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Inevitable or Not?

Narrative Arguments Regarding Autonomous Vehicles in Singapore

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I Introduction

The technology era we now inhabit encompasses the Internet of Things, in which everyday objects send and receive data without human intervention.[1] But despite this presence in daily life, evidence of strong negative reactions of people in communities with autonomous vehicles (AVs) suggests that concerns remain. Fatalities caused by self-driving cars have been reported.[2] In the United States, Uber's pilot self-driving cars were met with rude gestures and forced to stop by other drivers, who drove up close to their rear bumpers, and Google's autonomous-vehicle unit, Waymo, experienced similar issues in which people slashed vehicle tires and even pulled guns on safety drivers.[3] In Singapore, residents have concerns about safety, including the ability of vehicles to react and evaluate traffic situations and follow traffic rules.[4] Among academics, there are concerns regarding AV

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[1] Hanna Rzeczycka & Mitja Kovac, "Autonomous Self-Driving Vehicles – The Advent of a New Legal Era?" (2019) 10:1 *King's Student Law Review* 30 at 30.

[2] See Peter C. Baker, "Collision Course: Why Are Cars Killing More and More Pedestrians?" *The Guardian* (October 3, 2019); see Daisuke Wakabayashi, "Self-Driving Uber Car Kills Pedestrian in Arizona, Where Robots Roam," *The New York Times* (March 19, 2018), www.nytimes.com/2018/03/19/technology/uber-driverless-fatality.html.

[3] Isobel Asher Hamilton, "Uber Says People Are Bullying Its Self-Driving Cars with Rude Gestures and Road Rage," *Business Insider* (June 13, 2019).

[4] "Singaporeans Worried over Autonomous Vehicle Tests," *The Star* (October 25, 2019), www.thestar.com.my/news/regional/2019/10/25/singaporeans-worried-over-autonomous-vehicle-tests.

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risks and unintended consequences.[5] This chapter considers the case of Singapore, which has been testing the use of AVs. Using surveys and newspaper reports, the chapter explores the rhetorical devices used to frame relevant discussion, focusing on the concepts of narrative and narrative argument. The chapter identifies the narratives used to assert the potential benefits AVs offer, as well as addresses the concerns and fears they raise, thereby justifying the presence of AVs on the streets.

Narrative is used as the central instrument of inquiry in the chapter because this form of discourse is a fundamental way in which reality is understood and constructed,[6] and because it plays a particular role in the public discourse examined in the chapter.[7] The definition of narrative is contested, but for purposes of this chapter, "narrative" is defined simply as a representation of an event.[8] Some definitions of narrative use additional or expanded elements,[9] but without delving into the issue of narrativity,[10] this chapter adopts a more minimalist definition of narrative in order to identify the narrative character of public discussion of AVs.

The narratives considered here take place in the context of public discussions of the merits and drawbacks of AVs, and can therefore be understood as narrative argument, i.e., arguments relying to some degree on narrative. Concepts underlying narrative argument can be traced back to ancient rhetoric,[11] but they were developed in more

[5] See e.g. Araz Taeihagh & Hazel Si Min Lim, "Governing Autonomous Vehicles: Emerging Responses for Safety, Liability, Privacy, Cybersecurity, and Industry Risks" (2019) 39:1 *Transport Reviews* 103 at 103–128.

[6] See Jerome Bruner, "The Narrative Construction of Reality" (1991) 18:1 *Critical Inquiry* 1 at 4.

[7] See Bruce W. Weal, "The Force of Narrative in the Public Sphere of Argument" (1985) 22:2 *Journal of the American Forensic Association* 104 (discussed below).

[8] See Gérard Genette, *Figures of Literary Discourse* (New York, NY: Columbia University Press, 1982) at 127; Gerald Prince, *A Dictionary of Narratology*, rev. ed. (Lincoln, NE: University of Nebraska Press, 2003) at 58; Horace Porter Abbott, *The Cambridge Introduction to Narrative*, 2nd rev. ed. (Cambridge, UK: Cambridge University Press, 2008) at 13; and more generally at 13–27; per Moshe Simon-Shoshan, an event is dynamic in that something happens or changes, and specific in that it presents change through the concrete and the specific; see Moshe Simon-Shoshan, *Stories of the Law: Narrative Discourse and the Construction of Authority in the Mishnah* (Oxford University Press, 2012) at 16. For discussion of the concepts of narrative, story, and discourse, see Chapter 15 in this volume.

[9] For an overview of different narrative definitions, see Marie-Laure Ryan, "Toward a Definition of Narrative" in David Herman (ed.), *The Cambridge Companion to Narrative* (Cambridge, UK: Cambridge University Press, 2007) 22 at 22–35.

[10] See ibid. at 28–31, and see 33 (if "defining narrative has any cognitive relevance, it is because the definition covers mental operations of a more fundamental nature than passing global judgments of narrativity").

[11] See Paula Olmos, "Narration as Argument," paper delivered at the Ontario Study of Augmentation Conference 10 (May 22, 2013), Ontario Society for the Study of Augmentation Conference Archive 123 ["Narration as Argument"] at 2–13.

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modern times by Walter Fisher, who is credited with distinguishing between the rational world paradigm and the narrative world paradigm.[12] In the rational paradigm, humans are essentially rational beings, and the paradigm for human decision-making and communication is argument, understood as clear-cut, inferential structures.[13] The narrative paradigm presupposes that humans are storytelling creatures, and that the paradigm for human decision-making and communication is "good reasons," including narrative probability, an internally coherent story, and narrative fidelity, a story consistent with lived experience.[14] The narrative paradigm can be considered the synthesis of two traditional strands of rhetoric, the argumentative, persuasive theme, and the literary, esthetic theme,[15] which makes it well-suited to analysis of narrative arguments.

The narrative arguments explored in the chapter occur in the wider Singapore community, and they therefore comprise narratives in the public space.[16] Bruce Weal has suggested why narratives perform a useful function in the public sphere. First, stories proceed via the actions of characters, and stories display the values of those characters; in a conflict of positions, the fact that one character prevails is an argument for that character's values.[17] Second, narratives engage audience attitudes and understandings because the story form is more easily comprehended by most audiences compared to technical arguments.[18] This point echoes Fisher, who asserted that decisions of a public nature are subject to public narratives, which members of the public can participate in if they are sufficiently informed, because unlike expert subject matter, the public can assess narrative probability and fidelity.[19]

[12] See Walter R. Fisher, "Toward a Logic of Good Reasons" (1978) 64:4 *Quarterly Journal of Speech* 376; Walter R. Fisher, "Narration as a Human Communication Paradigm: The Case of Public Moral Argument" (1984) 51:1 *Communication Monographs* 1 ["Communication Paradigm"]; and Walter R. Fisher, *Human Communication as Narration: Toward a Philosophy of Reason, Value, and Action* (Columbia, SC: University of South Carolina Press, 1989).

