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A MODEL OF PROACTIVE REGULATION FOR AUTONOMOUS DIGITAL SYSTEMS

Abstract

Technology companies developing autonomous digital systems ('ADS'), including autonomous vehicles ('AVs'), have enjoyed significant regulatory leeway as consumers embrace novel technologies and agencies struggle to adapt accountability mechanisms. Public tolerance of companies pushing ADS to market with minimal regulation is now waning as consumer awareness of harms caused by ADS grows.

Regulating ADS is complicated by the significant influence which technology companies have over regulatory agencies. The risk of regulatory capture is increased due to the information asymmetry existing between technology companies and regulators. The scale and pace at which companies are developing ADS means that capture dynamics can expand to capture regulators and the structures and processes of a State.

This paper argues that *ex ante* regulatory measures are likely to be more effective, and reduce the risk of capture, than seeking to hold companies to account after harm is caused. This paper examines the *Automated Vehicles Act 2024* (UK) which establishes a proactive regulatory framework defining the legal responsibilities of the companies developing and selling AVs, and the people using them. The paper argues that this model of liability can be applied to other forms of ADS, including autonomous weapons systems, to rebalance power relations and counter the risk of capture.

I   Introduction

Public tolerance of technology companies pushing forward with the development of innovative digital products, with little regard for the damage they cause, is waning. There is increasing consumer awareness of the potential harms, ranging from privacy concerns[1] and loss of social connection,[2] to physical harm when digital products fail or are misused.[3] This is accompanied by increasing attention from international organisations, privacy regulators and legislators.[4] Technology companies have acknowledged the increasing public concern by openly discussing how they will implement safety measures, such as conducting risk assessments and working towards information sharing and transparency for the technology they develop.[5] The issue of how to effectively address the harms that can be caused by these technologies, while allowing for innovation and economic growth, remains problematic for regulators to resolve.

One form of digital technology, autonomous digital systems ('ADS'), has generated significant debate regarding how it should be developed, used and who is responsible if harm is caused as a result of its use. ADS are systems which can perform certain

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[1]   See: Lubna Luxmi Dhirani et al, 'Ethical Dilemmas and Privacy Issues in Emerging Technologies: A Review' (2023) 23(3) *Sensors* 1151:1–18; John Alagood, Gayle Prybutok and Victor R Prybutok, 'Navigating Privacy and Data Safety: The Implications of Increased Online Activity Among Older Adults Post-COVID-19 Induced Isolation' (2023) 14(6) *Information* 346:1–14.

[2]   See generally: Salfin Salfin, Pahar Kurniadi and Erwin Erwin, 'Language Development in the Digital Age: A Literature Review on the Influence of Technology on Human Communication' (2024) 1(1) *Sciences du Nord: Humanities and Social Sciences* 1; Berkley Petersen et al, 'The Association Between Information and Communication Technologies, Loneliness and Social Connectedness: A Scoping Review' (2023) 14(1) *Frontiers in Psychology* 1063146:1–16.

[3]   See: Deema Almaskati, Sharareh Kermanshach and Apurva Pamidimukkula, 'Autonomous Vehicles and Traffic Accidents' (2023) 73(1) *Transportation Research Procedia* 321; Associated Press, 'Nearly 400 Crashes in 11 Months Involved Automated Tech, Companies Tell Regulators', *NPR* (online, 15 June 2022) <https://www.npr.org/2022/06/15/1105252793/nearly-400-car-crashes-in-11-months-involved-automated-tech-companies-tell-regul>.

[4]   See: Gabi Schlag, 'European Union's Regulating of Social Media: A Discourse Analysis of the Digital Services Act' (2023) 11(3) *Politics and Governance* 168; Anu Bradford, *Digital Empires: The Global Battle to Regulate Technology* (Oxford University Press, 2023); Susie Alegre, 'Regulators are Finally Catching Up with Big Tech: The Lawless, Wild West Era of AI and Technology is Almost at an End, as Data Protection Authorities Use New and Existing Legislation to Get Tough', *Wired* (online, 12 January 2024) <https://www.wired.com/story/regulators-are-finally-catching-up-with-big-tech/>.

[5]   The voluntary Frontier AI Safety Commitments have been signed by 20 technology companies including Google, IBM, Meta, Microsoft, Open AI and xAI: Department for Science, Innovation and Technology (UK), 'Frontier AI Safety Commitments: AI Seoul Summit 2024', *GOV.UK* (Web Page, 7 February 2025) <https://www.gov.uk/government/publications/frontier-ai-safety-commitments-ai-seoul-summit-2024/frontier-ai-safety-commitments-ai-seoul-summit-2024>.

tasks with minimal or no human intervention.[6] ADS are now used throughout many societies with autonomous vehicles ('AVs') being a notable example.

The conversation regarding ADS has evolved from an ethical debate as to whether these systems *should* be used,[7] to an acceptance by the public, academics and regulators that these systems *will* be used and a discussion as to how accountability can be determined if harm is caused.[8] The need to ensure the safety of ADS while not stifling the development of these technologies has generated further scholarly

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[6] See, e.g: David Danks and Alex John London, 'Regulating Autonomous Systems: Beyond Standards' (2017) 32(1) *IEEE Intelligent Systems* 88; Michael Fisher et al, 'Towards a Framework for Certification of Reliable Autonomous Systems' (2021) 35(1) *Autonomous Agents and Multi-Agent Systems* 8:1–65; Neshat Elhami Fard, Rastko R Selmic and Khashayar Khorasani, 'Public Policy Challenges, Regulations, Oversight, Technical, and Ethical Considerations for Autonomous Systems: A Survey' (2023) 42(1) *IEEE Technology and Society Magazine* 45; Andreas Tsamados, Luciano Floridi and Mariarosaria Taddeo, 'Human Control of AI Systems: From Supervision to Teaming' (2024) *AI and Ethics* 1.

[7] See, e.g: Noel Sharkey, 'Automated Killers and the Computing Profession' (2007) 40(11) *Computer* 124; Robert Sparrow, 'Killer Robots' (2007) 24(1) *Journal of Applied Philosophy* 62; Michael Robillard, 'No Such Thing as Killer Robots' (2018) 35(4) *Journal of Applied Philosophy* 705; Antonios E Kouroutakis, 'Autonomous Vehicles: Regulatory Challenges and the Response from UK and Germany' (2020) 46(5) *Mitchell Hamline Law Review* 1103; Julian De Freitas et al, 'From Driverless Dilemmas to More Practical Commonsense Tests for Automated Vehicles' (2021) 118(11) *Proceedings of the National Academy of Sciences of the United States of America* e2010202118:1–9; Vaughan Black and Andrew Fenton, 'Humane Driving' (2021) 34(1) *Canadian Journal of Law and Jurisprudence* 11; Laura Emmons, 'The Reasonable Robot Standard: How the Federal Government Needs to Regulate Ethical Decision Programming in Highly Autonomous Vehicles' (2020) 33(3) *Journal of Civil Rights and Economic Development* 293; Stephen S Wu, 'Autonomous Vehicles, Trolley Problems, and the Law' (2020) 22(1) *Ethics and Information Technology* 1; Veljko Dubljević et al, 'Moral and Social Ramifications of Autonomous Vehicles: A Qualitative Study of the Perceptions of Professional Drivers' (2023) 42(9) *Behaviour and Information Technology* 1271.

[8] The increased acceptance of ADS is evidenced by the growing revenue of the AI market and public use of digital technologies such as autonomous vehicles: see Katherine Haan, '22 Top AI Statistics and Trends', *Forbes* (online, 16 October 2024) <https://www.forbes.com/advisor/business/ai-statistics/>. This has resulted in an increased regulatory response to AI use — see, e.g: Mark Fenwick, Erik PM Vermeulen and Marcelo Corrales, 'Business and Regulatory Responses to Artificial Intelligence: Dynamic Regulation, Innovation Ecosystems and the Strategic Management of Disruptive Technology' in Marcelo Corrales, Mark Fenwick and Nikolaus Forgó (eds) *Robotics, AI and the Future of Law* (Springer, 2018) 81; Blair Levin and Larry Downes, 'Who is Going to Regulate AI?', *Harvard Business Review* (online, 19 May 2023) <https://hbr.org/2023/05/who-is-going-to-regulate-ai>; Yong Jin Park and S Mo Jones-Jang, 'Surveillance, Security, and AI as Technological Acceptance' (2023) 38(6) *AI and Society* 2667.

debate and motivated regulators to develop mechanisms to govern the use of ADS.[9] This debate has also generated significant literature considering accountability measures that could be implemented *ex post*, after an incident occurs, using existing legal frameworks.[10] This accountability dilemma for ADS is not limited to AVs; rather, it is an issue which is impacting a broad range of technologies which share the common component of requiring an ADS.[11]

A complicating factor in regulating innovative technologies is the influence of large technology companies, and the likelihood of regulatory capture occurring[12] —

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[9]   For example, the debate with respect to autonomous vehicles — see, e.g: Mikolaj Firlej and Araz Taeihagh, 'Regulating Human Control Over Autonomous Systems' (2021) 15(4) *Regulation and Governance* 1071; Anat Lior, 'Insuring AI: The Role of Insurance in Artificial Intelligence Regulation' (2021) 35(2) *Harvard Journal of Law and Technology* 467; Julie-Anne Tarr and Anthony A Tarr, 'Autonomous Vehicles: Liability and Insurance' in Anthony A Tarr et al (eds), *The Global Insurance Market and Change: Emerging Technologies, Risks and Legal Challenges* (Routledge, 2024) 157; Amy Dunphy, 'Is the Regulation of Connected and Automated Vehicles (CAVs) a Wicked Problem and Why Does it Matter?' (2024) 52(1) *Computer Law and Security Review* 105944:1–16; James Ng, 'Back in the Driver's Seat: The United States Should Enact a Unified Automated Vehicle Law and Regulation' (2024) 39(1) *Berkeley Technology Law Journal* 1.

