Jeremy Pitt

Transparent Ownership of Mobility-as-a-Service

I have not got a sixty-nine Chevy with a three-ninety-six, and I am fairly sure that what I have got does not have fuelie heads or a Hurst on the floor. Nor is it waiting tonight in the parking lot, and it is not going racing in the street — but it is taking up space in the street.[1]

I can also assert that, with the exception of various "financial products" (like endowment mortgages, pensions, and personal savings plans (mis)sold in the carnage of financial deregulation in the 1980s), the top four most ludicrous purchases that I have ever made are the four cars that I have bought. Generalizing massively, the whole personal car ownership model is completely absurd, for several reasons besides, at least in the U.K., predicating the entire transport policy of a small, crowded island on road building, traffic growth, and car sales, irrespective of environmental damage and carbon emission targets.[2]

These reasons include: that the "own car" is expensive to purchase, and equally expensive to maintain (tax, insurance, roadworthiness); it loses half its value as soon as it is driven off the garage forecourt; it is

Parking in London. The most popular British models have increased in width by 16% in the last 40 years, and so increasingly encroach on pedestrian spaces.

powered by a fuel that is environmentally unsustainable and contributes to rampant levels of air pollution (1); it is unused 95% of the time; it occupies room in a public space (and, as the deluded desire for ever larger cars increases, so the encroachment into pedestrian spaces increases, see Figure 1); it is not multi-purpose (i.e. a different vehicle is required for different tasks)[3]; it can be stressful to use, as increasing incidents of "road rage" attest; and it can be dangerous, par-

ticularly for other road users, as irresponsible drivers speed, drink-drive, or use mobile phones (even those who try to practice defensive driving are not immune: you sit behind the wheel of a car in motion; you can kill someone with that machine).

Personal car ownership is also incredibly inefficient (2). Single occupancy of vehicles designed for four or more is still wasteful, despite carpooling and ride-sharing initiatives. Moreover, it is estimated that up to one third of the traffic circulating in central London is simply driving in search of a parking spot; moreover, the energy savings of platooning (motorway driving with vehicles

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[1] Bruce Springsteen, *Racing in the Street* (1978). Beyond the sixty-nine Chevy, which I understand refers to a model of car manufactured by U.S. automotive industry company Chevrolet, and the parking lot, I have absolutely no idea what the rest of it means.

[2] One of the Thatcher government's barmier ideas: "roads for prosperity" and the "great car economy." Like financial deregulation, that worked out well. Having said that, the U.K. Conservative party had yet to discover that sane and rational policy for nation building and economic growth otherwise known as "Brexit."

[3] Anyone who has tried to get four 100 kg (220 lb) men and all their golf clubs in a Nissan Micra, as a prelude to actually playing the game rather than an attempt to gain an unlikely entry in the Guinness Book of Records, will recognize the difficulty of this situation.

much closer than the recommended stopping distance) could be as much as 4%. Similarly, the spare tire that used to be carried in the trunk occupied space, carried significant weight and often went unused. Like turning off the standby button on electronic devices, making a small savings on a large number adds up to a large savings, and automakers began eliminating spare tires to make vehicles lighter, in order to meet fuel efficiency standards.

Ranged against this, of course, is the fact that a car ownership is an undeniably comfortable and convenient mode of transport: it is a ready-made "bubble" that can alleviate (some of) the aggravation of

> **Besides questions of responsibility and liability, driverless cars raise other questions concerning control, transparency, and ownership.**

using public transport, reduce waiting and journey times, reduce exposure to the elements, and pander to an unwillingness to share personal space with complete strangers. And for some, there is pleasure in ownership in and of itself, even if for some of the terminally insecure, it provides an ostentatious symbol of what they might be lacking in social status, and for some others, allegedly, over-compensation for goodness knows what else they might be lacking in physical stature.

However, the car itself has proved, in recent years, to have been a convenient vehicle (sic) or significant driver (sic) for research and development in battery technology, but also, seemingly, the foundation of the 'Ur' challenge for data-driven Artificial Intelligence (AI) – the *driverless car*. It could certainly be argued that it provides a grounded, highly relatable application for the study of machine ethics and moral decision-making based on pattern-matching [3], for issues of responsibility and safety in vehicle manufacturing and traffic regulation, and transparency in the pursuit of "explainable" AI. However, from a user-centered perspective, it might be more reasonable to inquire: why would anyone own, or even need to own, a driverless car, if they do not get to drive it? Which in turn begs the question, if the central tenet of the personal car ownership model (i.e., ownership) no longer holds, then what is the replacement business model?