[13] Ibid. at 4.

[14] Ibid. at 6.

[15] Ibid. at 2.

[16] See James Hickling, "The Importance of Narrative in the Negotiation of Host Government Agreements for LNG Projects: The Case of British Columbia and Petronas" (2017) 10:4 *Journal of World Energy Law and Business* 293, although Hickling focuses on legal positioning in contract negotiation as a result of public space narratives.

[17] Bruce W. Weal, "The Force of Narrative in the Public Sphere of Argument" (1985) 22:2 *Journal of the American Forensic Association* 104 at 105.

[18] Ibid.

[19] "Communication Paradigm", note 12 above, at 16, and generally at 11–16.

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The field of narrative argument is a growing one with its own disagreements, e.g., the degree to which the traditional analysis of argument must accommodate narrative.[20] Paula Olmos has identified different categories of narrative argument, two of which are: (1) primary or core narratives, which assume that someone has been given the responsibility to give a plausible account of facts unknown or under discussion via narrative devices; and (2) secondary or digressive narrative, in which narratives are not the main event, but are related to a conclusion or claim, and their relevance is either fully expressed or left to the audience.[21] As explored below, narratives regarding AVs in Singapore are less about plausible versions of contested facts and more about contested views about how AVs function and how to evaluate the benefits and risks they pose; as such, AV narratives would fall within the category of secondary or digressive narratives.

I.A Methodology and Terminology

To explore narratives regarding AVs in Singapore, the chapter considers both research studies on public opinion in Singapore and newspaper coverage. The research studies help establish opinions and narratives within the public sphere, and while the studies appear to be commercially oriented and display some biases in favor of artificial intelligence (AI) and AVs, the studies in turn also help establish the narratives of commercially oriented entities.

After reviewing the studies, the chapter provides a detailed analysis of Singapore newspaper reports. Examining newspaper coverage is a common methodology in socio-legal research.[22] In this chapter, local newspapers form the narrative "topos" for analysis.[23]

[20] See Christopher Trindale, "Narratives and the Concept of Argument" in Paula Olmos (ed.), *Narration as Argument* (Cham, Switzerland: Springer, 2017) 11.

[21] "Narration as Argument", note 11 above, at 11–12; see also Paula Olmos, "Story Credibility in Narrative Arguments" in Frans Hendrik van Eemeren & Bart Garssen (eds.), *Reflections on Theoretical Issues in Argumentation Theory* (Cham, Switzerland: Springer, 2015) 155 at 156–157.

[22] See Steven Garber & Anthony G. Bower, "Newspaper Coverage of Automobile Product Liability Verdicts" (1999) 33:1 *Law and Society Review* 93; Lyn Hinds, "Three Strikes and You're Out in the West: A Study of Newspaper Coverage of Crime Control in Western Australia" (2005) 17:2 *Current Issues in Criminal Justice* 239; and Jianlin Chen, "Singapore's Culture War over Section 377A: Through the Lens of Public Choice and Multilingual Research" (2013) 38:1 *Law and Social Inquiry* 106.

[23] Zahr K. Said & Jessica Silbey, "Narrative Topoi in the Digital Age" (2018) 68:1 *Journal of Legal Education* 103.

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The Factiva database was used to identify newspaper articles on AVs in Singapore from January 2014 to March 2021, using the Factiva search function that gathers articles related to AVs. This search produced an initial group of 67 newspaper articles in the relevant time frame. Different words were used for AVs in these articles, and these words arguably contain different orientations toward AV risks and benefits. For example, "driverless" vehicles might suggest a greater concern regarding vehicles, as the word emphasizes the lack of a driver and the associated risks of proceeding without a driver, while "autonomous" suggests that the vehicle can function autonomously without a driver. To determine chapter terminology regarding AVs, the frequency of terminology use was reviewed. Within the group of 67 articles, "autonomous" was used more frequently (59) than driverless (39), self-driving (50), and automated (5). The phrases "autonomous" and "driverless" both appeared first in 2014, but if "autonomous" and "automated" are combined, a phrase utilizing the root "auto" becomes even more clearly the preferred term (64). The chapter therefore adopts the phrase "autonomous vehicle" (AV), with occasional deviations to incorporate different usage in original texts, but with the understanding that the term autonomous vehicle may contain a pro-AV bias.

For purposes of performing narrative analysis, the chapter excluded publications based in jurisdictions outside of Singapore, as they appear less likely to reflect Singapore opinion. An exception was made for *IEEE Spectrum*, a magazine edited by the Institute of Electrical and Electronics Engineers, as it contained detail regarding commercial entities not available in local publications. The resulting 51 articles were analyzed qualitatively for narratives and narrative argument. Chapter analysis in the following sections is organized into three categories, depending on whether the article primarily represented the views of the public, government entities, or commercial entities. Articles were placed in one of these categories if more than 50 percent of the content comprised the opinions or activities of the public, commercial entities, or government entities.

II Research Studies and Surveys

Two relatively recent surveys contain information relevant to attitudes about AVs in Singapore. In 2019, the Boston Consulting Group (BCG) reported the results of a survey ("BCG Survey") of citizen perspectives on

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the use of AI in government, based on the responses of 14,000 internet[24] users in different jurisdictions, including Singapore.[25] The BCG Survey asked participants how comfortable they were if certain decisions were made by a computer rather than a human being, what concerns they had regarding the use of AI by governments, and how concerned they were regarding the impact of AI on the economy and jobs.[26] Overall, the findings indicated that citizens were most supportive of using AI for tasks such as transport, traffic optimization, and predictive maintenance, but citizens did not support the use of AI for sensitive decisions associated with the justice system, such as parole board and sentencing recommendations.[27]

Noting Singapore's "Smart Nation" and Digital Government Group, the BCG Survey characterized Singapore as a case study in how to promote the application of AI technologies across the government.[28] Characterizing Singapore as a positive AI case study also indicates the survey's pro-AI orientation to promote the use of AI in government. The BCG Survey's orientation is reflected in how questions were posed, e.g., "[w]hen is it acceptable to use 'black box' deep-learning models, where the logic used … cannot possibly be explained or understood,"[29] as opposed to asking whether this kind of AI should be used at all. The BCG Survey's pro-AI orientation is also illustrated in its use of what the chapter calls the "inevitability narrative," the narrative that AI or AVs are inevitable and should just be accepted and managed. An opinion piece by the Partner and Managing Director of BCG, Singapore, while highlighting key points from the survey, asserted that the "AI genie is out of its bottle, and no amount of wishing it were otherwise will turn back the tide of AI innovation."[30] The inevitability narrative occurs primarily in the narratives of commercial entities, and it is analyzed in this Section II, as well as Sections III.A.4 and III.B.3.