[10]   See, e.g: Alice Giannini and Jonathan Kwik, 'Negligence Failures and Negligence Fixes: A Comparative Analysis of Criminal Regulation of AI and Autonomous Vehicles' (2023) 34(1) *Criminal Law Forum* 43; Damien A Riehl, 'Car Minus Driver: Autonomous Vehicles Driving Regulation, Liability, and Policy' (2018) 35(5) *Computer and Internet Lawyer* 1; Cassandra Cole, Richard Corbett and Lynne McChristian, 'Regulatory Issues Related to Autonomous Vehicles' (2023) 35(7) *Journal of Insurance Regulation* 1; Mark A Geistfeld, 'A Roadmap for Autonomous Vehicles: State Tort Liability, Automobile Insurance, and Federal Safety Regulation' (2017) 105(6) *California Law Review* 1611; Tina Sever and Giuseppe Contissa, 'Automated Driving Regulations: Where Are We Now?' (2024) 24(1) *Transportation Research Interdisciplinary Perspectives* 101033:1–19; Sabine Gless and Katalin Ligeti, 'Regulating Driving Automation in the European Union: Criminal Liability on the Road Ahead?' (2024) 15(1) *New Journal of European Criminal Law* 33; Cassandra Burke Robertson, 'Litigating Partial Autonomy' (2024) 109(4) *Iowa Law Review* 1655.

[11]   See, e.g: Vahid Yazdanpanah et al*,* 'Reasoning About Responsibility in Autonomous Systems: Challenges and Opportunities' (2023) 38(4) *AI and Society* 1453; Rebecca Williams et al, 'From Transparency to Accountability of Intelligent Systems: Moving Beyond Aspirations' (2022) 4(3) *Data and Policy* e7:1–23; Daniel Omeiza et al, 'Towards Accountability: Providing Intelligible Explanations in Autonomous Driving' (Conference Paper, IEEE Intelligent Vehicles Symposium (IV), July 2021); Simon Burton et al, 'Mind the Gaps: Assuring the Safety of Autonomous Systems from an Engineering, Ethical, and Legal Perspective' (2020) 279(1) *Artificial Intelligence* 103201:1–16.

[12]   See generally: Swati Srivastava, 'Algorithmic Governance and the International Politics of Big Tech' (2023) 21(3) *Perspectives on Politics* 989; Josh Hawley, *The Tyranny of Big Tech* (Simon and Schuster, 2021); Linda Monsees et al, 'Transversal Politics of Big Tech' (2023) 17(1) *International Political Sociology* olac020:1–23; Juho Lindman, Jukka Makinen and Eero Kasanen, 'Big Tech's Power, Political

where the regulatory agencies are influenced by the very entities that they seek to regulate — in circumstances where States are increasingly reliant on these companies.[13] This is leading not only to the capture of regulatory agencies,[14] but also the capture of multiple areas of government, coined 'State capture'.[15] If accountability measures and regulation only occur *ex post*, then these measures may be less effective as they encounter the dynamics of regulatory capture and State capture.

It is therefore important to explore ways to regulate ADS more effectively using *ex ante*, or proactive, regulation. While commentators have recognised the benefits of *ex ante* regulation of technology generally,[16] this paper will focus specifically on the *Automated Vehicles Act 2024* (UK) ('*AV Act*')[17] because it is a clear example of *ex ante* regulation of an ADS. While several countries, such as Germany and Sweden, rely upon legislation which distributes liability and risk between drivers,

Corporate Social Responsibility and Regulation' (2023) 38(2) *Journal of Information Technology* 144; Nathan Cortez, 'Regulating Disruptive Innovation' (2014) 29(1) *Berkeley Technology Law Journal* 175.

13   See generally: Reijer Hendrikse et al, 'The Big Techification of Everything' (2022) 31(1) *Science as Culture* 59; Araz Taeihagh, M Ramesh and Michael Howlett, 'Assessing the Regulatory Challenges of Emerging Disruptive Technologies' (2021) 15(4) *Regulation and Governance* 1009; Leighton Andrews, *Facebook, the Media and Democracy: Big Tech, Small State?* (Taylor & Francis, 2020); Laura Adler, 'Framing Disruption: How a Regulatory Capture Frame Legitimized the Deregulation of Boston's Ride-for-Hire Industry' (2021) 19(4) *Socio-Economic Review* 1421; Ruth Berins Collier, VB Dubal and Christopher L Carter, 'Disrupting Regulation, Regulating Disruption: The Politics of Uber in the United States' (2018) 16(4) *Perspectives on Politics* 919.

14   Taeihagh, Ramesh and Howlett (n 13); Adler (n 13) 1442; Collier, Dubal and Carter (n 13); Ilya Shapiro and David McDonald, 'Regulation Uber Alles: How Governments Hurt Workers and Consumers in the New New Economy' [2017] (1) *University of Chicago Legal Forum* 461.

15   José van Dijck, 'Governing Digital Societies: Private Platforms, Public Values' (2020) 36(1) *Computer Law and Security Review* 105377:1–4; Steven Feldstein, *The Rise of Digital Repression: How Technology is Reshaping Power, Politics, and Resistance* (Oxford University Press, 2021); Meredith Whittaker, 'The Steep Cost of Capture' (2021) 28(6) *Interactions* 51; Helen Stamp, 'Innovative Technologies and the Deepening Capture of Law Enforcement Agencies: The Uber Herzberg Case Study' (2023) 5(1) *Notre Dame Journal on Emerging Technologies* 70 ('Innovative Technologies and the Deepening Capture of Law Enforcement Agencies').

16   See, e.g: Len Palmer, 'Regulating Technology' in Lelia Green and Roger Guinery (eds), *Framing Technology* (Routledge, 2023) 77; Katerina Yordanova and Natalie Bertels, 'Regulating AI: Challenges and the Way Forward through Regulatory Sandboxes' in Henrique Sousa Antunes et al (eds), *Multidisciplinary Perspectives on Artificial Intelligence and the Law* (Springer, 2024) 441; Xukang Wang and Ying Cheng Wu, 'Balancing Innovation and Regulation in the Age of Generative Artificial Intelligence' (2024) 14(1) *Journal of Information Policy* 385.

17   *Automated Vehicles Act 2024* (UK) ('*AV Act*').

owners and manufacturers of vehicles,[18] the *AV Act* is significant as it creates a comprehensive regime of *new* legal actors with legal responsibility depending on which actor is in control of the AV at the relevant time. Australian regulators have also been developing similar liability concepts to those contained in the *AV Act* and are currently drafting legislation to implement these changes.[19] This work by Australian regulators will be examined briefly in this paper to provide a comparison with the *AV Act*.

The *AV Act* was introduced to the United Kingdom ('UK') Parliament in November 2023, in response to regulatory recommendations made by the Law Commission of England and Wales and the Scottish Law Commission (together, 'Commissions') to address the safe deployment of road-based AVs in the UK.[20] It came into force in May 2024.[21] There has been limited analysis of the *AV Act*, during its development and passage through Parliament, presenting an important opportunity for the examination of this regulatory model and its wider application to ADS other than AVs.

The *AV Act* centres on *ex ante* regulation of AV technology rather than only relying on *ex post* accountability measures. This paper will explore the central features of this *ex ante* regulatory model, including: (1) the information which must be provided by technology companies seeking to have their AVs authorised for use on public roads; (2) the safety standards that must be met by these companies; and (3) who is responsible when the AV is in operation.

This kind of proactive regulation has four distinct advantages over *ex post* regulation:

(1) the requirement that the corporations developing and selling the technology must comply with certain legislative requirements *before* their product can be approved for sale to the public. This is a strong motivating factor for these corporations who need to demonstrate to shareholders and investors that the technology developed can be approved by regulators, sold to the public and generate revenue;[22]

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18 *Straßenverkehrsgesetz* [Road Traffic Act] (Germany) 5 March 2003, BGBI I, 2003, 310, ss 7–20; *Produkthaftungsgesetz* [Product Liability Act] (Germany) 15 December 1989, BGBI I, 1989, 2198; *Bürgerliches Gesetzbuch* [German Civil Code] 2 January 2002 BGBI I, 2002, 42, s 823(1); *Skadeståndslag* [Tort Liability Act] (Sweden) 1972, 207, ch 2 s 1; *Produktansvarslag* [Product Liability Act] (Sweden) 1992, 18; *Trafikskadelag* [Traffic Damages Act] (Sweden) 1975, 1410.

19 National Transport Commission, *The Regulatory Framework for Automated Vehicles in Australia* (Policy Paper, February 2022).

20 Law Commission of England and Wales and Scottish Law Commission, *Automated Vehicles: Joint Report* (Law Commission Report No 404 / Scottish Law Commission Report No 258, 25 January 2022) app 2 ('*Joint Report*').

21 *AV Act* (n 17).

22 See generally: Karen Boll and Michael Tell, 'Proactive Public Disclosure: A New Regulatory Strategy for Creating Tax Compliance?' [2015] (2) *Nordic Tax Journal* 36; Jon Truby, Rafael Brown and Andrew Dahdal, 'Banking on AI: Mandating a

(2) the focus on increasing the safety of the technology (rather than seeking to attribute blame) *and* promoting the development of innovation in the economy is likely to result in increased regulatory compliance by corporations;[23]

(3) the dynamics of regulatory and State capture that would deter regulators from taking measures to hold corporations to account — both in terms of safety requirements and liability for harms caused — are less likely to occur when *ex ante* regulation clearly delineates the responsibilities of individuals, corporations and regulators *before* a technology is used and before an incident occurs;[24] and

(4) *ex ante* regulation also encourages the establishment of independent investigatory bodies with the relevant technical expertise to investigate incidents, countering the influence which technology companies may exercise over regulatory agencies and *ex post* accountability measures.[25]

The model of liability set out in the *AV Act* is significant not only for the novel way in which it governs AVs in the UK, but also for the potential it has for broader application in regulating other forms of ADS. This potential broader application of the *AV Act* model is the motivation for this paper and will be explored as follows. Part II outlines the regulatory context of the automotive industry and the collaborations occurring between vehicle manufacturers and technology companies to develop AVs. It then considers the concepts of regulatory and State capture and how these dynamics can impact the regulatory environment of innovative technologies, including ADS. Part III discusses the background research and consultation process that led to the development of the *AV Act* and examines the main features of this Act. Part IV considers similar work that has been conducted to prepare Australia for the introduction of AVs and contrasts this with corresponding parts of the *AV Act*. Part V then draws on the main features of the *AV Act* to create a generic model of

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Proactive Approach to AI Regulation in the Financial Sector' (2020) 14(2) *Law and Financial Markets Review* 110; R Patriarca et al, 'Safety Intelligence: Incremental Proactive Risk Management for Holistic Aviation Safety Performance' (2019) 118(1) *Safety Science* 551.

23   See generally: Nicole E Wheeler, 'Responsible AI in Biotechnology: Balancing Discovery, Innovation and Biosecurity Risks' (2025) 13(1) *Frontiers in Bioengineering and Biotechnology* 1537471:1–10; Wenda Li et al, 'The Making of Responsible Innovation and Technology: An Overview and Framework' (2023) 6(4) *Smart Cities* 1996.

