that it is prudent for AV manufacturers to contemplate taking up product liability policies to cover for the possibility of future mishaps (*eg*, caused by defective sensors or software bugs). However, large manufacturers while applying for coverage may not be transparent with their records of in-house test results and corrective safety enhancements for fear of exposing market-sensitive information. If AV manufacturers opt for corporate hesitancy when asked to disclose confidential data (even when faced with insurers' repeated queries) for the purposes of risk evaluation, such an attitude if

27 Automated and Electric Vehicles Act 2018 (c 18) (UK) s 3(2). Note that this Act is currently under review: see Law Commission of England and Wales & Scottish Law Commission, *Automated Vehicles: Joint Report* (January 2022) (Chairs: The Right Honourable Lord Justice Green & The Right Honourable Lady Paton).

28 This highlights the importance of the inquiry approach adopted in the UK's reformed consumer position where it now behoves the insurer to ask relevant questions because remedy is found only in actionable misrepresentation: see ss 4–5 and Sch 1 of the Consumer Insurance (Disclosure and Representations) Act 2012 (c 6) (UK).

left unregulated will potentially spiral into a culture of dishonesty[29] and avoidance of responsibility. This scenario affirms that there is still some residual relevance of the utmost good faith duty for AV manufacturers to volunteer (or respond to requests for) product-sensitive information when seeking insurance.

16 Interestingly, the UK has already taken the long-overdue initiative to reform non-business insurance by enacting the Consumer Insurance (Disclosure and Representations) Act 2012[30] and abolishing in one bold legislative stroke the disclosure duty hitherto foisted on consumers to volunteer material information throughout the process of applying for cover from insurers; this radical statute imposes on the layman an entirely reactive duty "to take reasonable care not to make a misrepresentation during pre-contractual negotiations"[31] (*ie*, merely to "answer the insurers' questions honestly and to take reasonable care that their replies are accurate and complete"[32]). Extending the overall revamp initiative to business insurance as well, the UK thereafter passed the Insurance Act 2015[33] which contains the new duty of fair presentation where the businessman's duty to disclose material information has to now be complemented by the insurer's duty to elicit further information or clarify any doubts after the insured furnished "sufficient information to put a prudent insurer on notice that it needs to make further enquiries for the purpose of revealing those material circumstances".[34] If the Singapore Parliament chooses in future to follow suit, the consumer owners and

29 For reports of major automobile manufacturers resorting to dishonest practices, see Nazanin Mansouri, "Case Study of Volkswagen's Unethical Practice in Diesel Emission Tests" (2016) Int J Sci & Eng Applications 211 and Andrew Harris, Ryan Beene & Margaret Cronin Fisk, "Audi Managers Indicted by Federal Grand Jury in Emission Cheating Case" *Time* (18 January 2019) <https://time.com/5506677/4-audi-indictments-emissions-cheats/> (accessed 23 November 2023).

30 c 6 (UK).

31 "Consumer Insurance (Disclosure and Representations) Bill [HL]: Explanatory Notes" *www.parliament.uk* (16 May 2011) at para 10 <https://www.publications.parliament.uk/pa/bills/lbill/2010-2012/0068/en/2012068en.htm> (accessed 23 November 2023).

32 "Consumer Insurance (Disclosure and Representations) Bill [HL]: Explanatory Notes" *www.parliament.uk* (16 May 2011) at para 21 <https://www.publications.parliament.uk/pa/bills/lbill/2010-2012/0068/en/2012068en.htm> (accessed 23 November 2023).

33 c 4 (UK).

34 Insurance Act 2015 (c 4) (UK) s 3(4)(b). Working out the parameters of this reformed duty in the UK has its own challenges: see Robert Merkin & Ozlem Gurses, "Insurance Act: Rebalancing Interests of Insurer and Assured" (2015) 78 MLR 1004 at 1007–1008 and Baris Soyer & Andrew Tettenborn, "Mapping (Utmost) Good Faith in Insurance Law – Future Conditional?" [2016] LQR 618. For the local situation, see Simon Goh, "Impact of UK Insurance Act 2015 on Singapore Insurance Law and Practice" *Singapore Law Gazette* (October 2016) <http://v1.lawgazette.com.sg/2016-10/1682.htm> (accessed 23 November 2023).

business operators of local AVs can similarly be spared from the onerous duty of disclosing all material information. With regard to the consumer insured, the local insurers (like their UK counterparts) will then be under an obligation to specifically request for facts that they wish to know or are not at their disposal. With regard to the business insured, the novel (UK-imported) duty to deliver a fair presentation of risks expected of any corporate AV owner in Singapore ought to be balanced by the proactive duty imposed on the local insurer to inquire should there be queries raised during the fair-presentation process.

B. Waning reliance on misrepresentation

17 Pre-contractual misrepresentation in insurance law refers to the act of providing a false answer or statement by the insured while completing a proposal form for insurance and/or answering requests for clarification subsequently posed by the insurer. If the misrepresentation is neither material nor substantial,[35] the insurer is inclined to affirm the policy and merely updates the contract accordingly to account for the corrected information. If, on the other hand, the misrepresentation "would influence the judgment of a prudent insurer in fixing the premium or determining whether he will take the risk",[36] the insurer is entitled to avoid the contract[37] and deny any claims lodged by the insured.

18 AV insurers will generally find it problematic to rely on pre-contractual misrepresentation to avoid contracts. Thus far, most of the questions included by motor insurers in their proposal forms for insuring conventional vehicles relate to human factors like the driver's age, traffic violations and accident records. As for AVs, the misrepresentation defence will be more challenging to invoke even if the answers furnished by the insured are false given that human factors have now become less material on a prudent insurer's mind when focused instead on checking out the vehicle risks associated with self-driving capabilities. Indeed, the particular insurer will be hard put to show that there had been inducement – making it more difficult to prove the second requisite

35 Section 20(4) of the Marine Insurance Act 1906 (2020 Rev Ed) states that "[a] representation as to a matter of fact is true if it be substantially correct, that is to say, if the difference between what is represented and what is actually correct would not be considered material by a prudent insurer". For instance, if the insured misspelt his address whilst rushing to complete the proposal form, this misrepresentation would not be considered material.

36 Marine Insurance Act 1906 (2020 Rev Ed) s 20(2).

37 Marine Insurance Act 1906 (2020 Rev Ed) s 20(1).

of materiality (*viz*, the element of inducement)[38] in order to trigger an actionable defence of misrepresentation.

19 As already discussed in Part II.A above,[39] vehicular factors will become far more important for insurers when assessing risks prior to deciding whether to offer coverage for AVs and, if so, how much to charge for premiums. Since technical details such as the level of self-driving autonomy and efficacy of cyber-protection measures can be readily obtained from manufacturers' data sheets, the range of conceivable scenarios where an insured is prone to misrepresenting facts whilst providing replies to the insurer's requests for standard information on his AV's risk profile ought to be markedly reduced.

C. Increasing significance of terms, warranties and exclusions

20 Unlike non-disclosure and misrepresentation which are henceforth foreseen as declining in potency (despite having been the primary lines of defence for insurers when rejecting vehicle accident claims over the past decades), terms, warranties and exclusions will continue to be relevant in the age of AVs. As a matter of fact, they are likely to become collectively the AV insurers' most important risk management tool.