One alternative could be rooted on a more general trend to a switch from the purchase of objects towards a subscription to services (life by subscription [4]). So, for example, increasing numbers of people no longer own "records" or "discs," but instead subscribe to an Internet music-streaming service; similarly, increasing numbers do not own DVDs but instead sign up to subscription-based video-on-demand content-streaming services that offer direct access to film and television media. The same phenomenon has already been seen, in fact, in the approach and attitude towards car tires: in the event of a flat tire, many drivers prefer to turn to a service provider, such as an automobile association, rather than fixing it themselves, even if this comes at the cost of some (further) de-skilling [5].

The same "*-as-a-service" model[4] could also be applied to revolutionize

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[4]*-as-a-service refers to something (anything, hence the "*") being made available to a subscriber or customer as a service.

the personal car ownership model, by supplying not the car, per se, but the *journey* as the service. This idea of mobility-as-a-service [6] (also referred to as transport-as-a-service or journey-as-a-service) presents a vision of mobility as a concept that can be bundled, marketed, monetized and sold as a standalone product delivered directly to travelers,[5] bypassing car manufacturers, civil authorities, scheduled public transportation, and on-demand service providers (i.e., taxi companies) that traditionally control, regulate, or deliver such activity.

Let us envisage, then, a world of driverless cars that has dismantled the personal car ownership model and replaced it with mobility-as-a-service. A journey could be booked by logging in to the service provider's platform, specifying the details of the journey (start point, end point, depart time, arrive time, one-way or return, etc.,), customizing the model of car for a particular task. A type of 'standing order' could be set up to specify a regular commute. The details of the requested journey would be submitted to some warehouse-sized centralized computer which would allocate the vehicle, calculate the route and duration, and schedule accordingly. All vehicles would be electric and street parking would be eliminated, avoiding contention for charging points. At off-peak times, multi-story car parks would conveniently double-up in function as large, distributed second-tier batteries that can help compensate for over- or under-generation of stochastic renewable energy sources. The car itself picks up and drops off

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[5]We use the term "traveler" here to denote the user of a service: however, we would certainly prefer the term "passenger," i.e., denoting someone who is taking advantage of the provision of a service, over the term "customer," i.e., denoting someone who is taken advantage of in the sale of a service.

at the appointed times, and does not require parking or waiting. It all sounds quite pro-social, possibly utopian:[6] what's not to like?

In fact, there is much not to like. As with all business models based on *-as-a-service, whether or not the technology to deliver it turns out to be a public good is a question of *ownership*, and in particular *transparency* of ownership. It is necessary to determine who owns the infrastructure, who owns the objects that are operating on the infrastructure, who owns the platform, and who owns the data that is generated by operation of the infrastructure — and determine who is benefitting from this ownership, and by how much. The problem is that *private* and *opaque* ownership and provision of mobility-as-a-service is potentially fraught with problems. There are many reasons for this.

Firstly, the arguments against private ownership of the means of social coordination have been strongly made in prior work (9). The opportunities for successful collective action are diminished, the distribution of benefits between the service users and the platform/service provider is asymmetric, and the "market" dominated by a few organizations who wield disproportionate and unaccountable social and political power.

Secondly, mobility is critical to the economic well-being of both cities and regions (10). Restricting

mobility privately-owned driverless cars while mass urban transportation is eliminated as an option presents another opportunity for transnational corporations to insert their corporate proboscis into the social economy of a local community and suck the lifeblood from it (11). Some online transportation companies charge as much as 25% commission for each journey taken: this means that currency, as a force multiplier for creating loose ties in a social network, is diminished by a quarter. A local economy can wither away when these loose ties are untangled.

Moreover, mobility can be a public service for a prosocial public good, and arguably should be subsidized as such. Anyone could run a profit-maximizing bus company if they only ran services during morning and evening rush hours with nothing in between, and had all their drivers on zero-hours contracts so they were only employed and paid for those hours. Seeing each individual's mobility as simply a revenue stream and not appreciating its semantics and its contribution to collective civil enterprise is entirely reductionist and devoid of humanity.

Thirdly, there is a question of "road neutrality." Mirroring the issue of net neutrality, each car on the road network should be treated equally, the same way that each packet on the Internet is treated equally. Discriminating between journeys by designating some as more important than others, or creating "markets" where none exists (there are proposals for the occupants of driverless cars to bid for resources, like priority at junctions, speed, and so on) undermines the concept of a public infrastructure offering a common experience to all.

Fourthly, transportation data is essential for urban planning. This

data should not disappear behind a corporate firewall and only be available for analytics by the corporation itself. In a closed system, the control (and in fact the potential for manipulation and misrepresentation) of information is concentrated in an un-elected and unaccountable external body.

Fifthly, there is a concern of what happens in case of systemic failure. Suppose there is an accident: who is responsible for paying for and provisioning emergency services? Typically in situations where profit is privatized and risk is socialized, the platform- and service-provider

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abnegates responsibility for events occurring on the infrastructure, and claims that it merely provides an access point to that infrastructure.