24   See generally: Imad Antoine Ibrahim and Davide Giacomo Zoppolato, 'Emerging Technologies and the Law: From "Catch Me if You Can" to "Law by Design"' (2024) 13(2) *Global Journal of Comparative Law* 148; Marc A Saner and Gary E Marchant, 'Proactive International Regulatory Cooperation for Governance of Emerging Technologies' (2015) 55(2) *Jurimetrics* 147; Ran Xi, 'On Emerging Technologies: The Old Regime and the Proactivity' (2025) 8(1) *Cardozo International and Comparative Law Review* 75.

25   See generally: Gregory Falco et al, 'Governing AI Safety Through Independent Audits' (2021) 3(7) *Nature Machine Intelligence* 566; Bernd Carsten Stahl et al, 'A European Agency for Artificial Intelligence: Protecting Fundamental Rights and Ethical Values' (2022) 45(1) *Computer Law and Security Review* 105661:1–25.

liability which can be more broadly applied to other forms of ADS. Part VI considers how this model of liability could have been applied to the circumstances of the fatal collision between an Uber AV and a pedestrian in 2018, the different accountability outcomes that may have occurred and how capture dynamics may have changed. A concluding discussion in Part VII examines the potential for broader applications of this model of liability while acknowledging its limitations. Ultimately, this paper will highlight the political influence which technology firms have over their own accountability and showcase the importance of seeking effective ways to address such influence.

II INNOVATIVE TECHNOLOGIES AND STATE CAPTURE

A *The Regulatory Context of the Automotive Industry*

The invention of the motor vehicle at the start of the 19th century, and the transport benefits that this provided for individual users, led to the mass production of vehicles, the growth of automotive manufacturing companies, and the opening of global markets.[26] Despite the general excitement regarding this technological development and the increasing use of motor vehicles by the public, concerns grew regarding their safety, both for those using motor vehicles and for others navigating the changed streetscapes.[27] Concerns were also raised with respect to the emissions produced by vehicles and the environmental impact of vehicle use.[28]

From the 1960s, the automotive industry has been subject to increasing government regulation to address these issues.[29] The continued push for increased vehicle safety, coupled with the development of the computer and digital technologies in the 1980s, laid the groundwork for applying innovative technologies to vehicles.[30] This resulted in the growth of technology companies entering the market to

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[26]   Cameron Elliott Gordon, 'Putting the Car Before the Horse: The Diffusion of the Automobile and the Rise of Technocratic Primacy' (2024) 4(4) *Histories* 487, 490; David Bailey et al, 'Global Restructuring and the Auto Industry' (2010) 3(3) *Cambridge Journal of Regions, Economy and Society* 311.

[27]   Carol A MacLennan, 'From Accident to Crash: The Auto Industry and the Politics of Injury' (1988) 2(3) *Medical Anthropology Quarterly* 233.

[28]   Gordon (n 26) 491; Sanya Carley, Natalie Messer Betts and John D Graham, 'Innovation in the Auto Industry: The Role of the US Environmental Protection Agency' (2011) 21(2) *Duke Environmental Law and Policy Forum* 367.

[29]   See generally: Rob Atkinson and Les Garner, 'Regulation as Industrial Policy: A Case Study of the US Auto Industry' (1987) 1(4) *Economic Development Quarterly* 358, 363; Joan Claybrook and David Bollier, 'The Hidden Benefits of Regulation: Disclosing the Auto Safety Payoff' (1985) 3(1) *Yale Journal on Regulation* 87; Ann-Kristin Bergquist and Mattias Näsman, 'Safe Before Green: The Greening of Volvo Cars in the 1970s–1990s' (2023) 24(1) *Enterprise and Society* 59.

[30]   Motoyuki Akamatsu, Paul Green and Klaus Bengler, 'Automotive Technology and Human Factors Research: Past, Present, and Future' [2013] (1) *International Journal of Vehicular Technology* 526180:1–27, 13–15.

collaborate with existing vehicle manufacturers.[31] Incorporating innovative technologies into vehicles, including AVs, to satisfy consumer demand (especially for technology that can increase safety) is now key to car manufacturers remaining in business.[32]

The AV marketplace is therefore increasingly made up of vehicle manufacturers working collaboratively with technology companies. This is a mutually beneficial arrangement:

> Companies leverage each other's strengths, tech firms contribute AI and software, while automakers provide manufacturing capabilities. These collaborations accelerate time-to-market and help meet regulatory standards by pooling knowledge.[33]

Big Tech continues to be involved in the AV market either directly or indirectly. Direct involvement occurs when a technology company collaborates with a vehicle manufacturer. For example, in 2024 Uber Technologies Inc entered into a partnership with Cruise to use Cruise AVs as an option for consumers on its rideshare platform.[34] Indirect involvement occurs when technology companies invest in AV startups, for example, Waymo which is owned by Alphabet and Zoox which is owned by Amazon.[35] The increasing sophistication of technology being rapidly developed for AVs, the reliance by vehicle manufacturers on technology companies to provide this expertise, and regulatory agencies often lacking this expertise, create conditions where regulatory capture is likely to flourish. The dynamics of regulatory and State capture will be explored in the following section.

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[31] Amaan Kazi, 'Combining Strengths: Collaborations Between Automotive Manufacturers and Tech Companies', *Forbe*s (online, 10 December 2024) <https://www.forbes.com/councils/forbesbusinesscouncil/2024/12/10/combining-strengths-collaborations-between-automotive-manufacturers-and-tech-companies>. See also Yuandi Wang et al, 'Dynamic Patterns of Technology Collaboration: A Case Study of the Chinese Automobile Industry 1985–2010 (2014) 101(1) *Scientometrics* 663.

[32] See generally: Janell D Townsend and Roger J Calantone, 'Evolution and Transformation of Innovation in the Global Automotive Industry' (2014) 31(1) *Journal of Product Innovation Management* 4; Jerry L Mashaw and David L Harfst, 'From Command and Control to Collaboration and Deference: The Transformation of Auto Safety Regulation' (2017) 34(1) *Yale Journal on Regulation* 167.

[33] Global Market Insights, *Autonomous Vehicle Development Platform Market Size: By Component, by Vehicle, by Functionality, by End-Use Analysis, Share, Growth Forecast, 2025–2034* (Summary of Report, November 2024) <https://www.gminsights.com/industry-analysis/autonomous-vehicle-development-platform-market>.

[34] Uber Technologies Inc, 'Uber and Cruise to Deploy Autonomous Vehicles on the Uber Platform' (Media Release, 22 August 2024).

[35] 'About', *Waymo* (Web Page) <https://waymo.com/about/>; Amazon, 'We're Acquiring Zoox to Help Bring Their Vision of Autonomous Ride-Hailing to Reality' (Media Release, 26 June 2020).

B *Regulatory Capture*

This section considers the dynamics of regulatory capture and how this form of influence can also spread more widely — as State capture — to affect the structure and processes of government. Regulatory capture refers to situations where regulatory agencies are influenced by the very entities that they are responsible for regulating.[36] This results in the agency being 'deflect[ed] … from its mandated mission'.[37] Such deflection can take the form of weak enforcement of certain regulations, industry-shaped regulation or repeal of regulation.[38] This influence can be over the agency itself as 'agency capture', or over the actual process of law-making by the agency, known as 'statutory capture'.[39]

Capture is a regulatory dynamic which has been extensively researched, yet the detection of capture remains difficult and efforts to address this form of influence are hampered by a lack of resources and funding for regulators, especially in industries requiring technical expertise.[40] Since 2016, several studies have examined the relationship between the accelerating development of new technologies and capture dynamics.[41] These studies, which focused on technology companies including Uber and Google, have identified three key risk factors for capture: (1) the information

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[36] Michelle E Portman, 'Regulatory Capture by Default: Offshore Exploratory Drilling for Oil and Gas' (2014) 65(1) *Energy Policy* 37, 38.

[37] Ibid.

[38] See also Amitai Etzioni, 'The Capture Theory of Regulations: Revisited' (2009) 46(4) *Society* 319, 320.

[39] The study of regulatory capture also includes statutory capture where industry seeks to influence the drafting of regulations and statutes — see generally: Edward Pendleton Herring, *Public Administration and the Public Interest* (McGraw-Hill, 1936); Avery Leiserson, *Administrative Regulation: A Study in the Representation of Interests* (University of Chicago Press, 1942); James William Fesler, *The Independence of State Regulatory Agencies* (Public Administration Service, 1942); Marver H Bernstein, *Regulating Business by Independent Commission* (Princeton Legacy Library, 1955); George J Stigler, 'The Theory of Economic Regulation' (1971) 2(1) *Bell Journal of Economic Management Science* 3; Justin Rex, 'Anatomy of Agency Capture: An Organizational Typology for Diagnosing and Remedying Capture' (2020) 14(2) *Regulation and Governance* 271; William J Novak, 'A Revisionist History of Regulatory Capture' in Daniel Carpenter and David A Moss (eds), *Preventing Regulatory Capture: Special Interest Influence and How to Limit It* (Cambridge University Press, 2013) 25.

[40] See generally: Taeihagh, Ramesh and Howlett (n 13); Ernesto Dal Bó, 'Regulatory Capture: A Review' (2006) 22(2) *Oxford Review of Economic Policy* 203; J Jonas Anderson, 'Court Capture' (2018) 59(5) *Boston College Law Review* 1543, 1560; Wendy E Wagner, 'Administrative Law, Filter Failure, and Information Capture' (2010) 59(7) *Duke Law Journal* 1321, 1329–34.