21 Insurers are wont to manage risk: one way of doing so is to stipulate terms that serve to lessen or mitigate the risks of untoward events. With regard to AVs, critical updates of the automation software as well as unauthorised tampering of the self-driving algorithms have thus far been identified to be of especial concern and various mitigation measures are already available to address these risks. The terms selected for discussion under the present sub-heading pertain to those that are either explicitly styled as warranties or negatively reframed as exclusions.

22 The more straightforward approach for AV insurers is simply to specify exclusions for the purpose of restricting or limiting liabilities when certain risk-bearing acts give rise to damages as a result of non-compliance by the insured. In the UK, for example, s 4(1) of the

38 Introduced by House of Lords in the landmark case of *Pan Atlantic Insurance Co Ltd v Pine Top Insurance Co Ltd (No 2)* [1995] 1 AC 501. See decisions in *Zurich Insurance Plc v Niramax Group Limited* [2021] EWCA Civ 590 and *Tan Yi Lin Cheryl v AIA Singapore Pte Ltd* [2021] SGHC(A) 23 where the respective insurers needed to specifically adduce evidence of inducement (via misrepresentation or non-disclosure as the case may be).

39 See paras 11 and 13 above.

Automated and Electric Vehicles Act 2018[40] (which was proactively enacted) specifically provides:

> **4 Accident resulting from unauthorised software alterations or failure to update software**
>
> (1) An insurance policy in respect of an automated vehicle may exclude or limit the insurer's liability … for damage suffered by the insured person arising from an accident occurring as a direct result of–
>
> (a) software alterations made by the insured person or with the insured person's knowledge … or
>
> (b) a failure to install safety-critical software updates that the insured person knows or ought reasonably to know are safety-critical.

23 The other approach is for AV insurers to structure the risk-bearing conditions as prescriptive warranties instead. At common law, a warranty in an insurance policy refers to the insured's assurance that certain conditions or statements spelt out in the policy shall be fulfilled. If any of these particular conditions or statements is not exactly complied with, the resulting breach of warranty triggers an automatic discharge of the contract.[41] In general, there are two ways for AV insurers to capitalise on the warranty doctrine.

24 Firstly, the AV insurer would ask whether the insured intends to regularly update the automation software and concurrently incorporate a basis clause that turns the various resultant answers into warranties.[42] During the last decade, however, the UK passed two long-overdue insurance statutes which abolished the use of basis clauses by all insurers.[43] Locally, the insurance law reform sub-committee convened

40 c 18 (UK).

41 Marine Insurance Act 1906 (2020 Rev Ed) s 33(3). See also, *eg*, *Bank of Nova Scotia v Hellenic Mutual War Risks Association (Bermuda) Ltd* [1992] 1 AC 233 and *Sugar Hut Group Ltd v Great Lakes Reassurance (UK) plc* [2011] Lloyd's Rep IR 198. In fact, the UK's Law Commissions noted that "warranties are the third most common ground for claims disputes": see The Law Commission & Scottish Law Commission, *Insurance Contract Law: Business Disclosure; Warranties; Insurers' Remedies for Fraudulent Claims; and Late Payment* (July 2014) at para 14.5 (Chairs: The Right Honourable Lord Justice Lloyd Jones & The Honourable Lord Pentland).

42 This is based on the assumption that the common law remains unchanged in Singapore and the existing doctrine of warranties continues to apply. In the UK, warranties can now only operate as suspensive terms: see s 10 of the Insurance Act 2015 (c 4) (UK).

43 Both of these UK statutes were enacted after a prolonged series of public consultations and reform reviews stretching over several decades; see, in particular, s 6(2) of the Consumer Insurance (Disclosure and Representations) Act 2012 (c 6) (UK) and s 9(2) of the Insurance Act 2015 (c 4) (UK) where both provisions specify

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by the Singapore Academy of Law's ("SAL") Law Reform Committee has recommended, *inter alia*, that basis clauses be abolished[44] – in line with the UK's wide-ranging insurance-revamp measures that also include amendments dealing with warranties (which can now only become suspensive terms[45] and have henceforth been defanged of the hitherto draconian effects associated with automatic discharge). In any event, AV insurers are not going to find basis clauses to be overly useful in ensuring that the facts they received from the insured are true, given the shift from human-driver risks to vehicle-automation risks; rather, they will turn to sources of AV information (*eg*, manufacturers' technical data releases or commentators' performance safety reviews) when assessing the self-driving risks to be underwritten.

25 Secondly, it is also possible for the AV insurer to spell out the software update and no-tampering undertakings as warranties.[46] Whether such terms are actually turned into warranties depends on whether the following three-pronged test in *HIH Casualty & General Insurance Ltd v New Hampshire Insurance Co Ltd*[47] is satisfied:

> (a) whether the answers go to the transaction's roots ("Limb 1");
>
> (b) whether the answers bear materially on the risk of loss ("Limb 2"); and
>
> (c) whether the damages are inadequate ("Limb 3").

Even if all three limbs are satisfied, the court may still find that, on proper construction, the terms are not really warranties (as a matter of

that a representation made by an insured "is not capable of being converted into a warranty … by declaring the representation to form the basis of the contract".

44 Singapore Academy of Law, Law Reform Committee, *Report on Reforming Insurance Law in Singapore* (February 2020) at paras 2.63 and 2.73 (Chair: Simon Goh Keng Yeow).

45 The UK's law reform turned all common law warranties into suspensive terms in order to reduce the effects of the insured's breach; see s 10 of the Insurance Act 2015 (c 4) (UK). If the Singapore Legislature follows suit, the warranties in local insurance policies will likewise become suspensive terms which operate on the basis that cover will be suspended when there is non-compliance with any stipulated term – with the cover resuming when there is subsequent rectification or compliance.

46 A warranty can in a way be perceived as akin to a condition precedent which must be complied with before the risk sticks; see *Bank of Nova Scotia v Hellenic Mutual War Risks Association (Bermuda) Ltd* [1992] 1 AC 233.

47 [2001] CLC 1480 at 1504 as qualified by *Bluebon Limited v Ageas (UK) Limited plc* [2017] EWHC 3301.

the term's commercial purpose) but rather terms delimiting risks (which circumscribe the scope of risks).[48]

26 Applying this three-pronged test to the two aforesaid[49] examples of AV risks (specifically mentioned in the Automated and Electric Vehicles Act 2018[50]), the insured's undertakings to regularly update the automation software and refrain from tampering with the algorithms are likely to be construed as warranties. Limb 1 is clearly satisfied as the UK's novel piece of AV legislation "takes a strong line against prohibited software alterations and failures to install safety-critical software".[51] Limb 2 is possibly satisfied as the answers do bear materially on the risk of loss. Limb 3 can also be satisfied as damages may prove to be inadequate. It will be challenging to ascertain in a counterclaim, on a balance of probabilities, that the AV accident was caused by the automation software and proving consequential damages is in turn going to be difficult. Nevertheless, the example of the software update warranty can at common law still be deemed to be a term delimiting risk suspending cover until the insured has remedied the breach by installing the requisite software updates – given that judges prefer to read down the warranty as a suspensive term which is less draconian in effect.[52]

D. Complicating already-difficult issue of causation

27 In the modern age of automation where human activities and business processes have been disruptively transformed, the tangled issues of causation and fault attribution assume knottier complications than before the advent of robotic control. By reducing the role of the driver in a vehicle, self-driving technology will likewise have significant impact on the issue of causation – especially for AVs pegged at Level 3 where standby drivers are expected to take over vehicle control when required. In the event of a semi-AV crashing, can fault be automatically

48 See *Bluebon Limited v Ageas (UK) Limited plc* [2017] EWHC 3301 where the three limbs were satisfied but it was nevertheless held to be a suspensive term instead of a warranty (as a matter of commercial purpose).