Sixthly, there is the undermining of "democratization." Democratization here means ensuring that decision-making with respect to self-determination is as close to the edge of the network as possible: in this case, it should rest with the individual traveler. Who gets to be mobile, and who does not, might be dependent on whether or not there are resources available ("error 396: car not found"?) but with a centralized system lacking transparency it could also be because of an inverted denial of service — the platform has censored or prohibited the mobility of the service user, and it would be impossible to tell the difference.

Finally, the restriction of physical mobility diminishes social mobility. It is no surprise that those wishing

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[6]*This Pervasive Day* (7) examined the technology portrayed in the human-society-controlled-by-computer dystopian novel *This Perfect Day* (8) to evaluate how close the reality of 2012 had been to the imagination in 1970. Although many aspects were covered, from wearables to implants, transportation was not addressed, indicating just how far and how quickly the concept of the driverless car has come in recent years. However, the predominant forms of transportation in the book were planes (mass) and bicycles (personal), and the car was considered dirty, dangerous and in fact superfluous. Control people's lives and you can limit their mobility; reciprocally, limiting their mobility can help control people's lives.

for the U.K. to leave the European Union are also so keen to load its citizens with student debt: this implicitly imposes a form of 21st century indentured slavery by taking away one of their rights, i.e., the free movement of labor. The gig economy [12] does no favors for those on zero-hours contracts, but driverless cars reduces even this perilous employment (i.e., no couriers or taxi drivers are required), thereby creating an ever larger pool of labor, further depressing wages, workers' rights, pensions, and so on.

The Opinion section of this issue contains one article predicting that driverless cars will make passenger rails obsolete, and a number of responses. Underlying this important debate (and many thanks to the contributors who have participated and made it possible in these pages), is the belief that in the end, this is not just a question about whether driverless cars will make passenger rail obsolete, or whether driverless cars will be one of a plurality of transport modalities, or a question about the investment decisions, technological developments, and social implications that are implied by either outcome. The deeper question is one of ownership and transparency: who owns the infrastructure; who owns the "things" which move on the infrastructure, who owns the platform(s) that do the aggregation and service provision, and who owns the information generated by normal behavior (i.e., commuting). There needs to be more vocal public inquiry, more strategic planning and proactive regulation, and some much better-informed decision-making about the headlong, eyes-down pursuit of driverless cars.

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References

[1] G. Monbiot. Cars are killing us. Within 10 years, we must phase them out. The Guardian, 7 March 2019. https://www.theguardian.com/commentisfree/2019/mar/07/cars-killing-us-driving-environment-phase-out
[2] G. Monbiot. The car has a chokehold on Britain. It's time to free ourselves. The Guardian, 1 August 2017. https://www.theguardian.com/commentisfree/2017/aug/01/car-chokehold-britain-polluted-inefficient-transport-system-motor-industry
[3] A. Winfield, K. Michael, J. Pitt and V. Evers, Machine ethics: the design and governance of ethical AI and autonomous systems. Proceedings of the IEEE, 107(3):509-517.
[4] N. Milanovic. Life, by subscription. TechCrunch, 2016. https://techcrunch.com/2016/03/18/life-by-subscription/
[5] A. Nowak, P. Lukowicz and P. Horodecki. Assessing Artificial Intelligence for Humanity. IEEE Technology and Society Magazine, 37(4):26-34, 2018.
[6] N. Sipe and D. Pojani, For Mobility as a Service (MaaS) to solve our transport woes, some things need to change. The Conversation, 19 Novemmber 2018. https://theconversation.com/for-mobility-as-a-service-maas-to-solve-our-transport-woes-some-things-need-to-change-105119
[7] J. Pitt (editor), This Pervasive Day. IC Press, 2012.
[8] I. Levin, This Perfect Day. Random House, 1970.
[9] J. Pitt, A. Rychwalska, M. Roszczynska-Kurasinska and A. Nowak, Democratizing Platforms for Social Coordination. IEEE Technology and Society Magazine, 38(1):43-50, 2019.
[10] C. Wolmar, Are Trams Socialist?: Why Britain Has No Transport Policy. London Publishing Partnership, 2016.
[11] J. Pitt, J. Clippinger and C. Sorensen, Values, Axial Currencies, and Computational Axiology: Digital Currencies Can Do More than Buy Stuff. IEEE Technology and Society Magazine, 37(3):56-63, 2018.
[12] N. Kobie, What is the gig economy and why is it so controversial. Wired Magazine, 14 September 2018. https://www.wired.co.uk/article/what-is-the-gig-economy-meaning-definition-why-is-it-called-gig-economy

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