[41] Stamp, 'Innovative Technologies and the Deepening Capture of Law Enforcement Agencies' (n 15); Adler (n 13); Collier, Dubal and Carter (n 13); Lisa-Maria Neudert, 'Regulatory Capacity Capture: The United Kingdom's Online Safety Regime' (2023) 12(4) *Internet Policy Review* 1.

advantage held by technology companies over agencies; (2) the disregard shown by technology companies towards existing regulatory regimes; and (3) consumer demand for new technologies.[42]

The significant wealth and power of technology firms, together with the scale and pace at which their products are sold to the public, means that their ability to influence is not limited to regulatory agencies but can affect the working of government more generally.[43] The study of State capture has identified that government structures and processes become vulnerable to capture when a government is over-reliant on corporations which are dominant in a special interest industry.[44] This theory of capture developed in the field of political economics, with an initial focus on how countries transitioned from State-run economies to enterprise-led economies with privatised institutions. The academic literature on State capture has focused on examples of Eastern European countries following the breakup of the Soviet Union, and considered the behaviours exhibited by previously State-owned firms which transitioned to private enterprises.[45] Firms continue to behave as if they are still State-owned, and 'appropriate some parts or functions of the [S]tate and use its resources to the benefit of the group while harming the public good'.[46]

Research conducted by Joel Hellman, Geraint Jones and Daniel Kaufmann indicates that whether firms engage in State capture or have influence on the State, 'both forms of interaction with the [S]tate generate significant gains for the firm'.[47] The main policy conclusion from this work is 'the need to shift the focus of reform strategies to address the way in which firms interact with the [S]tate'.[48] As with regulatory capture, State capture covers a wide range of influence over State processes and is not limited to actions which would constitute the offences of bribery and corruption.

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[42] Stamp, 'Innovative Technologies and the Deepening Capture of Law Enforcement Agencies' (n 15); Adler (n 13); Collier, Dubal and Carter (n 13); Neudert (n 41).

[43] Juho Lindman, Jukka Makinen and Eero Kasanen, 'Big Tech's Power, Political Corporate Social Responsibility and Regulation' (2023) 38(2) *Journal of Information Technology* 144, 149–50.

[44] See, e.g., Elizabeth David-Barrett, 'State Capture and Inequality' (Research Paper, NYU Center on International Cooperation, December 2021) 4–6.

[45] See, e.g: Mihály Fazekas and Bence Tóth, 'The Extent and Cost of Corruption in Transport Infrastructure: New Evidence from Europe' (2018) 113(1) *Transportation Research Part A: Policy and Practice* 35; Mihály Fazekas and István János Tóth, 'From Corruption to State Capture: A New Analytical Framework with Empirical Applications from Hungary' (2016) 69(2) *Political Research Quarterly* 320 ('From Corruption to State Capture'); Alexander Stoyanov and Alexander Gerganov, 'State Capture: From Theory to Piloting a Measurement Methodology' [2019] (1) *Yearbook of UNWE* 19.

[46] Fazekas and Tóth, 'From Corruption to State Capture' (n 45) 322.

[47] Joel S Hellman, Geraint Jones and Daniel Kaufmann, 'Seize the State, Seize the Day: State Capture and Influence in Transition Economies' (2003) 31(4) *Journal of Comparative Economics* 751, 765.

[48] Ibid 771.

Both forms of capture can be intertwined and pervasive, with the influence of private actors having a broad impact over agencies and government structures and processes.

C *A Broader Definition of State Capture*

Since 2018, the definition and elements of State capture have broadened in academic literature and its link with regulatory capture has been explored.[49] This approach has recognised that capture dynamics can have an impact on all government processes, with regulatory capture being just one part of this. Pamela McCann, Douglas Spencer and Abby Wood define State capture as

> the degree to which a subset of the public — often an industry — steers government actors' policy agenda and decisions in a way that benefits the industry rather than the broader public, particularly when the industry's dominance is repeated or durable. Implicit in [this] definition is a conflict — or at least some difference — between the ideal policy from an industry's perspective and the ideal policy from the broader public's perspective.[50]

These authors note that there has been a focus on regulatory capture and less focus on other arms of government which can also be subject to capture. Accordingly, they argue that capture should also be thought of in terms of influencing governing structures and governing processes.[51] McCann, Spencer and Wood are of the view that '[a] strong theory of capture must therefore include special interest pressures on all branches of government and account for varying channels of influence'.[52] From this, they also support the view that

> control exercised by the industry or special interest is continuous rather than binary. In other words, whether an agency is captured is a matter of degree, complementary to the durability and control requirements.[53]

McCann, Spencer and Wood further note that 'structure or process — or both — can be captured',[54] and that 'where structure or process are weak or captured, the

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[49]   See, e.g: Elizabeth David-Barrett, 'State Capture and Development: A Conceptual Framework' (2023) 26(2) *Journal of International Relations and Development* 224 ('State Capture and Development'); Pamela J Clouser McCann, Douglas M Spencer and Abby K Wood, 'Measuring State Capture' [2021] (5) *Wisconsin Law Review* 1141.

[50]   McCann, Spencer and Wood (n 49) 1158. See also Caroline Devaux, 'Towards a Legal Theory of Capture' (2018) 24(6) *European Law* Journal 458.

[51]   McCann, Spencer and Wood (n 49) 1145.

[52]   Ibid 1147.

[53]   Ibid 1155.

[54]   Ibid 1164. See also: Dal Bó (n 40); George W Hilton, 'The Basic Behavior of Regulatory Commissions' (1972) 62(2) *The American Economic Review* 47; Randall G Holcombe, 'Rethinking Regulatory Capture' (2022) 37(1) *Journal of Private Enterprise* 39; Sam Peltzman, 'Toward a More General Theory of Regulation' (1976) 19(2) *Journal of Law*

risk of [S]tate capture rises'.[55] As with regulatory capture, observing State capture is difficult as it 'is often actualized outside of public view'.[56]

What is evident from the literature on State capture (as with regulatory capture) is that the following requirements need to be present for capture to occur:

(1) a *regulated* entity — this being a private corporation involved in some form of regulated industry which is subject to regulation or some form of State decision-making;

(2) the regulated entity has an *intent to influence* (and even control) the regulatory process;[57]

(3) the *regulated industry* has the *resources* that translate into influence on State intervention — 'special interest' or 'industry capture';[58]

(4) the *information problem* usually exists (as with regulatory capture) where 'principals are unable to control agents because they face an asymmetric information problem — they cannot observe their agents' behaviour sufficiently to hold them to account;'[59]

(5) *durability of the bias* toward industry and the fact that when a governmental unit is captured by industry, the industry exercises *some degree of control* over the unit and its decisions, at least as it pertains to the industry's interests;[60] and

(6) cost to the public when capture occurs and regulation is 'directed away from the public interest and *toward the interests* of the regulated industry'.[61]

The substantial resources and technical expertise held by technology companies, especially Big Tech, and the scale and pace at which they develop innovative

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and Economics 211; Wagner (n 40); Taeihagh, Ramesh and Howlett (n 13); Selwyn W Becker and Fred O Brownson, 'What Price Ambiguity? Or the Role of Ambiguity in Decision-Making' (1964) 72(1) *Journal of Political Economy* 62; Rachel Ashworth, George A Boyne and Richard M Walker, 'Regulatory Problems in the Public Sector: Theories and Cases' (2002) 30(2) *Policy and Politics* 195; Zheng Wentong, 'The Revolving Door' (2015) 90(3) *Notre Dame Law Review* 1265; Elizabeth David-Barrett, Daniel Kaufmann and Juan Camilo Ceballos, *Measuring State Capture* (Insights Brief No 8, October 2023).

[55] McCann, Spencer and Wood (n 49) 1164.

[56] Ibid.

[57] Ibid 1152. See also: Dal Bó (n 40); David-Barrett, 'State Capture and Development' (n 49) 227.

[58] McCann, Spencer and Wood (n 49) 1152–3.

[59] David-Barrett, 'State Capture and Development' (n 49) 235.

[60] McCann, Spencer and Wood (n 49) 1153; Barry M Mitnick, 'Capturing "Capture": Definitions and Mechanisms' in David Levi-Faur (ed), *Handbook on the Politics of Regulation* (Edward Elgar, 2011) 34.

[61] Daniel Carpenter and David A Moss, 'Introduction' in Daniel Carpenter and David A Moss (eds), *Preventing Regulatory Capture: Special Interest Influence and How to Limit It* (Cambridge University Press, 2013) 1, 13 (emphasis added). See also McCann, Spencer and Wood (n 49) 1154.

products for consumers, exposes significant vulnerabilities to capture on the part of regulatory agencies and State processes and structures involved in regulating these technologies.[62]

The following section will consider the proactive regulation which has been enacted in the *AV Act* to govern the use of AVs. This model will be examined also in terms of McCann, Spencer and Wood's definition of State capture to consider how a proactive model of regulation might counter the effects of capture on agencies and the State when regulating technology companies.

III *AUTOMATED VEHICLES ACT 2024* (UK)

In May 2024, the UK enacted legislation to govern the use of AVs on public roads.[63] The legislative process began in 2018, when the Government requested that the Commissions commence a combined process of consultation and feedback from stakeholders to determine the most appropriate way to regulate AVs.[64] By 2018, the development of AV technology was gathering pace globally with significant safety trials of these vehicles being carried out in the United States by Uber, Waymo and Lyft.[65] Other countries, including Singapore and Japan, were also becoming more involved with the development of AV technology.[66] The growth of the AV industry prompted calls to determine how the industry should be regulated.[67]

The process to regulate AVs in the UK commenced because of the policy position that developing a regulatory framework

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[62] McCann, Spencer and Wood (n 49); David-Barrett, 'State Capture and Development' (n 49).

[63] See *AV Act* (n 17).

[64] Law Commission of England and Wales, 'Automated Vehicles', *Law Commission: Reforming the Law* (Web Page) <https://lawcom.gov.uk/project/automated-vehicles/>.

[65] Biz Carson, 'Uber's Self-Driving Cars Hit 2 Million Miles as Program Regains Momentum', *Forbes* (online, 22 December 2017) <https://www.forbes.com/sites/bizcarson/2017/12/22/ubers-self-driving-cars-2-million-miles/>; Waymo, 'Where the Next 10 Million Miles Will Take Us' (Media Release, 10 October 2018); Contra Costa Transportation Authority, 'Lyft Furthers its Development of Self-Driving Vehicle Technology with GoMentum Station Partnership' (Press Release, 8 March 2018).

[66] GlobalData, 'Autonomous Vehicles: Timeline', *Road Traffic: Technology* (online, 14 January 2021) <https://www.roadtraffic-technology.com/comment/autonomous-vehicles-timeline/>, citing GlobalData, *Autonomous Vehicles 2020 Update: Thematic Research* (Report, July 2020).