49 See para 22 above.

50 c 18 (UK).

51 Law Commission & Scottish Law Commissions, *Automated Vehicles: A Joint Preliminary Consultation Paper* (8 November 2018) at para 6.25 (Chairs: The Hon Mr Justice Green & The Honourable Lord Pentland).

52 See common law cases like *Provincial Insurance Co Ltd v Morgan* [1933] AC 240 and *Pratt v Aigaion Insurance Co SA* [2008] EWCA Civ 1314. It is hoped that the recommendations proposed by SAL's sub-committee for reforming the insurance law regime on warranties – including turning all warranties into suspensive terms (as per the reformed law in the UK) – would have already been adopted for legislative action by Parliament.

attributed to the automation software with the human driver absolved of blame altogether?

28 It is axiomatic in insurance law that the cause of the loss suffered by the insured must fall within the terms of the policy for the insurer to approve the resulting claim for compensation.[53] The general principle in English law is that the insurer is liable only for the losses proximately caused by the perils insured against.[54] Initially, the term "proximate cause" was regarded as referring to the last cause that occurred in time prior to the incidence of losses. Subsequently, the seminal case of *Leyland Shipping Co Ltd v Norwich Union Fire Insurance Society Ltd*[55] ruled instead that the term referred to the dominant, effective and operative cause. At common law, this undergirding principle remains a challenging area with poor predictive outcome as the case law is conflicting.[56]

29 For a collision that involves only conventional vehicles, the fault can usually be attributed to one of the human tortfeasors, *ie*, any of the drivers, the unfortunate victim(s) or an errant passer-by. When a semi-AV (self-driving in either partial or conditional mode) crashes, however, cause identification and fault attribution become more complex since there is the need to determine whether the incident is due to the carelessness of the human driver or some limitation of the automation software. The question of causation must be carefully weighed for a semi-AV caught in an accident as what typically happens in practice is that the automation software is not always in self-driving mode over the entire duration of the road trip and the driver should be prepared to assume control of the vehicle when prompted at any time (normally with not much prior notice). Whether the cause was the human driver's negligence or some algorithm's malfunction has to be carefully ascertained, taking into account all the circumstances. Further complexities arise when both driver and software are potentially at fault. This difficult issue remains open to future judicial development as and when such mishaps occur.

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53 See, *eg*, s 55(1) of the Marine Insurance Act 1906 (2020 Rev Ed) which is reflective of the common law in general insurance as well. See also Meixian Song, *Causation in Insurance Contract Law* (Informa Law, 1st Ed, 2014).

54 See Robert Merkin KC, *Lowry, Rawlings and Merkin's Insurance Law* (Hart Publishing, 4th Ed, 2022) ch 10. See also *Pacific Chemicals Pte Ltd v MSIG Insurance (Singapore) Pte Ltd* [2013] 1 SLR 324.

55 [1918] AC 350. Affirmed in *Global Process Systems Inc v Syarikat Takaful Malaysia Bhd* [2011] Bus LR 537.

56 See, *eg*, *Blackburn Rovers Football & Athletic Club Plc v Avon Insurance Plc* [2005] EWCA Civ 423, *cf*, earlier case of *Fidelity & Casualty Co of New York v Mitchell* [1917] AC 592. The challenge in determining causation may be aggravated in situations of multiple causes; see, *eg*, *Global Process Systems Inc v Syarikat Takaful Malaysia Bhd* [2011] Bus LR 537 and *Atlasnavios-Navegação, LDA v Navigators Insurance Co Ltd* [2019] AC 136.

30 Examples of semi-AVs crashing while self-driving on roads have already been reported – particularly in the US where the accident details are readily available online. A case in point is the highly publicised incident of a Tesla Model S (equipped with Autopilot) that crashed into a tractor-trailer on a Florida highway in May 2016.[57] "Autopilot" is Tesla's nomenclature for its high-end cruise control software that helps the semi-AV to stay in lane semi-autonomously. Investigations were thereafter conducted by the National Transportation Safety Board ("NTSB") which concluded that the semi-AV's collision was largely due to the car driver's distracted state. The onboard data recorder showed that the semi-AV was engaged in Autopilot mode all the time and the car driver held the steering wheel for only 25 seconds during the 37-minute drive. Autopilot successively flashed seven separate "hands required [but] not detected" warnings which were evidently not heeded. Tesla's design of the semi-AV apparently lulled the car driver into over-reliance on the self-steering software, leading to his prolonged disengagement and resultant inattentiveness to cautionary messages.

31 What was the dominant, effective and operative cause for this crash? On the one hand, the NTSB found that the design limitations of Autopilot played a major role in causing the semi-AV to plough into the tractor-trailer.[58] On the other hand, Tesla could justifiably counter that the fatal accident would have been averted if the car driver had not been so distracted as to be oblivious of Autopilot's repeated instructions to take charge of the vehicle's functions; in any event, his failure to respond to the multiple prompts for assuming control was also the last proximate cause prior to the semi-AV's collision. While the spectacular failure of the semi-AV's much-hyped software to detect the hard-to-miss presence of the massive tractor-trailer attracted much media coverage, the truck driver was not blameless either but he was merely charged with a right-of-way traffic violation for failing to yield when entering the highway from a side road. The NTSB eventually arrived at a finding of concurrent causation with the car driver's negligence and the semi-AV's lack of sufficient system safeguards identified as the major causes of this tragedy (which, incidentally, did not end up in litigation).

32 If this case had been litigated, how would the court have ruled where there are two concurrent and proximate causes of the loss? It

57 See "Collision between a Car Operating with Automated Vehicle Control Systems and a Tractor-Semitrailer Truck" *National Transportation Safety Board* (2016) <https://www.ntsb.gov/investigations/Pages/HWY16FH018.aspx> (accessed 24 November 2023), where the Tesla vehicle under investigation was considered a Level 2 AV.

58 Interestingly, Tesla subsequently upgraded Autopilot in an attempt to wean bored drivers from over-relying on the automation software.

should generally be quite straightforward as long as one of these causes is covered by the insurance policy given that the common law allows recovery. Problems arise when either of the two causes has been explicitly excluded from coverage – despite the other cause falling under the policy. In such an instance, the exclusion takes priority and the insurer will consequently not be liable for the loss suffered by the insured.[59] This is so even when the two causes are "equal or nearly equal in their efficiency in bringing about the damage".[60]

33 For this reason, particular attention must be paid to exclusion clauses. Insurers have been known to routinely include in their motor insurance policies certain exclusion clauses to withdraw coverage for any mishap due to the wilful act or negligence of the driver.[61] The insurer may therefore seek to deny liability when the driver's negligence has been established to be one of the concurrent causes. This would have been relevant to the Tesla crash had the case been litigated as the court might have ruled that the driver's egregious violation of safety protocols amounted to wilful negligence or recklessness.