A second study conducted by the insurance company American International Group ("AIG Survey") focused squarely on attitudes

[24] *The Citizens' Perspective on the Use of AI in Government* (Boston Consulting Group, 2019) at 3.
[25] Ibid. at 7, 8, 11–12.
[26] Ibid. at 3.
[27] Ibid.
[28] Ibid. at 12.
[29] Ibid. at 3.
[30] Michael Tan, "Trust, Transparency Must Form Pillars of Singapore's AI Success," *The Business Times* (May 10, 2019).

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regarding AVs, and this study segregated data on respondents from the United States, the United Kingdom, and Singapore.[31] The answers of the Singapore respondents indicate that one in five adults self-identified as the current driver of a vehicle with automated assistance systems such as emergency breaking, lane departure avoidance, or features that make the vehicle capable of self-driving part of the time, and two-thirds of Singapore drivers said that autonomous features had a positive influence on their decision to purchase the car.[32] A total of 49 percent of Singapore adults who did not currently drive a vehicle with autonomous features said they thought they would buy, rent, share, or travel in a vehicle with those features, although 25 percent said they would not.[33]

Respondents were concerned about safety. As the AIG Survey put it, the "general public is especially concerned about safety."[34] Singapore respondents cited safer roads as the second-most appealing benefit for AVs, but there was divided opinion regarding sharing the road with driverless vehicles: 46 percent said they would be comfortable, and 29 percent said they would be uncomfortable.[35] Only 32 percent of Singapore drivers thought that driverless cars would be safer than the average driver, and when asked if driverless cars would be safer than their own driving, only 22 percent said yes.[36]

Security is a related concern, and adults in all three countries saw security as a "significant barrier" to AV adoption.[37] A total of 78 percent of Singaporean respondents expressed concern about hackers taking control of AVs, and 73 percent were concerned about the privacy of personal data such as where they travel and when.[38] A total of 47 percent of Singaporeans said their biggest concern about privacy would be a breach of personal information, such as credit card data stored in the car.[39] Another issue included the car overhearing private conversations (10 percent),[40] a concern not unheard of in Singapore, where taxis can

[31] *The Future of Mobility and Shifting Risk* (American International Group, Inc., 2018) [AIG Survey].
[32] Ibid. at 6.
[33] Ibid. at 7.
[34] Ibid. at 9.
[35] Ibid.
[36] Ibid. at 10.
[37] Ibid. at 11.
[38] Ibid.
[39] Ibid.
[40] Ibid.

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audio-record customer conversations.[41] The AIG Survey noted that AVs are susceptible to "cracking," outsiders taking control of the car, and that sophisticated software could take control of a car, and cause it to sense that the car is located in the wrong place, or "see" something on the road that isn't there.[42] A "less immediate but equally real risk" would be less invasive hacking to gain access to information stored in the vehicle.[43]

Like the BCG Survey, the AIG Survey is pro-AV. The AIG Survey stated that AVs "promise the potential of greatly reducing the number of deaths attributable to automobiles (currently about 40,000 per year in the United States) and injuries from vehicle crashes. Over 90 percent of today's roadway deaths and injuries are due to human error."[44] These figures are accurate statistics, but the assertion assumes that AVs would not commit any "human errors," and that AVs would not commit any AV errors, errors that humans would not commit. The AIG Survey also asserted the inevitability narrative, stating that "[i]nevitably, the role of the traditional driver will decrease and the role of technologies will increase."[45]

III Newspaper Articles

The majority of Singapore newspaper articles addressed the views or activities of the government or commercial entities. Of the few articles to address public opinion, one welcomed the idea of AVs on Sentosa, a small island close of Singapore that has been developed as a tourist and entertainment destination, because AVs would be "hassle-free" and more convenient for families with children, could help with long queues, and could be "exciting."[46] One view endorsing AVs noted that during a morning commute in which the commuter was focused on his daily activities, "I don't want to speak to anyone. I would even prefer hailing a driverless car to work to hiring one with a driver."[47] However, some

[41] See Low Youjin, "Drivers Welcome LTA's Move to Allow Audio Recording in Taxis, Private-Hire Cars from July 15," *Today* (July 2, 2019), www.todayonline.com/singapore/drivers-welcome-lta-move-allow-audio-recording-taxis-private-hire-cars-july-15.

[42] AIG Survey, note 31 above, at 12.

[43] Ibid.

[44] Ibid. at 1.

[45] Ibid.

[46] Olivia Siong, "Sentosa to Trial Self-Driving Vehicles from Early-2016," *Channel News Asia* (October 13, 2015) ["Sentosa to Trial"].

[47] Wong Pei Ting, "Grab Users in One-North Could Get Free Ride on Driverless Taxis," *Today* (September 24, 2016) ["Driverless Taxis"].

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newspaper articles regarding public opinion indicated concerns and fears regarding AVs, e.g., safety issues needed to be "ironed out."[48] In the context of automated buses, a school bus driver asked whether "parents of young school children would trust driverless technology more than bus drivers and their sidekicks, the 'bus aunties.'"[49] There was also the concern regarding jobs for drivers, and that "job disruption for bus drivers may occur sooner than for taxi drivers."[50]

In contrast to the bright futures asserted in government and commercial narratives reviewed below, one expert noted that if he was "taking the bus on a daily basis, and the bus is leaving the bus bay, I can waive my hand and the driver can stop and open the door. With the driverless bus, I don't think this is going to happen. Even though Singapore has been very aggressive in promoting driverless technology, I do not know if this is the future society we'd like to have."[51]

III.A Government Entities

Government discussions of AVs assert narrative arguments regarding the role of the government in pushing for AV development, the reasons for this, and the activities involved in working together with commercial partners to support AV usage in Singapore. Narrative arguments also addressed liability regarding AVs and rules or guidelines, and the careful testing of AVs and restriction of their movement.

III.A.1 AV Benefits

The emphasis in Singapore is less on AVs for personal use and more on AVs for community use, an approach which makes sense given population density in the city-state, but which also increases the risk of injury if there is an accident. In 2015, the Ministry of Transport's (MoT) Permanent Secretary and Chairman of the Committee on Autonomous Road Transport for Singapore (CARTS) stated that it was not "the replacement of one driven car today by a driverless car tomorrow that excites us. What we're interested in is the introduction of new mobility and transportation concepts that can enhance commuter mobility, and

[48] Koh Swee Fang Valerie & Neo Chai Chin, "Self-Driving Buses Easier to Implement than Cars but Concerns Remain: Experts; Safety Issues, Livelihood of Drivers and Handling of Quirks of Bus Travel Yet to Be Ironed Out," *Today* (October 20, 2016) ["Concerns Remain"].
[49] Ibid.
[50] Ibid.
[51] Ibid.