[67] See, e.g., Alex John London and David Danks, 'Regulating Autonomous Vehicles: A Policy Proposal' in *Proceedings of the 2018 AAAI/ACM Conference on AI, Ethics, and Society* (Association for Computing Machinery, 2018) 216.

reduces uncertainty and provides legal clarity. Legal clarity, in turn, enables development, potentially at a faster pace, and there is the prospect for improved safety, increased mobility and reduced social exclusion.[68]

This policy position had the objective of providing legal clarity for both the companies developing AVs and the people using them, in relation to how liability would be apportioned if an incident occurred. The policy also sought a balance between ensuring the safety of people using AVs and the public, while also encouraging investment by companies into the UK AV industry.[69] Media commentary subsequently suggested that proactive legislation was enacted with the hope that it would 'spark trials [of AVs] akin to those seen in San Francisco and other American cities' in the UK.[70]

The Commissions published three consultation papers between November 2018 and December 2020 which sought responses from stakeholders to questions about the proposed regulatory framework.[71] In its submission, Uber recognised the proposed change in legal responsibilities:

> The Commission's approach … valuably distinguishes between the core competencies of and roles played by developers, operators, and service providers within an AV ecosystem. Moreover, the Commission's proposal reasonably recommends that an actor's duties should derive from such distinctions between roles. For example, Uber agrees that developers play lead roles in AV design and therefore are reasonably subject

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68   Regulatory Policy Committee, *AVs* (Impact Assessment No LAWCOM0075, 26 January 2022) 1 ('*AVs*'). 'The Regulatory Policy Committee ('RPC') is the independent regulatory scrutiny body for the UK Government. The Committee assesses the quality of evidence and analysis used to inform government regulatory proposals': Regulatory Policy Committee, 'About Us', *GOV.UK* (Web Page) <https://www.gov.uk/government/organisations/regulatory-policy-committee/about>.

69   *AVs* (n 68) 1.

70   Nicole Kobie, 'What the UK's Automated Vehicles Act Really Means', *TechFinitive* (online, 24 June 2024) <https://www.techfinitive.com/features/what-the-uks-automated-vehicles-act-really-means>.

71   Law Commission of England and Wales and Scottish Law Commission, *Automated Vehicles Consultation Paper 3: Analysis of Responses* (Analysis of Responses to Law Commission Consultation Paper No 252 / Scottish Law Commission Discussion Paper No 171, 26 January 2022) ('*Analysis of Responses*'); Law Commission of England and Wales and Scottish Law Commission, *Automated Vehicles: A Joint Preliminary Consultation Paper* (Report, Law Commission Consultation Paper No 240 / Scottish Law Commission Discussion Paper No 166, 8 November 2018); Law Commission of England and Wales and Scottish Law Commission, *Automated Vehicles: Consultation Paper 2 on Passenger Services and Public Transport* (Report, Law Commission Consultation Paper No 245 / Scottish Law Commission Discussion Paper No 169, 16 October 2019); Law Commission of England and Wales and Scottish Law Commission, *Automated Vehicles: Consultation Paper 3: A Regulatory Framework for Automated Vehicles* (Report, Law Commission Consultation Paper No 252 / Scottish Law Commission Discussion Paper No 171, 18 December 2020).

to some subset of design-related responsibilities, and that operators are reasonably subject to responsibility for safe on-road operation … A recognition of these various and distinct roles can and should inform the ultimate regulatory framework governing different actors' responsibilities …[72]

In January 2022, the Commissions issued the *Automated Vehicles: Joint Report*, which identified core changes to the liability framework that should be applied to the use of AVs on public roads in the UK.[73] The Commissions' recommendations subsequently formed the main components of the 2024 legislation.[74] In particular, these components focused on clarifying the meaning of 'self-driving' and implementing a new system of legal accountability, including the introduction of new legal actors and specific criminal offences for companies for non-compliance. These areas will be examined below.

A *A Clear Definition of Self-Driving*

The Commissions identified the need to distinguish clearly between different types of AVs and to distinguish 'driver support' features from self-driving or autonomous driving features.[75] The blurring of this distinction was found to be a significant cause of public confusion.[76] The Commissions stated that 'a vehicle should only be authorised as self-driving if it is safe even if an individual is not monitoring the driving environment, the vehicle or the way that it drives'.[77]

The significance of identifying when a vehicle is self-driving is that 'self-driving' will indicate a new legal threshold — once a vehicle is authorised as having a self-driving feature which is engaged, then 'the human in the driving seat is *no longer responsible* for the dynamic driving task'.[78]

The Commissions recommended that the *AV Act* needs to stipulate a test which a vehicle must satisfy before a self-driving ('ADS') feature on the vehicle is authorised

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72   Uber London Limited, Submission to the Automated Vehicles Team, Law Commission, *Automated Vehicles Consultation Paper 3: A Regulatory Framework for Automated Vehicles* (21 March 2021) 3 <https://webarchive.nationalarchives.gov.uk/ukgwa/20241223105428/https://lawcom.gov.uk/responses-to-automated-vehicles-consultation-paper-3/>.

73   *Joint Report* (n 20).

74   *AV Act* (n 17).

75   *Joint Report* (n 20).

76   Ibid 12-18.

77   Law Commission of England and Wales and Scottish Law Commission, *Automated Vehicles: Joint Report Overview* (Report, 26 January 2022) 1 ('*Joint Report Overview*').

78   Law Commission of England and Wales and Scottish Law Commission, *Automated Vehicles: Summary of Joint Report* (Summary of Law Commission Report No 404 / Scottish Law Commission Report No 258, 26 January 2022) 5 ('*Joint Report Summary*') (emphasis added).

for use. This authorisation process would 'distinguish between driver assistance and self-driving for legal purposes'[79] and require that the self-driving ADS feature be able to 'control the vehicle so as to drive safely and legally, even if an individual is not monitoring the driving environment, the vehicle or the way that it drives'.[80]

The Commissions' broader definition of the autonomous capabilities of an AV is less technical than the classifications of autonomous function in vehicles provided by the Society of Automotive Engineers ('SAE') — a classification system which has been relied on extensively by regulators and commentators.[81]

The *AV Act* has incorporated the Commissions' recommendations into its definition of what constitutes a self-driving vehicle, this being:

> (2) A vehicle "satisfies the self-driving test" if —
>   (a) it is designed or adapted with the intention that a feature of the vehicle will allow it to travel autonomously, and
>   (b) it is capable of doing so, by means of that feature, safely and legally.[82]
>
> …
> (5) A vehicle travels "autonomously" if —
>   (a) it is being controlled not by an individual but by equipment of the vehicle, and
>   (b) neither the vehicle nor its surroundings are being monitored by an individual with a view to immediate intervention in the driving of the vehicle.[83]

B *A New System of Legal Accountability*

The Commissions set out that once a vehicle is 'authorised' as having self-driving features and these are engaged, 'the system of legal accountability will change'.[84] The *AV Act* is unique in that it creates new legal actors to correspond with the changes in responsibility which occur when the AV transitions from self-driving to being under the control of a driver.

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79   Ibid.

80   Ibid.

81   Society of Automotive Engineers, *Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles*, No J3016 202104 (30 April 2021); Debbie Hopkins and Tim Schwanen, 'Talking About Automated Vehicles: What Do Levels of Automation Do?' (2021) 64(1) *Technology in Society* 101488; Eric R Teoh, 'What's in a Name? Drivers' Perceptions of the Use of Five SAE Level 2 Driving Automation Systems' (2020) 72(1) *Journal of Safety Research* 145; Jianqiang Wang et al, 'Towards the Unified Principles for Level 5 Autonomous Vehicles' (2021) 7(9) *Engineering* 1313.

82   *AV Act* (n 17) s 1(2).

83   *AV Act* (n 17) s 1(5).

84   *Joint Report Summary* (n 78) 2.

The new accountability regime means that a driver will become a 'user-in-charge' ('UIC') and cannot be prosecuted for offences which directly arise from the driving task.[85] They will have immunity from a range of driving offences such as dangerous driving but will remain responsible for duties such as having insurance and ensuring passengers wear seatbelts.[86]

Each vehicle will have a corresponding Authorised Self-Driving Entity ('ASDE')[87] which will usually be the corporate developer or manufacturer of the AV who is seeking to have an AV authorised for use on public roads.

1 User-In-Charge

The UIC is defined by the *AV Act* as follows:

> An individual is the "user-in-charge" of a vehicle if —
> (a)   the vehicle is an authorised automated vehicle with an authorised user-in-charge feature,
> (b)   that feature is engaged, and
> (c)   the individual is in, and in position to exercise control of, the vehicle, but is not controlling it.[88]

When a self-driving feature is engaged, the UIC

> cannot be prosecuted for offences relating to the way a vehicle drives, unless they have taken steps to override the system … [They] will reacquire the obligations of a driver when they take control of the vehicle or at the end of the transition period.[89]

The *AV Act* stipulates that the UIC does not commit an offence if the incident is a result of something the vehicle does while the person is a UIC.[90] This immunity does not apply if the incident occurs after a transition demand has been issued in accordance with the legislation and the transition period has ended.[91]

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[85]   See *AV Act* (n 17) s 47.

[86]   Ibid ss 48–9.

[87]   This paper adopts the term 'Authorised Self-Driving Entity' ('ASDE'), which is reflected in the UK *AV Act*, noting the analogous term 'Automated Driving System Entity' ('ADSE') is used throughout some commentary and industry bodies, particularly in Australia.

[88]   *AV Act* (n 17) s 46.

[89]   *Joint Report Overview* (n 77). See generally Law Commission of England and Wales and Scottish Law Commission, *Automated Vehicles: Background Papers* (Background Papers of Law Commission Report No 404 / Scottish Law Commission Report No 258, 26 January 2022) 1–22.

[90]   *AV Act* (n 17) s 47.

[91]   Ibid ss 48–9.

The *AV Act* also regulates automated vehicles with no UIC requirement, such as robotaxis, however this form of AV is outside the scope of this paper.[92]

2 *Authorised Self-Driving Entity*

The Commissions recommended that a further legal actor be created — the vehicle manufacturer or software developer who puts the AV forward for authorisation — which would be referred to as an ASDE if authorisation requirements are met.[93] It was also recommended that the ASDE would need to be able to show that the AV meets the tests for self-driving and present a safety case to regulators.[94]

There was some resistance from car developers to the concept of an ASDE during the consultation process. For example, Waymo stressed that each developer 'should be able to document its application of its chosen methodologies'.[95] Edge Case Research were of the view that regulators 'should concentrate on ensuring that manufacturers have a coherent story to tell about safety rather than mandating what that story actually is'.[96]

Against these industry recommendations, the Commissions were of the view that the regulator should set the levels of safety required for AVs and that a safety case would need to be signed off by a nominated person in a senior position of the ASDE.[97] The nominated person could face criminal charges if the information provided is not correct and complete.[98] The regulator would also need to be assured that the vehicle can record and store data which can then be accessed if an incident occurs.[99]

The Commissions concluded that the ASDE should face sanctions if the AV contravenes road rules.[100] An aggravated criminal offence could be applied if a corporation or senior manager did not disclose or misrepresented information about an AV which related to (1) an increased risk of a type of adverse incident, (2) that type of incident occurred, and (3) the incident caused a death or serious injury.[101]

The *AV Act* also puts strict requirements on ASDEs, through regulations and notices to produce, in relation to the information which they provide to the government and

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92   Ibid pt 1, ch 2.