34 Fortunately for the insured, the courts have in general been slow to find that these negligence clauses have been triggered except when there is strong evidence of reckless behaviour. Indeed, common law cases have always enjoined that "an exclusion clause must be read in the context of the contract of insurance as a whole … [and] must be construed in a manner which is consistent with and not repugnant to the purpose of the insurance contract".[62] Vehicle accidents often happen when drivers fail to exercise reasonable levels of care, and the commercial purpose of motor insurance is to insulate against such carelessness especially for third-party liabilities. In view of this, the exclusion clause for negligence

59 *Wayne Tank & Pump Co Ltd v Employers Liability Assurance Corpn Ltd* [1974] QB 57 – affirmed locally in *Kin Yuen Co Pte Ltd v Lombard Insurance Co Ltd* [1994] 1 SLR(R) 964. See also *Financial Conduct Authority v Arch Insurance (UK) Ltd* [2021] AC 649.

60 *Wayne Tank & Pump Co Ltd v Employers Liability Assurance Corpn Ltd* [1974] QB 57 at 67. See also *Global Process Systems Inc v Syarikat Takaful Malaysia Ltd* [2011] Bus LR 537, *Atlasnavios-Navegação, LDA v Navigators Insurance Co Ltd* [2019] AC 136 and *Siang Hoa Goldsmith Pte Ltd v The Wing On Fire and Marine Insurance Co Ltd* [1998] 2 SLR(R) 408.

61 See, *eg*, p 9 of AXA's motor policy (available at <https://www.axa.com.sg/pdf/our_solutions/car/smart-drive/motor_policy_no_begin_with_ga.pdf> (accessed 23 November 2023)) which contains the following exclusion: "[y]our policy does not insure you against … any wilful act and/or negligence committed by you or by your authorised driver".

62 *Impact Funding Solutions Ltd v Barrington Support Services Ltd* [2017] AC 73 at [7]. See also *Fraser v B N Furman (Productions) Ltd* [1967] 1 WLR 898 and *Grace Electrical Engineering Pte Ltd v EQ Insurance Co Ltd* [2016] SGHC 233.

ought to be construed narrowly. Accordingly, a driver is deemed as negligent only when he is "reckless … with actual recognition made by the insured himself that a danger exists and not caring whether or not it is averted".[63] Otherwise, the negligent driver of a semi-AV will encounter difficulties when claiming for losses incurred during a mishap (as would have been the case had the Tesla crash ended up in litigation). Further complications are added when other derivative clauses with exclusionary bias like "independently of all other causes" have also been inserted into the policy.

35 The onus of proving that the causative event falls within the policy terms lies with the insured claimant; in practical terms, however, adducing technical evidence of the semi-AV's malfunction (particularly with regard to the automation software notoriously known to be a "black box") will be inordinately formidable for any layman insured. A suggested alternative is to opt for a rebuttable presumption[64] where semi-AV collisions are *prima facie* attributable to malfunctioning hardware sensors and/or automation software anomalies. The burden of proving otherwise will then fall on the semi-AV manufacturer which will have to convince the court that the specific accident was caused by human error instead. In fact, foisting the rebuttable-presumption liability on manufacturers arguably incentivises them to push ahead with safety enhancements for their semi-AV designs (as can be seen from Tesla's upgrading of Autopilot after the negative media coverage of the accident in May 2016) whereas placing the burden of proving causation on the insured will only dampen consumer interest in these cutting-edge vehicles rather than discourage drivers from negligent behaviour.[65] This approach finds fraternal support in the analogous strict liability[66] stance (endorsed by the European

63 *Fraser v B N Furman (Productions) Ltd* [1967] 1 WLR 898 at 905, endorsed in *Grace Electrical Engineering Pte Ltd v EQ Insurance Co Ltd* [2016] SGHC 233.

64 This is achievable via legislation. See analogous example in Arts 3–4 of the Product Liability Act (Act No 85 of 1994) (Japan). In addition, the European Commission's Expert Group on Liability and New Technologies has pointed out that "where a particular technology increases the difficulties of proving the existence of an element of liability beyond what can be reasonably expected, victims should be entitled to facilitation of proof": see *Liability for Artificial Intelligence and Other Emerging Digital Technologies* (European Commission, 2019) at p 4 <https://data.europa.eu/doi/10.2838/573689> (accessed 23 November 2023).

65 Andrew Brown, "Blame it on the Machines: How Autonomous Vehicles will Impact Allocation of Liability Insurance and the Resulting Impact on the Legal Community" (2016) 95 North Carolina Law Rev Addendum 29 at 32.

66 The EC's Expert Group on Liability and New Technologies has suggested that "strict liability is an appropriate response to the risks posed by emerging digital technologies if … they are operated in non-private environments and may typically cause significant harm": see *Liability for Artificial Intelligence and Other Emerging Digital Technologies* (European Commission, 2019) at p 6 <https://data.europa.eu/doi/10.2838/573689> (accessed 23 November 2023). In its *Report on the Attribution*

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Commission's ("EC") Expert Group on Liability and New Technologies) that presupposes collisions by unmanned AVs to be invariably traceable to product defects. With the added advantage of flexibility, the rebuttable-presumption alternative (which allows the presumption to be overridden in meritorious cases so as to lead to more just results) is preferable to the blunt strict liability regime.

E. Extension of agency principles (in absence of human drivers)

36 As for more advanced AVs intended to operate at Level 4 or Level 5, there is no need for human drivers to be engaged in any of the self-driving tasks. Indeed, the fully autonomous AVs developed by Google's Waymo and General Motors' Cruise do not even incorporate steering wheels in their working prototypes.[67] For this reason, the US National Highway Traffic Safety Administration[68] ("NHTSA") explicitly agreed to "interpret 'driver' in the context of Google's motor-vehicle design as referring to the self-driving system itself and not to any of the vehicle occupants".[69]

37 Extrapolating from the NHTSA's line of interpretation, it is suggested that an alternate approach is to enlist the assistance of agency principles such that an AV is legally regarded as the driver hired by the owner.[70] After all, the AV is technically doing the owner's bidding. Analogous to how the acts of a managing director (who operates with authority as an agent) are attributable to the company, an AV that has

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of Civil Liability for Accidents Involving Autonomous Cars compiled in 2020, the SAL Law Reform Committee noted at p 5 that "it is possible to frame product liability laws so as to impose strict liability on manufacturers of the [autonomous] car and/or its components". See also Jerrold Soh Tsin Howe, "Towards a Control-Centric Account of Tort Liability for Automated Vehicles" (2021) 26 Torts Law J 221.

67 See, *eg*, Stephanie Mlot, "Waymo Unveils Robo-taxi with no Steering Wheel" *PC Magazine* (30 December 2021) <https://www.pcmag.com/news/waymo-unveils-robotaxi-with-no-steering-wheel-pedals> (accessed 23 November 2023) and Ryan Felton, "GM's Cruise Seeks Regulatory OK to Test Shuttle with no Steering Wheel" *The Wall Street Journal* (30 November 2022) <https://www.wsj.com/articles/gms-cruise-seeks-regulatory-ok-to-test-shuttle-with-no-steering-wheel-11669820462> (accessed 23 November 2023).