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the overall public transport experience, especially for the first- and last-mile travel."[52] One 2014 article asked readers to imagine a "completely car free town and residents taking 'personalized MRTs' in the form of driverless pods running underground from under their block to public transport nodes."[53] The reference to "personalized MRTs" would be an appealing concept to many Singaporeans. MRT stands for Mass Rapid Transit, and as this public transportation is crowded at commuting times, it is anything but personalized. If a mode of transportation like the MRT could be personalized and offer a way from the user's home to other public transportation, that would be a significant improvement. This article describes a utopian AV future: "In our dream town, its surface would be dominated by green and open spaces for residents … and free of the smoke, noise, congestion and safety concerns posed by vehicles today."[54] Regarding the trial of driverless buses, the Chief Technology Officer of the Land Transport Authority (LTA) noted that while most AV technology focuses on self-driving cars, "Singapore's need for high-capacity vehicles to address commuters' peak-hour demands presents an opportunity for companies … to develop autonomous buses …."[55]

Beyond the benefits of AVs to commuters such as better mobility as well as safe and less congested roads, the advantages of connected cars were discussed. For example, an opinion piece noted that by having "information on a smart car's performance, a carmaker can predict when the car requires maintenance," which prevents manufacturers from over-investing in maintenance labor and parts, but also "delights customers as it shortens the time taken for maintenance."[56] The real value of connected devices such as AVs lies in the insights provided by

[52] Valerie Koh, "Driverless Vehicles Slated for Use in Four Areas; Three Trials Announced, Starting in December at Gardens by the Bay," *Today* (October 13, 2015) ["Driverless Vehicles Slated"].

[53] Joy Fang, "Driverless Cars May Be Closer to Reality; LTA, A*STAR Will Spearhead Setting Up of Platform to Spur Autonomous Vehicle Technology," *Today* (August 28, 2014) ["Driverless Cars"].

[54] Ibid.; regarding benefits, see also Zhaki Abdullah, "Two Firms to Test Driverless Cars for Last Mile-Trips; Service Set to Start by 2018," *The Straits Times* (August 2, 2016) ["Test Driverless Cars"]; Valerie Koh, "First Driverless Bus Trial Launch as Early as 2018 in Jurong West," *Today* (October 20, 2016) ["Driverless Bus Trial"].

[55] "LTA Signs Deal with ST Kinetics to Develop, Trial Driverless Buses," *Channel News Asia* (April 10, 2017) ["LTA Signs Deal"].

[56] Wong Yoke Choo, "Opinion; Driving the Future of Singapore's Urban Mobility with Open Data," *The Business Times* (May 29, 2018).

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"the data they generate."[57] This opinion piece presented a positive narrative and did not address potential concerns regarding AV data such as hacking and cybercrime.

III.A.2 Government Support for AVs

The government's supportive role for AVs is illustrated by a 2014 article, which noted that previous development of AVs had been done by disparate organizations.[58] This disorganized state of affairs was to be replaced by the Singapore Autonomous Vehicle Initiative (SAVI), in which the LTA and the Agency for Science, Technology and Research (A*STAR) would jointly oversee "the setting up of a technology platform to spur research and development as well as the testing of AV technology, applications and solutions."[59] CARTS was also formed to "chart the strategic direction and study opportunities for AVs …."[60] Among the possibilities mentioned were transport networks such as driverless buses, or intra-town shuttles in future residential developments.[61] Fares were anticipated to be "competitive."[62]

The narrative that Singapore was pushing for AV development arises regularly, often via literal use of the word "push." For example, the launch of the self-driving vehicle (SDV) research center and circuit was "part of the Government's push towards a car-lite Singapore."[63] To "push the development of self-driving technology" in Singapore, the LTA installed equipment aimed at supporting and monitoring the testing of driverless vehicles at One-North in 2016.[64] It was noted in 2017 that a project to trial driverless trucks on the industrialized Jurong Island was "one of several involving autonomous vehicle technology initiatives in Singapore, as the country pushes ahead to roll out driverless vehicles."[65] The "push for an AV transport system in Singapore" is

[57] Ibid.
[58] "Driverless Cars", note 53 above.
[59] Ibid.
[60] Ibid.
[61] Ibid.
[62] "Test Driverless Cars", note 54 above.
[63] Ibid.; see also Zhaki Abdullah, "Start-Up Puts Brakes on Self-Driving Trials after Accident," *The Straits Times* (October 21, 2016) ["Brakes on Self-Driving Trials"].
[64] Zhaki Abdullah, "CCTVs, New Equipment, Introduced at One-North to Support Driverless Trials," *The Straits Times* (October 18, 2016).
[65] "Singapore's First Driverless Truck Makes Debut at Jurong Island," *Channel News Asia* (October 24, 2017) ["Driverless Truck"].

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part of the country's Smart Nations initiatives, intended to also impact matters such as electronic payments and digital identity.[66]

Part of the Singapore narrative regarding AVs in that it is either the first country to achieve certain kinds of AV success, or it is one of the more conducive countries for AVs. For example, Singapore is the first country to "actively incorporate AV into future town-planning."[67] It was noted in 2014 that Singapore has been on the "forefront in testing transport concepts and transport technologies over the past three decades."[68] Guests to the tourist attraction Gardens by the Bay in 2015 were able to "test out the first fully-operational self-driving vehicle in Asia during a 2-week trial."[69] AV testing at One-North in 2015 was "the first public road network in Singapore for the testing of driverless vehicles."[70] Driverless buses in Jurong West continued Singapore's "bid to take the lead in self-driving vehicles," the "first of its kind in Singapore."[71] It was noted in 2019 that Singapore was an early champion of AVs and was ranked "first among 20 countries for policy and legislation regarding self-driving vehicles in KPMG's Autonomous Vehicles Readiness Index."[72] In February 2019, it was noted that the Economic Development Board was setting its sights on Singapore to take "a leading role in developing and deploying autonomous vehicles and smart mobility systems."[73] In December 2019, it was observed that tests on driverless cars using a 5G network would be the first time this was done in Singapore.[74]

Why should Singapore play the role of AV advocate? AVs can assist Singapore to "radically transform land transportation in Singapore to address our two key constraints – land and manpower."[75]