93   *Joint Report Summary* (n 78) 20.

94   Ibid 13.

95   *Analysis of Responses* (n 71) 39.

96   Ibid.

97   *Joint Report Summary* (n 78) 13.

98   Ibid.

99   Ibid 31.

100 Ibid 15.

101 Ibid 27.

regulators.[102] It also creates offences for failing to provide information or providing misleading information about the safety of a vehicle.[103]

The *AV Act* further creates an aggravated offence, as recommended by the Commissions, where death or serious injury occurs due to the following circumstances where the ASDE:

> …
> (b)   had information been provided in a way that avoided the commission of any such offence, that information would have disclosed a heightened risk that a vehicle in which an authorised automation feature is engaged would be involved in a dangerous incident of a particular kind;
> (c)   a vehicle in which that feature is engaged is involved in a dangerous incident of that kind; and
> (d)   an individual is killed or seriously injured as a result of that incident.[104]

3 *A Clear Transition between Self-Driving Mode and Human Control*

The Commissions identified the need for AVs to have a clear transition when changing from self-driving mode to the UIC taking control. This transition period needed to incorporate: (1) clear alarms to alert the driver; (2) sufficient time for the driver to gain situational awareness and take control; and (3) the ability for the vehicle to manage the situation safely and mitigate risk of injury or damage if the driver fails to take back control.[105]

These recommendations have been incorporated into the *AV Act*, including the requirement that an alert is given to the driver at the completion of the transition period.[106] Following a completed handover, the UIC becomes the driver and is subject to all the responsibilities of a driver (however, may not be responsible for an event which occurs due to the actions of the ADS prior to handover).[107] At the end of the transition period, the UIC's immunity from dynamic driving offences ceases and the UIC becomes liable.[108] This clear transition period is essential for delineating the new legal actors and where legal responsibility will fall if an incident occurs when the AV is operating.

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102   *AV Act* (n 17) ss 14–23.

103   Ibid ss 24–5.

104   Ibid s 25(1). See also s 25(2).

105   *Joint Report Summary* (n 78) 1.

106   *AV Act* (n 17) s 7.

107   Ibid ss 47–8.

108   Ibid s 49.

C *Company Liability*

The Commissions recommended that specific criminal offences be created for the failure by an ASDE or its representative to provide information to the regulator or for providing information to the regulator that is false or misleading in a material particular.[109]

This recommendation had significant support from stakeholders during the consultation process.[110] For example, law firm Burges Salmon LLP explained that

> [o]n balance we consider an offence of this type is necessary for public safety assurance, to reinforce the critical importance of safety transparency and to address the potential information/experience imbalance between ADSEs and regulators (especially at the outset of the technology's deployment).[111]

The Health and Safety Executive noted that ASDEs should not be held responsible through the use of the *Health and Safety at Work etc Act 1974* (UK).[112]

FiveAI were of a differing view stating that

> [a]n ADS is a complex product with many components and the ADS itself is sensitive to small changes. The ADSE will be reliant on information from many different sources inside and outside of the ADSE, and senior managers cannot be expected to have intimate knowledge of all the different parts of the systems.[113]

The Commissions also recommended that liability should be established for senior managers for breaches of the 'duty of candour',[114] and that the term 'senior manager' should be defined as a 'person who plays a significant role in the making of the decisions about how the 'ADSE … is managed or organised, or the management of the safety assurance process'.[115]

These liability provisions for senior managers have been incorporated into the *AV Act* together with extensive investigatory powers, including the use of warrants, to investigate possible offences.[116]

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[109]   *Joint Report Summary* (n 78) 25.

[110]   *Analysis of Responses* (n 71) 158.

[111]   Ibid.

[112]   Ibid.

[113]   Ibid 160.

[114]   *Joint Report Summary* (n 78) 25.

[115]   Ibid 26.

[116]   *AV Act* (n 17) s 27, pt 1, ch 4.

D *Incident Investigation*

It was noted by the Commissions that serious, complex and high-profile investigations into incidents involving AVs should be investigated by a specialist independent investigator with a focus on learning lessons rather than allocating fault.[117]

The development of a specialist investigation unit was widely supported in the consultation process. The Royal Society for the Prevention of Accidents noted '[i]f automated cars malfunction, they are likely to do so in ways which are unfamiliar to coroners or police officers. Understanding the causes of such failure will involve new types of expertise'.[118] Similarly, the RAC Foundation noted that the National Transportation Safety Board ('NTSB') in the United States 'investigates near miss collisions of AVs as well as the most serious, complex and/or high-profile collisions, as significant safety learning can come from near-miss collisions'.[119]

Despite these views, the Commissions' recommendations for independent investigation were watered down in the legislation. While the *AV Act* establishes the roles of 'inspectors of automated vehicle accidents', these positions remain very dependent on government, with the terms of these roles determined by the Secretary of State.[120] Ultimately, 'the main purpose of the role of inspector is that of identifying, improving understanding of, and reducing the risks of harm arising from the use of authorised automated vehicles on roads in Great Britain' without any blame or liability to be established.[121]

IV A SIMILAR PROPOSITION IN AUSTRALIA

While the UK enacted legislation in 2024 to regulate the use of AVs, similar regulatory concepts have been developed in Australia since 2016, with the aim of enacting the Automated Vehicle Safety Law ('AVSL') by 2026.[122] The proposed AVSL provides a useful comparison with the *AV Act*. Both the UK and Australia are focusing on corporate accountability by developing legislation for AVs which stipulates that the companies who develop AVs must be ASDEs. This approach requires such ASDEs to satisfy certain requirements and allows them to be held accountable if harm is caused through the use of an AV.[123]

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117   *Joint Report Summary* (n 78) 16.

118   *Analysis of Responses* (n 71) 94.

119   Ibid 95.

120   *AV Act* (n 17) s 60.

121   Ibid s 61.

122   National Transport Commission, *The Regulatory Framework for Automated Vehicles in Australia* (n 19) 8–10.

123   See generally Brittany Eastman et al, 'A Comparative Look at Various Countries' Legal Regimes Governing Automated Vehicles' [2023] *Journal of Law and Mobility* 1.

A *Defining Autonomous/Automated Vehicle*

The Australian approach to defining a self-driving or autonomous vehicle is more complex than the *AV Act*. The Australian proposal provides definitions for 'automated driving system' and 'automated vehicle' and refers to the SAE levels[124] to describe the differing levels of human and ADS control or intervention for AVs at each of these levels.[125] The *AV Act* has deliberately avoided using these technical definitions to delineate responsibility to avoid confusion, instead focusing on one clear definition of when a vehicle is considered to be self-driving and when it is not.

B *Accountability*

The proposed system of accountability under the AVSL for when an AV is operating on a public road is far less clear than the *AV Act*. The Australian proposal requires that human drivers using an AV comply with the state/territory general requirements for drivers — the only AV specific guidance relates to those driving an SAE Level 3 AV. Drivers operating an SAE Level 3 AV will have a legal duty to 'remain sufficiently vigilant to respond to ADS requests, mechanical failure or emergency vehicles and regain control of the vehicle without undue delay when required'.[126]

The Australian approach also creates the requirement for companies manufacturing and developing AVs to be certified as ASDEs, with onerous requirements to be fulfilled by the ASDE. The ASDE will have an overarching 'general safety duty to ensure the safe operation of its automated vehicles, so far as is reasonably practicable'.[127] The ASDE will also need to fulfill multiple prescriptive duties set out in the AVSL to support the general safety duty, including to 'prevent the operation of an ADS when the ASDE is aware the ADS is unsafe, so far as is reasonably practicable'[128] and to 'have appropriate resources, processes, policies and systems in place to identify, manage and minimise known and foreseeable safety risks'.[129] There are also duties on the ASDE to ensure that the ADS operates in a way which will be compliant with Australian road rules, and that the system can continue to operate safely when unexpected events occur.[130] 'Control' is a key concept in the proposed

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124   Society of Automotive Engineers, 'Automated Driving Levels of Driving Automation are Defined in New SAE International Standard J3016' (Media Release) <https://www.sae.org/binaries/content/assets/cm/content/news/press-releases/pathway-to-autonomy/automated_driving.pdf>; National Transport Commission, *What is an Automated Vehicle?* (Research Paper, April 2024).

125   National Transport Commission, *The Regulatory Framework for Automated Vehicles in Australia* (n 19) 11–12; National Transport Commission, *Human User or Occupant Obligations When Using a Vehicle with an ADS* (Research Paper, April 2024).

126   National Transport Commission, *The Regulatory Framework for Automated Vehicles in Australia* (n 19) 43.

127   Ibid 31.

128   Ibid 32.

129   Ibid 76.

130   Ibid 43.

AVSL framework, meaning that 'when an automated vehicle's ADS is engaged, the ADS is in control and the ADSE is responsible for complying with [dynamic driving task] … obligations'.[131]

In addition, the ASDE will need to comply with prescriptive duties in the AVSL to support enforcement such as to 'have appropriate resources, processes, policies and systems in place to identify, manage and minimise known and foreseeable safety risks', and to 'develop and maintain a law enforcement interaction protocol to be shared with the in-service regulator'.[132] The Australian regulation will also require that an ASDE 'be a corporation with suitable structures and capabilities to keep an ADS safe' and will require that an ASDE demonstrate that they have a corporate presence in Australia.[133] The requirement that an ASDE have a corporate presence in Australia demonstrates that Australian regulators are seeking to maintain jurisdictional control over ASDEs, and avoid possible issues relating to the enforcement by regulators of duties for ASDEs under the AVSL when a transnational company is involved.

C Incident Investigation

The proposed AVSL creates three key regulators to ensure the safety of AVs: the first-supply regulator, the in-service regulator, and state and territory road transport regulators.[134]

The first-supply regulator will approve AVs for entry into the market and confirm the roles and responsibilities of existing state and territory road transport regulators which will apply to AVs.[135]

The in-service regulator will play a pivotal role under the AVSL. It will regulate ASDEs and ASDE executive officers[136] and its 'key function will be to ensure regulated parties assure the safety of an ADS over its life cycle'.[137] This is a similar role to that of the 'inspectors of automated vehicle incidents' set out in the *AV Act*.[138] The in-service regulator will be required to investigate breaches of road rules 'as

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131   Ibid 11.