68 Aiming to be the global leader in motor vehicle and highway safety, the NHTSA formulates the American States' agendas for motor vehicles and highway safety; see also information available at <https://www.nhtsa.gov/> (accessed 23 November 2023).

69 See Jaikumar Vijayan, "Google's AI System is the Driver in Self-Driving Cars" *eWeek* (11 February 2016) <https://www.eweek.com/mobile/google-s-ai-system-is-the-driver-in-self-driving-cars-nhtsa-rules> (accessed 23 November 2023).

70 See Jack Boeglin, "The Costs of Self-driving Cars: Reconciling Freedom and Privacy with Tort Liability in Autonomous Vehicle Regulation" (2015) 17 Yale J of Law & Techn 171.

been activated by its owner to drive in a fully autonomous mode may in a similar vein be viewed to function as an agent of the owner.[71] If the AV then causes an injury whilst being employed to perform self-driving in public, its owner ought to be held liable in the same way that he would be for comparable injuries arising from the conduct of an agent.

38 This agency approach can be rationalised in two ways – firstly by using risks as the basis to justify holding the owner responsible as he had placed himself and/or others at risk during the AV ride, and secondly by using consequences as the basis for holding the owner responsible for any accident caused by the AV while acting on his instruction to self-drive to the specified destination. Should this proposed option be adopted, the owners of AVs equipped with Level 4 or Level 5 capabilities are strongly advised to insure against potential liabilities in order to provide the injured parties with the protection they would normally receive if their injuries had been inflicted by conventional vehicles instead.

39 Despite all the supporting arguments that have been put forward, this agency approach is not likely to attract much traction among scholars and practitioners. Given that an AV pegged at Level 4 or Level 5 is supposed to be fully self-driving, imputing blame on the owner when the human element is manifestly absent for all vehicle control operations appears to be unfair in principle. There are also other considerations militating against the adoption of agency in this context:

> (a) Perhaps the biggest obstacle is that – in contrast to a company – an AV is not recognised as possessing a separate legal personality.[72] Hence, it is inapposite to invoke the law of agency (which is focused on intermediaries) for application *mutatis mutandis* to AVs so as to determine when to attach liability.[73] As explained by commentators, there is no reason to justify that separate legal personality be accorded to an AV which,

71 This is intimated in the NHTSA's official response to Google's queries which were submitted via Waymo (available at <https://www.nhtsa.gov/interpretations/google-compiled-response-12-nov-15-interp-request-4-feb-16-final> (accessed 23 November 2023)).

72 §1.04(5) of *Third Restatement of Law of Agency* (American Law Institute, 2006) explicitly states that an agent must be a person with the "capacity to hold legal rights and the object of legal duties". Hence, any inanimate object (even though capable of fully autonomous decision-making without any human inputs to influence its course of actions) cannot be perceived to be a principal or an agent under the common law definition of agency.

73 In Singapore, the Insurance Act 1966 (2020 Rev Ed) requires that an insurance agent or insurance broker be a "person" while the Interpretation Act 1965 (2020 Rev Ed) defines "person" to include "any company or association or body of persons, corporate or incorporate". Since an AI does not fall within the definition of a person, it cannot perform the functions of an insurance agent or broker.

unlike a human, is not truly autonomous in that the self-driving algorithms cannot independently perform other new functions not originally envisioned during the software development.[74] Moreover, there already exist other means to penalise algorithms for wrongdoing.[75]

(b) From a commercial perspective, consumers will naturally be disinclined to purchase fully driverless vehicles which require no human assistance at all if there exists some possibility of AV owners having to bear liability for self-driving actions that are entirely determined by the automation software and not controllable by any of the human occupants.

40 Apart from viewing the AV as an agent acting on behalf of its owner, an alternative that ought to be considered is to regard the autonomous entity as an instrument (or extension) of the owner. Commentators have argued that even state-of-the-art AI should at best be perceived as a mere instrument of the user.[76] Furthermore, issues in contract and tort law are readily resolved via recourse to the instrumentality principle under which a claimant holds the owner, user or manufacturer (rather than the AV itself) liable under the law of negligence. As a matter of fact, the law nowadays recognises computers to be an instrument of the human operators utilising them.[77] Indeed, common law cases involving digital

74 See, *eg*, Daniel Seng Kiat Boon & Tan Cheng Han, *Artificial Intelligence and Agents* (NUS Law Working Paper 2021/019) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3935446> (accessed 23 November 2023).

75 The EC's Expert Group on Liability and New Technologies has reminded that "it is not necessary to give devices or autonomous systems a legal personality as the harm that these may cause can and should be attributable to existing persons or bodies": see *Liability for Artificial Intelligence and Other Emerging Digital Technologies* (European Commission, 2019) at p 4 <https://data.europa.eu/doi/10.2838/573689> (accessed 23 November 2023). See also Simon Chesterman, "Artificial Intelligence and Limits of Legal Personality" [2020] 69 ICLQ 819 and Jerrold Soh Tsin Howe, "Towards a Control-centric Account of Tort Liability for Automated Vehicles" (2021) 26 Torts Law J 221.

76 Unlike a company which is specifically accorded separate legal personality (to facilitate transactions and protect entrepreneurs), artificial agents do not need to be considered legal agents for users to be held responsible for the artificial agent's actions. Under the instrumentality theory, liability can instead turn on negligence – whether the principal had taken reasonable care in the performance of functions entrusted to it. See Daniel Seng Kiat Boon & Tan Cheng Han, *Artificial Intelligence and Agents* (NUS Law Working Paper 2021/019) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3935446> (accessed 23 November 2023).

77 The assumption implicit in § 14 of the Uniform Electronic Transactions Act (1999) (US) and Art 12 of the United Nations Convention on the Use of Electronic Communications in International Contracts (entered into force 1 March 2013) is that both embrace the instrumentality principle with no necessity to subject the artificial agent to rights and obligations.

machines and Internet-connected platforms being employed on behalf of human contractors have also been resolved on contract law principles without recourse to complex agency principles.[78]

F. Declining importance of notification term

41 In the event of any mishap involving a conventional vehicle, the insured owner is expected to inform the insurer as soon as possible. Failure to do so may amount to a breach of the accident notification condition commonly included in the motor insurance policy as a standard term (which is often styled as a condition precedent to liability).[79] In Singapore, the Motor Claims Framework[80] (compiled by the General Insurance Association in 2008) also contains a warning that the insurer is permitted to repudiate liability if the insured does not report the incident within the stipulated period of 24 hours. The underlying rationale is that the insured needs to supply sufficiently detailed information for the insurance investigators to verify the validity of the claim and determine who or what is at fault.

42 In the age of AVs, however, any failure to comply with the notification term is probably going to become less of an issue because of the automated features incorporated into the vehicle design to facilitate incident reporting and claims submission. First, it is anticipated that every AV will be equipped with the capability to automatically call an emergency response centre and notify the insurer immediately after a crash; in reality, this particular feature is already available locally for any conventional vehicle insured under Aviva's Motor Prestige plan which offers the eCall[81] smart sensor device that is designed to contact the insurer's emergency

78 See, *eg*, *Chwee Kin Keong v Digilandmall.com Pte Ltd* [2004] 2 SLR(R) 594; *Quoine Pte Ltd v B2C2 Ltd* [2020] 2 SLR 20; and *Thornton v Shoe Lane Parking Ltd* [1971] 2 QB 163.