[66] Hariz Baharudin, "Singtel to Develop Cyber Security Solutions for Self-Driving Vehicles with International Partner," *The Straits Times* (January 28, 2019) ["Cyber Security Solutions"].
[67] "Driverless Cars", note 53 above.
[68] Ibid.
[69] "MOT Wheels Out Self-Driving Vehicle Trials across the Island," *Channel News Asia* (October 12, 2015) ["Self-Driving Vehicle Trials"].
[70] Ibid.
[71] "Driverless Bus Trial", note 54 above.
[72] Zhaki Abdullah, "Standards Drawn Up for Safe Use of Fully Autonomous Vehicles," *The Straits Times* (February 1, 2019) ["Standards Drawn Up"].
[73] Seow Bei Yi, "Driverless Cars No More a Pipe Dream: EDB Sees Mobility as Next Area of Growth for Singapore in 2019," *The Straits Times* (February 14, 2019).
[74] Tan Ee-Lyn, "Kick-Starting Tests for 5G Driverless Cars at Science Park," *The Straits Times* (December 2, 2019).
[75] "Self-Driving Vehicle Trials", note 69 above; see also Adrian Lim, "Center for Self-Driving Vehicles Opens in Jurong West; 3 New Towns Identified as Test Areas," *The Straits Times* (November 22, 2017).

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Characterization of Singapore as a small country with limited resources is a regular refrain in public discourse,[76] and it contributes to AV narratives as well. Singapore's focus on the use of AVs in public transportation would "reduce reliance on private vehicles," and allow the saved road space to be used for other purposes.[77]

Driverless technology can also alleviate manpower concerns.[78] The adoption of AVs in the United States has "caused a stir because of the number of drivers who could be put out of a job," but Singapore faces challenges in attracting drivers.[79] Driverless buses could address the shortage of local bus drivers,[80] and driverless trucks were trialled in part because efficient freight movement is "critical" to Singapore's port activity.[81]

III.A.3 Addressing Issues Posed by AVs

Newspaper reports also contained narratives responsive to issues and concerns regarding AVs, such as the testing and trialing of AVs, and rules regarding legal responsibility. It was noted in 2014 that the LTA was working on a framework to allow AVs that "meet safety standards to be tested on all public roads" in the following year.[82] This position asserts that only safe vehicles will be tested, thereby protecting the public. A 2015 article noted that the MoT had unveiled "a slew of ongoing and upcoming self-driving trials" in locations including One-North, Gardens by the Bay, Sentosa, and West Coast Road.[83] Visitors to the Gardens could test out the SDVs during a two-week trial, and after this trial "further tests will be done before the vehicles are deployed in the Gardens."[84] Tests for A*STAR's self-driving car were done in urban areas, with plans to "test it on highways and in parking scenarios in the future."[85] But to get on the road, AVs in trials had to adhere to the LTA's requirements and could not go outside

[76] See Singapore Ministry of Foreign Affairs, "Small States," www.mfa.gov.sg/SINGAPORES-FOREIGN-POLICY/International-Issues/Small-States; and Danson Cheong, "As a Small Country, Singapore Has to Be Friends with Everyone, but at Times It Needs to Advance Its Own Interests," *The Straits Times* (July 18, 2017).

[77] "Driverless Vehicles Slated", note 52 above.

[78] Ibid.; see also "Driverless Truck", note 65 above.

[79] "Driverless Vehicles Slated", note 52 above; see also "Test Driverless Cars", note 54 above.

[80] "Concerns Remain", note 48 above.

[81] "Singapore to Start Trials of Driverless Trucks for Port Transport," *Channel News Asia* (January 9, 2017) ["Port Transport"].

[82] "Driverless Cars", note 53 above.

[83] "Self-Driving Vehicle Trials", note 69 above.

[84] Ibid.

[85] "PM Lee Rides in A*STAR's Latest Self-Driving Car," *The Straits Times* (July 27, 2016) ["A*STAR's Latest"].

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of the test area.[86] In some trials, an alert sounded if vehicles went outside of the test area.[87] It was noted in 2017 that driverless vehicles could ply a wider area, adding four times the previous area, but that those who "wish to conduct trials in mixed-use and residential estates in Dover and Buona Vista will need to demonstrate to LTA and Traffic Police that they are able to handle more dynamic traffic environments in autonomous mode."[88]

Trials for driverless buses were discussed together with a description of Nanyang Technological University's (NTU) Centre of Excellence for Testing and Research of Autonomous Vehicles, which replicated road conditions in Singapore such as a rain simulator and a flood zone.[89] The trial was supported by the Singapore Mass Rapid Transport (SMRT), which was to "play a key role in determining the road worthiness of autonomous vehicles on public roads."[90] Start-ups "from around the world" came to the purpose-built track that recreates an urban environment, to "test how autonomous vehicles cope" with those challenges.[91] One vehicle's quirky design, which looked more like a "giant robotic bug," was intentional, because in order "for the public to know that this is different to conventional cars, it needs to be noticeably different on first impressions, and stand out in comparison to other cars."[92] The public may want to know that a vehicle is an AV as a matter of general knowledge, but the public may also need to know so that they can be on the lookout for potentially dangerous situations. Regarding the conducting of AV trials, the LTA stated in 2019 that it would "engage local grassroots and community leaders ahead of time if there were plans to conduct AV trials in their specific constituencies," and that "public safety will continue to be the top priority for all autonomous vehicle trials."[93] Further expansion of trials would be permitted "after the AVs pass stringent competency tests."[94]

[86] "Driverless Taxis", note 47 above.
[87] "Test Bed for Driverless Vehicles Ramped Up at One-North," *Channel News Asia* (October 18, 2016) ["Test Bed"].
[88] Ng Huiwen, "Driverless Vehicle Routes Expand by 55km to NUS, Buona Vista and Dover," *The Straits Times* (June 23, 2017).
[89] "Driverless Electric Buses to Be Tested from 2019 in Collaboration Between NTU, Volvo," *Channel News Asia* (January 11, 2018) ["Driverless Electric Buses"].
[90] Nanyang Technological University, "'World's First' Autonomous Electric Buses to Hit Road in Singapore," *New Fortune Times* (March 5, 2019).
[91] Zahra Jamshed, "Singapore Wants Self-Driving Cars to Help Its Aging Society," *Cable News Network* (February 26, 2019) ["Self-Driving Cars"].
[92] Ibid.
[93] "Self-Driving Vehicles to Be Tested on Roads in All of Western Singapore," *Business Times Singapore* (October 24, 2019).
[94] Ibid.