132   Ibid 33–4.

133   'Making Sure the Automated Driving System is Safe When it Enters the Market', *National Transport Commission* (Web Page) <https://www.ntc.gov.au/making-sure-automated-driving-system-safe-when-it-enters-market>; National Transport Commission, *Requirements When a Vehicle with an ADS is First Provided* (Supporting Paper, April 2024); National Transport Commission, *Automated Driving System Entity Certification* (Supporting Paper, April 2024).

134   National Transport Commission, *The Regulatory Framework for Automated Vehicles in Australia* (n 19) 14–16.

135   Ibid.

136   Ibid 15.

137   Ibid.

138   *AV Act* (n 17) pt 3, ch 2.

a potential breach of the general safety duty where either: the ADS was clearly engaged at the time of the breach[,] the driver considers the ADS was engaged, or control is unclear'.[139] State and territory road transport regulators will retain responsibility for the general management of AVs being used on public roads, including vehicle registration, road worthiness inspections and regulation of the human drivers of AVs.[140]

Public consultation on the safety reforms proposed to govern the use of automated vehicles in Australia closed in June 2024 and the government is currently working to finalise the drafting of the AVSL.[141]

V A BROADER MODEL OF PROACTIVE REGULATION FOR AUTONOMOUS DIGITAL TECHNOLOGIES

The *AV Act* provides the basis for setting out a more general model which can be applicable not only to AVs but also to other ADS. While some parts of the *AV Act* relate to longstanding regulatory matters for motor vehicles, such as licensing,[142] permits,[143] and representations made by car dealers,[144] it is Part 2 of the *AV Act* which provides the foundation for a broader model.[145] On the above analysis, the main components of this model can be set out as follows:

(1) An ADS is a system which has the capability to operate autonomously for certain functions with minimal human oversight;
(2) A person or company is the *authorised entity* which develops and confirms the technology, provides information about the technology and can be sanctioned if information is not provided or is inaccurate. The authorised entity is responsible for applicable offences when the ADS is operating autonomously;
(3) The UIC is the *person* who uses the ADS and has immunity for offences which occur when the ADS is operating autonomously. The UIC is responsible for applicable offences when the ADS is not operating autonomously;
(4) There is a *clear transition* between the ADS operating in autonomous mode and the UIC regaining control of the ADS;

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[139] National Transport Commission, *The Regulatory Framework for Automated Vehicles in Australia* (n 19) 59.

[140] Ibid 15–16.

[141] See 'Automated Vehicle Safety Reforms', *Department of Infrastructure, Transport, Regional Development, Communications and the Arts* (Web Page) <https://www.infrastructure.gov.au/have-your-say/automated-vehicle-safety-reforms>.

[142] *AV Act* (n 17) ss 12–13.

[143] Ibid ss 82–90.

[144] Ibid ss 78–9.

[145] Ibid pts 2–3.

(5) This clear transition delineates legal responsibility (civil or criminal) for incidents occurring when the ADS is operating autonomously *and* when the ADS reverts to being controlled by the UIC;

(6) The UIC loses immunity for applicable offences which occur after the transition period has ended and the UIC has regained control of the ADS; and

(7) An independent agency is responsible for investigating incidents which occur when an ADS is being operated.

Legal uncertainty over liability for harms caused by ADS has been a continuing theme in debates on how to regulate autonomous technologies.[146] This model seeks to address this uncertainty by clearly delineating who has legal responsibility and when.

Returning to the issue of capture referred to in Part II, the remainder of this paper will consider how the broad model of proactive regulation can address capture dynamics. The overall argument is that this broad model will actively work to reduce the information advantage held by technology companies seeking regulatory approval for innovative technologies. The features of the model described above will allow regulatory agencies and state governments, which often do not have the technical expertise to adequately interrogate the claims made by technology companies, to better fulfill their regulatory functions. This model places the onus on the technology company to demonstrate that the technology they are seeking approval for is safe. The model also provides an economic incentive for companies to provide the required information in a timely manner, as this information needs to be provided and accepted by the regulator before public sales of the ADS product can start.

It is not contended that this model of liability is the missing panacea which will ensure that technology companies develop safe ADS and comply with regulatory requirements. Capture dynamics across industry continue to be difficult to detect and combat,[147] and this is even more so when large, wealthy technology companies

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[146] See, e.g: Filippo Santoni de Sio and Jeroen van den Hoven, 'Meaningful Human Control Over Autonomous Systems: A Philosophical Account' (2018) 5(15) *Frontiers in Robotics and AI* 1; Louise Hatherall et al, 'Responsible Agency Through Answerability: Cultivating the Moral Ecology of Trustworthy Autonomous Systems' (Conference Paper, Proceedings of the First International Symposium on Trustworthy Autonomous Systems, 11 July 2023).

[147] See: Luigi Zingales, 'Preventing Economists' Capture' (Working Paper No 99 / Booth Working Paper No 13–81, 12 November 2013); David A Moss and Daniel Carpenter, 'Conclusion: A Focus on Evidence and Prevention' in Daniel Carpenter and David A Moss (eds), *Preventing Regulatory Capture: Special Interest Influence and How to Limit It* (Cambridge University Press, 2013) 451; Toni Makkai and John Braithwaite, 'In and Out of the Revolving Door: Making Sense of Regulatory Capture' (1992) 12(1) *Journal of Public Policy* 61.

are involved.[148] It is contended that the proposed model of liability will begin to address the information asymmetry and influence held by technology companies over regulating entities and, in doing so, work to alter the regulatory environment in which instances of capture can flourish. This model also seeks to encourage technology companies to promote internal corporate cultures of safety and transparency with respect to their ADS with the motivating factor of having their ADS approved for public use and sales.

While the *AV Act* did not proceed with establishing a fully independent investigative agency, having such an independent agency would be recommended for this general model of ADS liability. An independent investigative agency with the relevant technical expertise is essential to reduce the information asymmetry between technology companies and regulators. In particular, the investigative agency needs to have both technical expertise and independence to properly assess any failures of disclosure during the ASDE authorisation process and the effect that such non-disclosure subsequently has on the performance of the vehicle.

This model of liability also recognises that there may be instances when technology companies provide false or misleading information about the safety of the ADS they are seeking approval for, which may not be detected by the regulator prior to the public use of the ADS. While focused on proactive regulation, the model also allows for accountability measures: the delineation of legal responsibility allows for sanctions to be imposed on companies if an incident occurs while the ADS is operating in autonomous mode, and companies can be charged with aggravated criminal offences if the failure to provide accurate information leads to a serious incident.

The following section will consider how the *AV Act* might apply to a situation where a serious incident occurs with an AV using the case study of the fatal collision in Arizona in 2018 in which an Uber AV killed pedestrian Elaine Herzberg. This is a valuable case study as it demonstrates many of the issues that the *AV Act* is now seeking to address.

VI APPLICATION TO THE UBER HERZBERG INCIDENT

This paper will approach the analysis of how the *AV Act* could have applied to the circumstances of the Uber collision in two ways. First, the analysis will consider the very different regulatory landscape that would have been in place in Arizona in 2018 if legislation similar to the *AV Act* had been in place. Secondly, the analysis will consider the different accountability outcomes that would have been available for the vehicle operator, Rafaela Vasquez, and for Uber if an equivalent regulatory scheme had existed.

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148   Matthew U Scherer, 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies' (2016) 29(2) *Harvard Journal of Law and Technology* 353, 377.

A *Regulatory Capture of Agencies in Arizona*

In earlier published work, the author examined the regulatory capture by Uber of the Tempe Police Department and the County Attorneys who were investigating the fatal collision and determining where criminal responsibility should fall.[149] These capture dynamics were supported by the pro-innovation stance of the Arizona government and a failure to seek technical assistance from specialised federal bodies.[150] This capture resulted in Uber evading criminal liability for the safety shortcomings present in both the Uber AV itself, and in the rollout of the Uber AV testing program in Arizona, with only Vasquez being charged for the death of Herzberg.[151]

Consider the altered regulatory landscape that would have been in place if similar legislation to the *AV Act* was in place in Arizona in 2018. Under the *AV Act* framework, Uber would have been required to seek regulatory authorisation to be an ASDE. Based on safety principles specified under the *AV Act*,[152] regulators would need to be satisfied that (1) the AVs that Uber wanted to trial were safe,[153] (2) that Uber could demonstrate that it was 'of good repute' and 'good financial standing', and (3) 'capable of competently discharging any authorisation requirements imposed'.[154] Uber could also have been criminally sanctioned under section 24 of the *AV Act*, if the information that they provided was false or misleading or if they refused to provide information.[155]

As at June 2025, the *AV Act* has not yet defined the applicable safety standards for AVs. The Commissions were of the view that the setting of the safety standard and what is considered to be acceptable risk by the public is a 'political question' to be undertaken by the United Kingdom's government.[156] This process is set out in the *AV Act* with a 'Statement of Safety Principles' to be prepared by the Secretary

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[149] Stamp, 'Innovative Technologies and the Deepening Capture of Law Enforcement Agencies' (n 15).

[150] Ibid 89, 107–8.

[151] United States National Transportation Safety Board, *Highway Accident Report: Collision Between Vehicle Controlled by Developmental Automated Driving System and Pedestrian, Tempe Arizona, March 18, 2018* (Accident Report, No NTSB/HAR-19/03, PB2019-101402, 19 November 2019) ('*NTSB Report*'). Vasquez was initially charged with the criminal offence of negligent homicide for the death of Herzberg and later pled guilty to the charge of reckless endangerment in a plea agreement. See Lauren Smiley, 'The Legal Saga of Uber's Fatal Self-Driving Crash is Over', *Wired* (online, 28 July 2023) <https://www.wired.com/story/ubers-fatal-self-driving-car-crash-saga-over-operator-avoids-prison/>.

[152] *AV Act* (n 17) s 2.

[153] Ibid ss 1–6.

[154] Ibid s 6.

[155] Ibid ch 3.