79 The provision for claims processing (which is required after the risks have occurred) is unlikely to be caught under s 11 of the Insurance Act 2015 (c 4) (UK) which refers more to risk mitigation terms instead. The provision is also unlikely to be caught under the warranties principle as it hardly satisfies the criteria discussed in *HIH Casualty & General Insurance Ltd v New Hampshire Insurance Co Ltd* [2001] CLC 1480.

80 All motor insurers in Singapore support the Motor Claims Framework: see <gia.org.sg/pdfs/Industry/Motor/MCF_Brochure.pdf> (accessed 23 November 2023).

81 Gabriel Olano, "Aviva Singapore Introduces Emergency Assistance Service for Motor Cover Clients" *Insurance Business Asia* (3 May 2018) <https://www.insurancebusinessmag.com/asia/news/breaking-news/aviva-singapore-introduces-emergency-assistance-service-for-motor-cover-clients-99517.aspx#:~:text=Aviva%20Singapore%20has%20launched%20eCall,Aviva's%20new%20motor%20insurance%20plan> (accessed 23 November 2023). In fact, all new vehicles sold in the EU after 2018 must be equipped with eCall.

team whenever a collision occurs. Second, an onboard data recorder must be installed in order to collect and log information on the AV's operational processes; with accessibility granted to retrieve the driving-related data stored on the AV, the insurance investigators no longer have to depend on the insured for his recollection of the accident details. Hence, the advent of AV technology ought to free the insured from the obligation to personally submit post-incident reports in compliance with the claims procedure. Taking these developments into consideration, motor insurers ought to de-emphasise the status of notification terms in their AV policies and not turn them into conditions precedent.

43 As for conventional vehicles, there are well-known cases in which the insured owners managed to receive compensation despite not having personally reported their mishaps to their respective insurers. Examples include *Tan Thuan Seng v UMBC Insurans Sdn Bhd*[82] (where the information was provided by a co-insured instead) and *Barrett Bros (Taxis) Ltd v Davies*[83] (where the information was provided by a third party instead). In each of these two cases, the necessity to submit timely information could be said to have been waived by an elective act of the insurer after having received the requisite information via other independent means.[84] However, cases like *Kosmar Villa Holidays plc v Trustees of Syndicate 1243*[85] ("*Kosmar*") later pared down the scope of this waiver by re-framing the defence as one of waiver by estoppel rather than waiver simpliciter by election. The latter merely requires a focus on the insurer's conduct – whether the insurer, with knowledge of the facts giving rise to a right to reject payment, has made an informed choice not to capitalise on the right that is already available.[86] The re-framing of the defence as an estoppel in *Kosmar* will arguably be more problematic for insured AV owners should the notification term continue to be included in future policies (after driverless technology has been given the go-ahead for public deployment). For an estoppel to arise, the insured has to show that there is in effect an unequivocal representation that the insurer has accepted liability and will not rely on breach of condition precedent as affording a defence. In addition, there must be detrimental reliance by the

82 [1997] 3 SLR(R) 725 at [26].

83 [1966] 1 WLR 1334 at 1339.

84 This will in general be "confined to the situation where the reliability of the notification is beyond doubt" as pointed out in Robert Merkin, *Colinvaux's Law of Insurance* (Sweet & Maxwell, 11th Ed, 2018) at para 10-013.

85 [2008] Bus LR 931. However, defence by waiver may still be relevant in the context of pure conditions not made precedent to liability; see John Birds, *Birds' Modern Insurance Law* (Sweet & Maxwell, 11th Ed, 2019) at para 14-20.

86 See *Motor Oil Hellas (Corinth) Refineries SA v Shipping Corp of India* [1990] 1 Lloyd's Rep 391. See also Malcolm Clarke, "Waiver, Estoppel and Election" (1993) *British Insurance Law Association* 5 <https://bila.org.uk/wp-content/uploads/old/4ff4163f977990.58593360.pdf> (accessed 23 November 2023).

insured to render as inequitable the subsequent attempt by the insurer to resile on such an unequivocal representation.

G. Reduction in fraudulent claims

44 Another potential benefit of AVs progressively replacing conventional vehicles on the roads is that the number of fraudulent claims[87] is consequently expected to fall significantly. With the wealth of vehicle operation details stored in the AV's onboard data recorder,[88] the insurance claims processor will be able to double-check the information reported in the insured's claim in order to look for signs of dishonest exaggeration or outright fabrication. It should also be extremely difficult to perpetrate a fraudulent claim because the automation software cannot, unless tampered or hacked, be readily manipulated to cause a collision.

45 This anticipated fall in the number of fraudulent claims[89] ought to be readily observable for all three principal categories of fraud that have been commonly identified from the history of claims (involving conventional vehicles) dealt with by insurance investigators:

> (a) Concoction of fabricated claims via the staging of accidents will hardly be feasible. For an AV labelled as Level 4 or Level 5 where there is no steering wheel, any owner (or would-be accomplice) with ill intention will not be able to crash his high-tech car against a person or another vehicle unless he has the digital skills to corrupt the automation software beforehand.
>
> (b) The number of genuine claims with the amount of losses dishonestly exaggerated is predicted to fall dramatically as well. After receiving automatic notification (*eg*, via eCall) of the crash, the AV insurer will in the not-too-distant future be able to routinely dispatch a drone to promptly fly to the scene and capture photographic evidence of the damages suffered by the different parties.
>
> (c) Even fraudulent devices (*viz*, collateral lies where the claims are authentic but the supporting facts had been dishonestly

87 For fraudulent claims, see John Birds, *Birds' Modern Insurance Law* (Sweet & Maxwell, 11th Ed, 2019) at para 14-25 and John Birds, *MacGillivray on Insurance Law* (Sweet & Maxwell, 15th Ed, 2023) at para 19-060.

88 It is presumed that motor insurers are legally entitled to access the information available from onboard data recorders. For Singapore's position, see First Schedule, Part 3, para 3 of the Personal Data Protection Act 2012 (2020 Rev Ed).

89 The possibility of hackers infiltrating cyber-security safeguards to instigate AVs to crash (as portrayed in movies with spying or assassination themes) cannot be discounted.

embellished)[90] will become untenable because they can be readily uncovered by insurance investigators after processing the mass of information retrieved from the data recorders installed on AVs. With far greater granularity expected in the future for the electronically-recorded data, there will be even less prospect of collateral lies distorting the AV claims process.[91]

46 Furthermore, insurance investigators nowadays have at their disposal a diversity of fraud detection tools developed by start-up insurtech firms that employ modern day digital technologies like big data analytics and predictive modelling. Obviously, the efficient detection of anomalies in claims submissions will directly benefit the insurance companies' financial performance. Additionally, there should be spill over benefits for the insured as well: if the resulting fall in the total compensation amount paid out for fraudulent claims proves to be significant enough, underwriters ought to lower the premiums they quote in order to attract more AV owners and operators in the generally competitive motor insurance market.