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Trials were sometimes reported to be conducted without passengers, thereby lowering risks to persons, e.g., in ComfortDelGro's trial of self-driving shuttle buses in 2018. During the initial stage of this trial, "the shuttle will not take any passengers."[95] Once the trial management team was satisfied that "the shuttle is ready for commuter trials, passengers will be able to start boarding the vehicle."[96] Trials were conducted for commercial vehicles as well, e.g., "the design and trials for autonomous truck platooning, which comprises a human-driven truck and one or more driverless vehicles, will be carried out over a three-year period …."[97]

Newspaper reports of trials have at times also discussed the topic of safety drivers, which suggests that there are concerns that the AVs may not be sufficiently safe on their own. In the 2015 trials at the Gardens by the Bay, it was noted that "there will be a trained staff stationed in each vehicle to guide passengers and gather insights on commuter behavior, passenger feedback and the performance of the vehicle."[98] In Grab's "Robo-Car," which the public could book for free, a safety driver as well as a support engineer were present in the car "to observe system performance and ensure the passenger's comfort and safety."[99] The presence of two individuals beyond the passengers in the small space of a taxi indicate significant concerns about safety. The self-driving shuttle bus trials at the National University of Singapore (NUS) in 2018 also had a safety engineer on board.[100] In 2019, the creation of guidelines for fully AVs was announced, together with the statement that all AVs being tested in Singapore require a safety driver "who takes control of the vehicle if necessary."[101]

One of the challenges encountered by AVs in Singapore is driving in bad weather.[102] Singapore encounters periods of heavy wind and rain,[103] and in the 2016 partnership between Grab and nuTonomy, the plan was

[95] "ComfortDelGro to Trial Self-Driving Shuttle Bus at NUS from March 2019," *Channel News Asia* (November 12, 2018) ["Self-Driving Shuttle Bus"].
[96] Ibid.
[97] Siti Nur Aisha Omar, "No Drivers Needed," *The New Paper* (October 13, 2015) ["No Drivers Needed"].
[98] "Self-Driving Vehicle Trials", note 69 above.
[99] "Driverless Taxis", note 47 above.
[100] "Self-Driving Shuttle Bus", note 95 above.
[101] "Standards Drawn Up", note 72 above.
[102] See "Driverless Vehicles Slated", note 52 above; and "Sentosa to Trial", note 46 above; regarding the ability of AVs to navigate in heavy rain, see "LTA Signs Deal", note 55 above; and Christopher Tan, "ComfortDelGro's Self-Driving Shuttles to Start Picking Up Passengers at NUS," *The Straits Times* (July 29, 2019) ["Self-Driving Shuttles"].
[103] "Sentosa to Trial", note 46 above.

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to have a safety driver who would take over if it started to rain heavily.[104] The weather challenge was included in the LTA and the Jurong Town Council SDV research center and circuit, where driverless vehicles could be tested under traffic conditions.[105] Senior Minister for State for Transport Josephine Teo observed that the center and circuit could help Singapore develop standards and put SDVs on the roads.[106] The creation of the Singtel Cyber Security Institute was announced in 2019, a research center where researchers would be able to "put the solutions they have developed through rigorous testing and prototyping."[107]

The safety issues posed by AV navigation are also addressed in discussions of AV navigation mechanisms. AVs tested in Gardens by the Bay had laser technology to "scan the surroundings and register the position of the vehicle. It is able to detect obstacles, such as a person walking into its path."[108] Camera lenses are located at the front and back of the vehicle for video capture, sensor fusion can choose the best navigation techniques to suit various road conditions, and radio frequency identification can be placed at different locations in Gardens by the Bay to support navigation.[109] Proposed automated buses in 2017 would have radar and sonars to detect other vehicles and pedestrians.[110] The Prime Minister Lee Hsien Loong and Minister for Trade and Industry Mr. S. Iswaran "hitched a ride" in A*STAR's self-driving car, which used laser sensors and A*STAR's own algorithm "to ensure a safe driving experience."[111]

In a demonstration, this AV was shown to have the ability to detect traffic lights, stop lines, "and objects as small as a child. It is even able to function in complete darkness."[112] The use of the image of a child is significant, as one of the concerns regarding AVs is that if they do not detect pedestrians, they could hit them and cause injury. Children could be more vulnerable to injury from AVs compared to adults, a theme that arose above in connection with automated school buses. The presence of a child in narratives regarding AVs can therefore indicate fear, but children are also put to other uses in these narratives. The need for

[104] "Driverless Taxis", note 47 above.
[105] "Test Driverless Cars", note 54 above.
[106] Ibid.
[107] "Cyber Security Solutions", note 66 above.
[108] "No Drivers Needed", note 97 above.
[109] Ibid.
[110] "LTA Signs Deal", note 55 above.
[111] "A*STAR's Latest", note 85 above.
[112] Ibid.

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safeguards is contextualized in a more palatable manner via the observation that "[y]ou really don't want your five-year-old jumping into a self-driving car and then taking off to Disneyland."[113] This narrative acknowledges a fear regarding AVs, but inserts a happy, almost cartoon-like story of a mischievous child, with the happy ending of arriving safely at Disneyland.

III.A.4 Regulation and Liability

It was noted earlier on in Singapore's engagement with AVs that SAVI would "look into regulations required for the mass adoption of such vehicles, such as liability issues when accidents happen and infrastructure requirements."[114] In the context of constructing infrastructure, CCTVs were put into place along a test route, to identify challenges and because "footage can also serve as evidence in an investigation if an accident occurs."[115] When Grab introduced a self-driving "Robo-Car" for testing in 2016, users had to be above the age of 18 and sign a liability waiver before riding.[116] Legal and insurance experts opined in December 2016 that liability issues involving AV technology were unclear.[117] Then Dean of the NUS Faculty of Law Simon Chesterman noted that criminal law focused on the driver of the vehicle, and that the lack of a driver posed "a real regulatory challenge."[118]

An accident involving a self-driving car did occur in Singapore on October 18, 2016.[119] One of nuTonomy's self-driving cars hit a lorry in Biopolis Drive while on a test drive. The vehicle had two engineers on board, and one of them was behind the wheel as a safety driver.[120] The vehicle was driving at a low speed and changing lanes when the accident occurred.[121] No one was hurt,[122] but the right bumper of the

[113] Walter Sim, "Self-Driving Cars: Japan Start-Up Sets Up Research Lab in Singapore," *The Straits Times* (August 26, 2018) ["Japan Start-Up"].
[114] "Driverless Cars", note 53 above.
[115] "Test Bed", note 87 above.
[116] "Driverless Taxis", note 47 above.
[117] Zhaki Abdullah, "Driverless Vehicles Could Change Laws, Insurance Policies," *The Straits Times* (December 13, 2016) ["Change Laws"].
[118] Ibid.
[119] "Driverless Bus Trial", note 54 above.
[120] Adrian Lim & Chew Hui Min, "NuTonomy Resumes Driverless Car Trials in One-North, Says Software Glitch to Blame for Accident," *The Straits Times* (November 24, 2016) ["Software Glitch"].
[121] "Brakes on Self-Driving Trials", note 63 above.
[122] Ibid.