[156] *Joint Report Summary* (n 78) 9.

of State and provided to Parliament.[157] The UK government has now released an 'open call for evidence' as the first stage of public consultations on how the 'safety principles might be used, how the safety standard might be described and how safety performance can be measured' although the statement of safety principles has not yet been publicly released.[158] Until the scope of such a safety standard is determined, it remains unknown what information would need to be disclosed by technology companies in order to comply with the *AV Act*. What is clear from the case study of the 2018 Uber fatal collision is that to be effective a review of safety would require, at a minimum, an assessment of the AV's ADS features and any *limitations* of the ADS which might affect the AV's capacity to drive safely and legally in autonomous mode on a public road. The review should also consider the general corporate safety policies and standards implemented by the technology company seeking ASDE status when they design and manufacture their AVs.

Theoretically, if the required safety standard was in place in Arizona in 2018, and Uber's management were aware of the information to be disclosed (as required under the *AV Act*), the following actions may have occurred in this altered regulatory landscape. First, Uber may have decided not to trial their AVs in Arizona given the requirements of the AV legislation. Second, Uber may have delayed the rollout of their AV testing until technical flaws had been rectified in the software and safety policies implemented so that they could comply with the legislation and avoid any sanctions. Or, Uber may have chosen to run the gauntlet in order to be first to market and proceed with seeking authorisation to trial its AVs without disclosing information about the AV's technical flaws.

B *Evasion of Accountability*

In subsequent published work, the author tested the theory of Uber's regulatory capture of the Tempe Police and County Attorneys by examining whether the criminal law framework in Arizona in 2018 would have allowed for a corporation to be charged with negligent homicide for the death of Herzberg.[159] This analysis demonstrated that, although there was a relevant legal framework in place at that time which would have allowed for the prosecution of Uber, this was not used due to Tempe Police's lack of AV technical expertise, the prosecution's focus on the

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157   *AV Act* (n 17) s 2.

158   Department of Transport Centre for Connected and Autonomous Vehicles (UK), 'Open Call for Evidence: Automated Vehicles: Statement of Safety Principles', *GOV.UK* (Web Page, 10 June 2025) <https://www.gov.uk/government/calls-for-evidence/automated-vehicles-statement-of-safety-principles/automated-vehicles-statement-of-safety-principles#statement-of-safety-principles>.

159   Helen Stamp, 'The Reckless Tolerance of Unsafe Autonomous Vehicle Testing: Uber's Culpability for the Criminal Offense of Negligent Homicide' (2024) 15(1) *Journal of Law, Technology and the Internet* 3 ('The Reckless Tolerance of Unsafe Autonomous Vehicle Testing').

actions of Vasquez, and the overarching influence of Uber on these law enforcement agencies.[160]

Consider the accountability outcome which could have occurred in these circumstances if similar legislation to the *AV Act* was in place in Arizona when the collision occurred.

As discussed above, to trial its AVs on public roads in Arizona, Uber would have needed to satisfy the legislative requirements to become an approved ASDE, including demonstrating that the AV can travel safely and legally when operating autonomously, and that neither the vehicle or its surroundings needs to be monitored by a person who could immediately intervene and take back control of the vehicle if required.[161]

If Uber had satisfied these legislative requirements and was considered an ASDE, then the divisions of legal responsibility set out in the *AV Act*, and examined in Part III of this paper, would have then applied to the collision between the Uber AV and Herzberg.

The police investigation noted that Vasquez reported to police that the Uber AV was travelling in autonomous mode at the time of the collision.[162] This autonomous functioning was also confirmed by the NTSB in its independent investigation.[163] There was also no evidence of any warnings or alerts given by the AV that would have alerted Vasquez to take back control of the vehicle prior to the collision.[164]

In these circumstances, as the AV was operating autonomously, Vasquez would have been considered the UIC until the AV transitioned back to non-autonomous mode. As the UIC, Vasquez would have had immunity from driving offences which occur because of an act by the AV while it is operating autonomously. As per the *AV Act*, when Vasquez was the UIC, she would not have been required to monitor the vehicle or the surroundings. This immunity would have remained until a clear transition demand had been made and the transition period completed with Vasquez taking back control of the vehicle.

Under the *AV Act* regulatory model, it is likely that more attention would have been paid by Tempe Police investigators and County Attorneys to whether the AV was operating autonomously when the collision occurred. It is also likely that these agencies would have paid greater attention to the role that technical flaws in the AV's ADS played in the collision.

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160   Ibid; *NTSB Report* (n 151).

161   *AV Act* (n 17) s 1(2).

162   See: Stamp, 'Innovative Technologies and the Deepening Capture of Law Enforcement Agencies' (n 15); Stamp, 'The Reckless Tolerance of Unsafe Autonomous Vehicle Testing' (n 159).

163   *NTSB Report* (n 151).

164   Ibid.

It would have been very difficult for Vasquez to have been prosecuted for the death of Herzberg under the *AV Act* model. This model of regulation clearly demarcates that either a vehicle can travel safely and legally in autonomous mode without a person monitoring the vehicle and environment or it should not be certified as self-driving and authorised for use on public roads. If the vehicle was travelling autonomously at the time of the collision, then the prosecution would not have been able to argue that Vasquez was a distracted driver, and that this distraction caused the collision (which was a central argument of the criminal case against Vasquez).[165]

The *AV Act* model places greater emphasis on the actions of corporations and the need for corporations to safely develop innovative technologies and to minimise the risk to the public when doing so. If the flaws in Uber's programming of the AV and their lack of safety policies (which were later identified by the NTSB)[166] had been disclosed, then under the *AV Act* model, Uber should not have been deemed an ASDE and not permitted to test their vehicles in Arizona. Alternatively, if Uber failed to disclose flaws and limitations in its AV technology — failures that 'would have disclosed a heightened risk that a vehicle in which an authorised automation feature is engaged would be involved in a dangerous incident of a particular kind'[167] — when applying for ASDE status in Arizona, then Uber could have been charged with an aggravated criminal offence for the death of Herzberg.

The Uber case study also clearly demonstrates the need to have an agency with sufficient technical expertise to competently investigate incidents involving autonomous technologies, such as the NTSB. This is important so that incidents can be properly investigated, and prosecutorial bodies briefed regarding liability issues and whether charges should be preferred. It is vital to have this information symmetry between companies developing this technology and those investigating incidents to reduce the potential for influence and agency capture to occur, as discussed earlier in Part II.

VII CONCLUSION

The *AV Act* is a leading example of regulation which addresses the issue of determining legal responsibility for harm caused using ADS through the creation of new legal actors which reflect who or what is in control of an AV when an incident occurs.

While further research in this area is required, the *AV Act* creates a model of liability which has the potential to be applied more broadly to other forms of ADS. For example, this model of liability could be applied to the use of ADS in healthcare

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165   *State of Arizona v Vasquez,* No 785 GJ 251 (27 August 2020) Case No CR2020-001853-001; Stamp, 'The Reckless Tolerance of Unsafe Autonomous Vehicle Testing' (n 159).

166   *NTSB Report* (n 151).

167   *AV Act* (n 17) s 25.

where robot assisted surgeries ('RAS') are raising similar concerns to those of AVs regarding liability for harm caused.[168] The types of RAS that are available 'primarily revolves around the robot's autonomy level, the degree of assistance provided by robotic systems during the execution of surgical procedures, and the human surgeon's control exercised'.[169] As with AVs, the liability questions surrounding the use of RAS require an examination of who (or what) is in control at a particular time, whether there has been a clear transition from a human performing surgical tasks to a RAS and whether responsibility should fall on a person or a company if harm is caused.

As discussed in Part IV of this paper, the proposed model of liability is a contribution towards a greater understanding of how ADS can be regulated and will not be applicable to all forms of ADS. This model of liability is best suited to the regulation of ADS operating within national legal frameworks where the relevant parties are easily identifiable, national legislation can be enacted or amended and sanctions enforced. The regulation of ADS which are subject to international legal frameworks, such as autonomous ships and autonomous weapons, involves a greater level of complexity which the current model of liability is unable to accommodate.

This model of liability invites an important reconsideration of how many forms of ADS could be regulated using legal frameworks which focus on the concepts of control and responsibility when an ADS is being used. The model discussed avoids fitting ADS into traditional frameworks of liability without acknowledging the control differences which occur when an ADS is operating, or trying to create entirely new legal regimes. Instead, this model draws on all parties involved and attributes responsibility based on who or what is in control when an incident occurs. Responsibility can then fall on the corporation which developed the technology or the person who has manual control of the technology at the relevant time.

It is a model which acknowledges the significant change which autonomous technologies bring for legal systems while also retaining liability for the corporations

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[168] See generally: Hassan Mohamed, 'The iRobo-Surgeon Conundrum: Comparative Reflections on the Legal Treatment of Intraoperative Errors Committed by Autonomous Surgical Robots' (2024) 16(1) *Law, Innovation and Technology* 194; Satvik N Pai et al, 'In the Hands of a Robot, from the Operating Room to the Courtroom: The Medicolegal Considerations of Robotic Surgery' (2023) 15(8) *Cureus* e43464:1–6.

[169] Eduard Fosch-Villaronga et al, 'The Role of Humans in Surgery Automation' (2023) 15(3) *International Journal of Social Robotics* 563, 568, citing Eduard Fosch-Villaronga and Hadassah Drukarch, *On Healthcare Robots: Concepts, Definitions, and Considerations for Healthcare Robot Governance* (Report, May 2021). See also: Mindy Nunez Duffourc, 'Malpractice by the Autonomous AI Physician' [2023] (1) *University of Illinois Journal of Law, Technology and Policy* 1; Frank Pasquale, 'Liability Standards for Medical Robotics and AI' in Larry A DiMatteo, Cristina Poncibò and Michel Cannarsa (eds), *The Cambridge Handbook of Artificial Intelligence: Global Perspectives on Law and Ethics* (Cambridge University Press, 2022) 200.

who develop this technology and for individuals who need to use this technology responsibly. Importantly, by reducing information asymmetry and taking a proactive approach rather than relying exclusively on *ex post* accountability measures, this model also works to address the dynamics of regulatory and state capture which often impact accountability mechanisms used to govern innovative technologies. While this model's focus is on proactive regulation, it also pragmatically acknowledges the need to include some *ex post* accountability measures for companies which circumvent the requirements for providing accurate information which results in a serious incident occurring.

This proactive model of liability for ADS has the potential to encourage the safe development of innovative technologies and to provide a fairer assessment of where responsibility should fall when an incident occurs. It also has the potential to assist in the process of rebalancing power relations between state governments, regulators, and large technology companies, allowing the benefits of autonomous technologies to be realised while prioritising public safety considerations.