III. The autonomous vehicles landscape in Singapore

47 At present, Singapore has opted for the approach that AV regulation should be enacted progressively in stages[92] – in line with what

90 An example of a collateral lie is when the insured stated that the traffic light at the road junction was green during an accident but it was actually amber at the time. In this instance, the claim is tainted by dishonesty since the insured clearly lied about the traffic light being green in his favour so as to make his case appear stronger. Nevertheless, the claim remains valid because the insured still had the right of way regardless of whether the traffic light was green or amber. See *Versloot Dredging BV v HDI Gerling Industrie Versicherung AG* [2017] AC 1 (where the majority judges refused to impugn claims on account of such white lies and excluded collateral lies from the remit of fraudulent claims) but whether this decision will be embraced by Singapore courts remains open. See also local decision of *Sumpiles Investments Pte Ltd v AIA Insurance Singapore Pte Ltd* [2006] 3 SLR(R) 12 which assumed that Singapore law followed the UK appellate case of *Agapitos v Agnew* [2003] QB 556 (where fraudulent devices or collateral lies were considered fraudulent claims).

91 The steady advancement of digital technologies in recording data on AV performance and accident conditions will cut down the opportunities for genuine fraud and inaccurate embellishment in AV claims, thereby fortifying the approach of the majority judges in *Versloot Dredging BV v HDI Gerling Industrie Versicherung AG* [2017] AC 1 who refused to reject fraudulent devices outright.

92 Singapore Academy of Law, Law Reform Committee, *Report on the Attribution of Civil Liability for Accidents Involving Autonomous Cars* (2020) at paras 4.2–4.5 (Co-Chairs: The Honourable Justice Kannan Ramesh & Charles Lim Aeng Cheng).

major jurisdictions like UK[93] and Germany[94] have elected to do for the time being. A major reason for preferring such an incremental course of action is that research in self-driving technology continues to yield new advances and how this ground-breaking industry will evolve in the future remains to be seen. After having decided to jump on the AV bandwagon,[95] Singapore had merely taken tentative steps by introducing piecemeal legislation to address the pressing problems that are directly associated with the experimental adoption of driverless technology. Parliament has yet to enact a statute specifically regulating AVs, but instead merely added several provisions during the amendment of the Road Traffic Act[96] in 2017 to address those concerns which are of immediate relevance during the initial phases of AV testing (where the focus is only on the comprehensive testing and pilot applications of driverless vehicles).[97] The validity of these preliminary AV-related provisions is expressly limited to the interim period from 24 August 2017 to 24 August 2027.[98] The general

93 During the third reading of the Automated and Electric Vehicles Bill, Baroness Sugg (Parliamentary Under-Secretary at the UK Department for Transport) acknowledged "the narrowness of the Bill" and agreed that "[the UK] Government must look at the fuller picture" in the future: see House of Lords, *Automated and Electric Vehicles Bill* (13 June 2018), volume 791. In the UK Law Commission's opinion, this new legislation seems "good enough for now" but "the issues should be re-considered after AVs have been deployed so that decision-makers can take account of practical experience": see Law Commission of England and Wales & Scottish Law Commission, *Automated Vehicles: Joint Report* (January 2022) at para 13.18 (Chairs: The Right Honourable Lord Justice Green & The Right Honourable Lady Paton).

94 Germany's Act on Autonomous Driving (19/27439) requires that AVs (even when designed for Level 4) have to be overseen by so-called technical supervisors and must operate in defined areas approved by the authorities – an acknowledgment that the current state of driverless technology is still not advanced enough for self-driving on a fully unrestricted basis. It has been pointed out that this recently enacted ordinance "should be regularly evaluated and further developed" because of the need to keep pace with future technological developments: see press release of German Association of Automotive Industry on 20 May 2022 (available at <https://www.automotiveworld.com/news-releases/vda-germany-secures-pole-position-in-autonomous-driving/> (accessed 23 November 2023)).

95 Ku Swee Yong & Sheila Conejos, "Commentary: Is Singapore Ready to have Driverless Cars on its Roads?" *Channel NewsAsia* (27 January 2023) <https://www.channelnewsasia.com/commentary/singapore-driverless-cars-autonomous-vehicles-transport-road-traffic-safety-3233236#:~:text=The%20short%20answer%20is%20yes,for%20driverless%20cars%20has%20arrived.> (accessed 23 November 2023).

96 2004 Rev Ed.

97 Section 6C empowers the Minister for Transport to draw up rules regulating the testing or use of AVs on public roads. Section 6D provides for exemptions and modified application of laws to approved AV trials or usage. Section 6E spells out the penalty for offenders who, without reasonable excuse, attempt to hinder or obstruct the progress of AV trials or use in Singapore.

98 The Road Traffic (Amendment) Act 2017 (Act 10 of 2017) originally specified that the preliminary AV-related provisions were applicable only during the interim period

(cont'd on the next page)

strategy of the relevant authorities' overall master plan is for the initial phases to focus on rigorous AV testing and selected trial deployments.[99] Thereafter, larger scale AV ventures will be attempted and more legislative measures will have to be introduced in order to cater for the different pioneering initiatives that are scheduled for future implementation.

48 Given that Singapore's AV landscape is still in the preliminary trial deployment phase, the interim provisions enacted in 2017 were only expected to deal with the limited number of AV trials approved under the initial phases for controlled operation in designated zones. As the interim provisions dictate compulsory cover for these AVs involved in the trial phases, should any accidents occur, there will be an insurer standing behind the owners of these AVs. However, as analysed in Part II above, there are many defences that an insurer can mount which may invalidate the cover. If the cover is invalidated, whether the tort victim can successfully obtain compensation from an AV owner pursuant to a court judgment will then turn on the creditworthiness of the AV owner. Such tort victims fare more poorly compared to their counterpart victims injured by a conventional motor vehicle, who are governed by the conventional motor vehicle regime undergirded by the Motor Vehicles (Third-Party Risks and Compensation) Act 1960[100] ("Motor Vehicles Act"). The Motor Vehicles Act provides greater protection for tort victims injured by a conventional motor vehicle – s 8 disallows the insurers from pleading certain kinds of terms, and s 9(1) makes it more difficult to apply the defence of the non-disclosure and misrepresentation *vis-à-vis* a third-party victim who also acquires a direct statutory action against the insurer.[101] However, given that the amendments to the Road Traffic Act in respect of AVs are only a temporary stopgap measure confined to addressing the immediate issues that arise during the AV testing phase, it is perhaps understandable that they lack the fuller protective provisions in favour of third party victims present under the Motor Vehicles Act. In any event, there has not been any litigation based on the Road Traffic Act's interim AV-related provisions to date – due for the most part to

from 24 August 2017 to 23 August 2022. The end date was thereafter extended to 24 August 2027 when Parliament amended the Road Traffic Act once again in 2021: see s 3 of the Road Traffic (Amendment) Act 2021 (Act 12 of 2021).

99 See the Land Transport Authority's AV deployment roadmap for Singapore since 2015: available at <https://www.lta.gov.sg/content/ltagov/en/industry_innovations/technologies/autonomous_vehicles.html> (accessed 23 November 2023).

100 2020 Rev Ed.

101 See s 9(2) of the Motor Vehicles (Third-Party Risks and Compensation) Act 1960 (2020 Rev Ed): "Despite subsection (1)(*b*)(i) providing for payment to the Public Trustee, the right of action created by the judgment referred to in that subsection vests in the person or persons entitled to the benefit of the judgment." See also Poh Chu Chai, *Law of Life, Motor & Workmen's Compensation Insurance* (Longman, 4th Ed, 1996) ch 5.

the limited number of driverless fleets approved for the initial phases of rigorous testing and controlled trials.