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self-driving car was damaged and the lorry had a dent in the side.[123] The Traffic Police and LTA investigated the accident, and the company conducted its own investigation.[124] Following the accident, nuTonomy put its tests of driverless cars on hold, although tests by three other agencies, A*STAR, Delphi, and the Singapore-MIT Alliance for Research and Technology, continued.[125] Also following the accident, the Executive Director of the Energy Research Institute @ NTU said that his researchers would be spending more time identifying possible safety compromises and run simulations on the buses being trialed at NTU to ensure safety.[126]

Having investigated the accident, NuTonomy reported the following month that "an extremely rare combination of software anomalies" affected how the vehicle detected and responded to other nearby vehicles when changing lanes.[127] There was no discussion of why the two safety engineers were not able to prevent the accident. The company reported that it had made improvements to its software system to eliminate the anomalies responsible for the accident, and that extensive tests had been performed using computer simulations and private roads to ensure a safe operation moving forward.[128] The company also reported that it had resumed trials.[129]

The need for additional regulation has been acknowledged in Singapore, with changes to, e.g., the Road Traffic Act in 2017.[130] The changes included penalties for private-hire drivers operating without a proper license or adequate insurance.[131] Without identifying particular AV issues, it was stated that while AVs can enhance the efficiency and convenience of Singapore's land transport system, "the Government cannot take a 'completely laissez-faire approach.'"[132] Singapore would therefore adopt a "balanced, light-touch regulatory stance that protects the safety of passengers and other road users, and yet ensures that these technologies can flourish."[133]

[123] "Software Glitch", note 120 above.
[124] "Brakes on Self-Driving Trials", note 63 above.
[125] Ibid.
[126] "Driverless Bus Trial", note 54 above.
[127] "Software Glitch", note 120 above.
[128] Ibid.
[129] Ibid.
[130] Faris Mokhtar, "Laws Regulating Private Car Hires, AVs to Enhance Safety Passed," *Today* (February 8, 2017).
[131] Ibid.
[132] Ibid.
[133] Ibid.

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Newspaper reports presented some competing narratives regarding the regulation of safety and risk. The Auto Insurance Head of AIG said that AVs could make the roads safer because of the large proportion of accidents caused by human error, and that other features such as collision avoidance systems have reduced accidents significantly.[134] However, NTUC (National Trades Union Congress) Income's general insurance and health general manager said that repair costs could be higher.[135] The creation of technical guidelines for AVs covering areas such as vehicle behavior and safety was announced in 2019, which came "after a year of discussions between representatives from the autonomous vehicle industry, government agencies, as well as research institutes and institutes of higher learning."[136] As noted by a professor at NUS's Advanced Robotics Centre, the guidelines were not rules, but they could be a basis for formulating regulations for AVs.[137] Permanent Secretary for Transport Loh Ngai Seng, Chairman of CARTS, said that he hoped that Technical Reference 68, a set of guidelines covering areas such as vehicle behavior and safety as well as cyber security, will "guide industry players in the safe and effective deployment of autonomous vehicles in Singapore."[138]

How might narrative arguments regarding AVs interact with Singapore's regulatory approach? Singapore has pushed for AV development, and given safety concerns, that would support a stricter approach with comprehensive regulation. However, a narrative that AVs are not inevitable, and that they would only be allowed if they pass rigorous testing etc., suggests that AVs do not need strict legal regulation, because testing and trial regimes ensure safe operation. Newspaper reports in fact suggest that government discussions of AVs did not assert that AV development was inevitable. Widespread use of AVs was characterized in 2015 as "possible in the next 10 years."[139] The study done on Sentosa would enable the venue to "decide whether the driverless vehicles will become a permanent feature after the trial," and the entire study on Sentosa should produce insights that "will also help authorities evaluate the possibility of deploying similar self-driving shuttle systems for intra-town in other parts of Singapore in the future."[140] The driverless

[134] "Change Laws", note 117 above.
[135] Ibid.
[136] "Standards Drawn Up", note 72 above.
[137] Ibid.
[138] Ibid.
[139] "Driverless Vehicles Slated", note 52 above.
[140] "Sentosa to Trial", note 46 above.

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truck trials in 2017 took place in two phases, with the first phase conducted by companies in their respective countries, and "depending on those outcomes, MOT and PSA Corporation will then select one of the companies" for Phase Two, which would involve further local trials and development.[141] Regarding driverless electric buses slated for trial in 2018, the SMRT Chief Executive Officer (CEO) stated that AVs "are expected to be fielded in larger scale under the future land transport master plan," and that they would "leverage our extensive experience operating and maintaining buses to support the eventual deployment of autonomous vehicles safely on our roads," but that "if successful" the buses "will serve commuters in the coming years," and no timeline was provided.[142] Even when discussing progress in AV development, government discussions tended to conceive of the process in steps, e.g., regarding driverless trucks using a platoon approach with a human-driven lead truck with a convoy of driverless trucks, "it is timely that we move on to the next steps in developing truck platooning technology."[143]

III.B Commercial Entities

In the Singapore context, commercial entities have paired up with government entities to develop AVs, and their narratives revolve around commercial success, AV advantages, and AV inevitability.

III.B.1 Commercial Success

Highlighting the theme that AVs could provide seamless first and last mile connectivity for commuters, a joint venture between the government transportation entity SMRT Services and the company 2getthere Holding was announced on April 20, 2016.[144] The Singapore-based joint venture planned to market, install, operate, and maintain AV systems for customers in Singapore and the Asia-Pacific, and aimed to commercialize 2getthere's "third-generation Group Rapid Transit Vehicle system in Singapore by the end of the year."[145] It was announced in January 2017 that agreements were signed with two automotive

[141] "Port Transport", note 81 above.
[142] "Driverless Electric Buses", note 89 above.
[143] "Port Transport", note 81 above.
[144] "SMRT and 2getthere Partner to Bring Automated Vehicles to Singapore," *Channel News Asia* (April 20, 2016).
[145] Ibid.