49 During the subsequent phases, however, a broader range of collision scenarios can be anticipated because the larger number of AVs self-driving on public roads will no longer be doing so under strictly controlled conditions. In addition, the relevant authorities will have to ramp up their efforts to co-ordinate the eventual integration of AV fleets seamlessly into the local transportation infrastructure as part of the nation's concerted efforts to minimise traffic congestion. Having embraced a wait-and-see approach thus far, the Government must therefore return in future to Parliament in order to pass appropriate statutes when the legal challenges on the ground become more apparent as the forthcoming plans for full-fledged AV applications unfold. Critically, the Government needs to decide which type of liability regime Singapore will choose to adopt.

50 In light of the analysis on the impact of AVs on the various insurance law doctrines in Part II above, the final issue to be considered is how Singapore ought to adapt its current insurance law framework in response. To an extent, this will turn on which type of liability regime Singapore chooses to adopt. It should be noted that the question of which liability regime to adopt is not the main remit of this article. Instead, this article is chiefly concerned with analysing and evaluating how the salient insurance principles may interface with the innovations in technology. Nevertheless, given that the type of regime Singapore chooses to adopt has ramifications for the impact of the analysis in Part II, some brief comments are called for regarding the contending liability regimes.

51 Recognising the challenges posed by self-driving technology when unleashed on local roads, the SAL Law Reform Committee convened a standing sub-committee[102] to study the compensation claims problems associated with AV accidents. The Committee issued a 55-page report which analysed three potential liability frameworks for motor

102 Convened by SAL's Law Reform Committee, the Robotics and Artificial Intelligence Sub-Committee (which is co-chaired by Justice Kannan Ramesh) published the 55-page *Report on the Attribution of Civil Liability for Accidents Involving Autonomous Cars* in 2020 as part of the series looking into the impact of robotics and AI on the law. Portions of this report make reference to Hannah Lim Yee-Fen, *Autonomous Vehicles and the Law: Technology, Algorithms and Ethics* (Edward Elgar, 2018), where the author (drawing upon her current research in law and past training in computer science) discusses liability implications arising from the hardware defects and automation anomalies discovered during post-collision investigations. See also Chen Siyuan, "Regulating Autonomous Vehicles: Liability Paradigms and Value Choices" in Gary Chan Kok Yew & Man Yip, *AI, Data and Private Law: Translating Theory into Practice* (Hart Publishing, 2021) at pp 147–172.

accidents involving AVs: (a) negligence;[103] (b) product liability;[104] and (c) no-fault liability.[105] Noting the inherent difficulties in proving that the duty of care had been breached in the event of a collision involving AVs, the sub-committee took the view that negligence would not provide a suitable framework for determining liability when the vehicle had been engaged in fully autonomous mode prior to the crash.[106] Neither is the law on product liability (which to date remains not as well developed as negligence in common law jurisdictions)[107] able to offer much assistance to such victims in Singapore. The report concluded that "the optimal nature or basis for an AV regulatory framework remains far from clear".[108] Nevertheless, the report suggests that the preferred approach may be to retain the existing system with the necessary modifications: "Given Singapore's long-established negligence-based liability regime and the potential transition costs entailed in adopting a wholly new model, the more productive approach may therefore be to retain the existing system, but make targeted modifications to import the desirable features of product liability and no-fault liability."[109]

52 This approach, if adopted, will mean that the system will continue to be undergirded by insurance law principles. It follows that the usual defences deployed by the insurer (as discussed in Part II above) continue to remain significant. As such, assuming that the new liability regime for AVs is likely to be overlaid upon the existing motor insurance compensation regime, policymakers, legislators and other insurance stakeholders will have to pay urgent heed to the knotty issues

103 Singapore Academy of Law, Law Reform Committee, *Report on the Attribution of Civil Liability for Accidents Involving Autonomous Cars* (2020) at p 44, para 5.4 (Co-Chairs: The Honourable Justice Kannan Ramesh & Charles Lim Aeng Cheng).

104 Singapore Academy of Law, Law Reform Committee, *Report on the Attribution of Civil Liability for Accidents Involving Autonomous Cars* (2020) at p 49, para 5.16 (Co-Chairs: The Honourable Justice Kannan Ramesh & Charles Lim Aeng Cheng).

105 Singapore Academy of Law, Law Reform Committee, *Report on the Attribution of Civil Liability for Accidents Involving Autonomous Cars* (2020) at p 52, para 5.23 (Co-Chairs: The Honourable Justice Kannan Ramesh & Charles Lim Aeng Cheng).

106 Singapore Academy of Law, Law Reform Committee, *Report on the Attribution of Civil Liability for Accidents Involving Autonomous Cars* (2020) at p 47, paras 5.10–5.11 (Co-Chairs: The Honourable Justice Kannan Ramesh & Charles Lim Aeng Cheng).

107 Singapore Academy of Law, Law Reform Committee, *Report on the Attribution of Civil Liability for Accidents Involving Autonomous Cars* (2020) at p 50, paras 5.18–5.19 (Co-Chairs: The Honourable Justice Kannan Ramesh & Charles Lim Aeng Cheng).

108 Singapore Academy of Law, Law Reform Committee, *Report on the Attribution of Civil Liability for Accidents Involving Autonomous Cars* (2020) at p 6, para 25 and p 55, para 5.29 (Co-Chairs: The Honourable Justice Kannan Ramesh & Charles Lim Aeng Cheng).

109 Singapore Academy of Law, Law Reform Committee, *Report on the Attribution of Civil Liability for Accidents Involving Autonomous Cars* (2020) at p 6, para 23 (Co-Chairs: The Honourable Justice Kannan Ramesh & Charles Lim Aeng Cheng).

surrounding the existing insurance principles highlighted in Part II of this article. It is critical for them to decide how these principles, which at times sit awkwardly with the new disruptive technology, ought to be reformulated in order to find renewed relevance amidst the shifting winds of disruptive technology.

IV. Conclusion

53 This article has sought to sketch an overview of the various novel insurance issues engendered by the advent of AVs which will indisputably revolutionise the motor vehicle landscape. Currently, there are various uncertainties and lacunae existing in the law simply because traditional insurance principles have to play catch up with the rapid pace of technological advances. This is exacerbated by the fact that not many opportunities have hitherto arisen for the courts to adjudicate compensation claims disputes that stem from accidents caused by or involving AVs. Early clarification of these ambiguities generated by the introduction of AVs will indubitably benefit manufacturers and consumers alike by elucidating their legal obligations and potential liabilities. In fact, it is arguably not even feasible to embark on any extensive plan for the commercial exploitation of AV innovation without clear laws firmly in place.

54 In particular, a comprehensive legislative review is called for so as to re-evaluate in detail the impact of the advent of AVs on the different insurance principles already analysed in Part II. On the one hand, the oft-lambasted duties to disclose and not misrepresent facts viewed as necessary for risks assessment will have to recede in relevance given the insurers' ready accessibility to material information via telematics and other digital means. On the other hand, certain doctrines relating to, *eg*, terms for risks management and causation for attributing fault will in all probability be catapulted to the forefront in significance because of how AVs have been envisaged to function under a diversity of operating conditions. Once these outstanding concerns have been resolved, Singapore can then expeditiously drive into the future of widespread AV usage.