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companies, Scania and Toyota Tusho, to develop and test an autonomous truck platooning system,[146] and a partnership was formed in April 2017 between the LTA and ST Kinetics to develop and trial autonomous buses.[147]

Singapore newspapers gave significant coverage to the local start-up nuTonomy, which was expected to start limited commercial service by 2018.[148] The LTA signed agreements with nuTonomy, as well as the UK company Delphi Automotive Systems, to make AVs a reality.[149] Grab introduced a "Robo-Car" in 2016,[150] and announced its partnership with nuTonomy, the first company in the world to try out self-driving taxis in public, three days after raising $750 million in funding.[151]

III.B.2 AV Advantages

There was occasional coverage of commercial entities extolling the virtues of their products, and these narrative advertisements echo some of the advantages of AVs noted in government narratives. One 2018 article regarding an Audi AV asked, "What would you do with an extra hour of your life every day?"[152] If you're someone who loves to drive, "then autonomous driving might not be for you," but in Singapore, "we experience traffic jams daily," and AVs give the driver the choice to "clear … e-mails or spend time interacting with … friends and family."[153] This discussion assumes that the AV is at the most advanced level and does not require the attention of the driver: "Once all the conditions are met and the systems are engaged, it leaves the driver free to take hands off the wheel and do other things."[154]

III.B.3 Inevitability

The inevitability narrative favored by commercial entities makes a strong appearance in the research studies and surveys discussed at the beginning of the chapter, and inevitability also appears in newspaper

[146] "Port Transport", note 81 above.
[147] "LTA Signs Deal", note 55 above.
[148] "Test Driverless Cars", note 54 above.
[149] Ibid.
[150] "Driverless Taxis", note 47 above.
[151] Ibid.
[152] Derryn Wong, "The Next Audi Limo Will Pay You Back in Time," *The Business Times* (January 13, 2018) ["Next Audi Limo"].
[153] Ibid.
[154] Ibid.

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coverage of commercial entities. The CEO of MooVita, creator of AV MooAV, suggested that cars like MooAV "will become a common sight in Singapore."[155] The CEO of taxi company ComfortDelGro stated that the operational experience gained in AV trials would be invaluable "as we prepare for a future where autonomous vehicles … become an integral part of our daily commute."[156]

There are even instances of a commercial entity attributing inevitability to the Singapore government. For example, local start-up nuTonomy described how favorable the AV environment is in Singapore, stating that they see Singapore as "one of the best markets in the world for this technology … [Singapore wants] it to happen, and they're going to make sure it does."[157] However, this statement attributes an inevitability to the Singapore government which is not reflected in the government narratives analyzed above.

A related but slightly different narrative argument is raised in commercial entities' discussion of regulatory approaches. In a 2018 article, Audi acknowledged there are hurdles to overcome in AV development, because although autonomous driving is a reality, the question is "whether or not you'll be allowed to do it …."[158] The article noted two legislative barriers: "whether autonomous cars are allowed at all, and what drivers are allowed to do while the car drives itself."[159] Audi said it planned to seek approval from the LTA for its "Audi AI Traffic Jam Pilot."[160] Another 2018 article noted that the establishment of a Japanese start-up in Singapore was attributed to Singapore's "support in removing regulatory barriers and promoting testing."[161] Companies can build technology, but if the market does not accept it, or "the government does not allow us to introduce the car, then all it is is an interesting toy."[162] The commercial message here is that AVs are here, but short-sighted regulation could impede consumer access to it. In particular, the toy image suggests that imprudent regulation could trivialize a major development, one that has already arrived.

[155] "Self-Driving Cars", note 91 above.
[156] "Self-Driving Shuttles", note 102 above.
[157] Evan Ackerman, "NuTonomy to Launch World's First Fully Autonomous Taxi Service in Singapore This Year," *IEEE Spectrum* (April 4, 2016).
[158] "Next Audi Limo", note 152 above.
[159] Ibid.
[160] Ibid.
[161] "Japan Start-Up", note 113 above.
[162] Ibid.

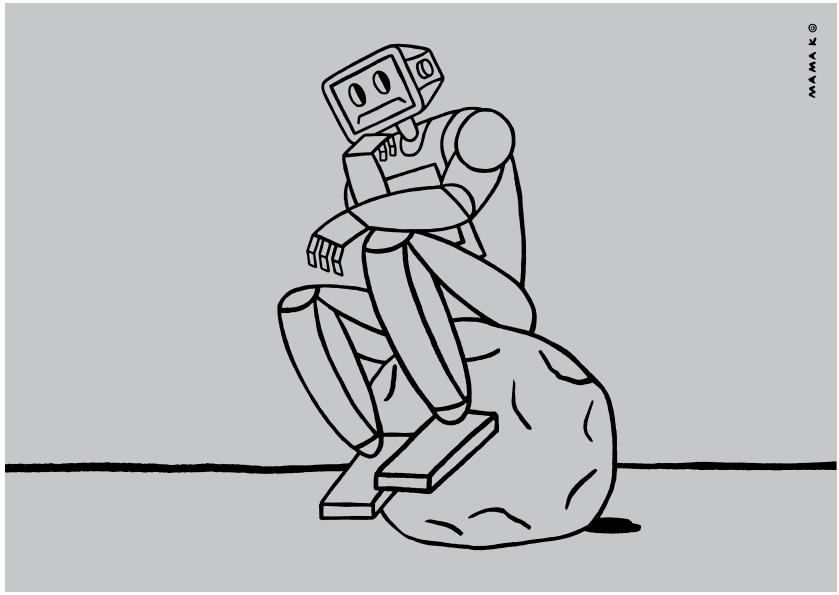
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IV Conclusion

The chapter has argued that research surveys and newspaper articles suggest a distinct group of narrative arguments regarding AVs in Singapore. Public opinion included some views that AVs would bring positive outcomes, such as convenience and task completion without the need to interact with a human, but concern and fear were also expressed, primarily about the safety of AVs with some discussion of job loss. Government and commercial entities expressed reassuring narratives, such as those emphasizing AV testing and controlled pilot projects. The Singapore government was portrayed, by itself and by its commercial partners, as pushing for AV development, to, among other reasons, address the Singapore need to deal with resources in short supply, such as truck drivers and land space.

Narratives of government and commercial entities often complemented each other, and in newspaper articles, the government and commercial positions were regularly intertwined. These narratives were frequently upbeat, and when they addressed safety concerns, they did not necessarily acknowledge the reasons why there would be any concerns. There is, however, a difference between government and commercial narratives regarding AVs: commercial entities asserted an inevitability narrative, while government entities did not. According to the inevitability narrative, there is no stopping technological advances like AVs and their composite parts such as AI, so countries and the public should simply accept that and focus on managing the risks. This narrative argument conflicts at a fundamental level with a different narrative regarding how government and law function, that government officials are responsible for determining what technology can be used in their jurisdiction and implementing rules regarding it, including prohibitions if warranted. The government's rejection of the inevitability narrative supports a view of law and government in which government officials decide the degree and pace of AV development. However, Singapore has not adopted a strict regulatory approach, and has opted instead for light touch regulation. As a narrative argument, the rejection of inevitability does not dictate a particular regulatory approach, and is consistent with either light touch or strict regulation.

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