

Horizon Scanning Series

The Effective and Ethical Development of Artificial Intelligence: An Opportunity to Improve Our Wellbeing

Transport and Mobility

This input paper was prepared by Michael Cameron

Suggested Citation

Cameron, M (2018). Transport and Mobility. Input paper for the Horizon Scanning Project “The Effective and Ethical Development of Artificial Intelligence: An Opportunity to Improve Our Wellbeing” on behalf of the Australian Council of Learned Academies, www.acola.org.

The views and opinions expressed in this report are those of the author and do not necessarily reflect the opinions of ACOLA.

What are the likely intersecting transformations between physical, communicative, digital and virtual mobilities in Australia and New Zealand in the next 5 to 10 years?

Ride hailing

In the last few years we have seen the emergence and proliferation of ride-hailing services using GPS equipped mobile devices. Companies like Uber and Lyft allow a rider to use their device to effortlessly request a ride to a specified destination without having to specify their current location (which is already known through the phone's GPS). The rider can see an exact quote of the cost of their ride before accepting it. They can also see the available vehicles in the vicinity, and they can be confident of the impending arrival of their ride. Riders in some cities are offered the cheaper option of ridesharing whereby an algorithm groups riders with similar routes together. In this way vehicles can weave through the city, taking small detours to pick up and drop off multiple riders along the way. And as a vehicle travels towards its destination, its driver is guided by GPS navigation apps.

This model is ripe for the introduction of driverless vehicles. Much of the system is already in place and consumers have already been trained how to use it. All that remains is for some of the cars in the ride hailing fleet to be replaced by driverless vehicles. This is already happening in some US cities such as Pittsburgh and Phoenix (albeit the "driverless" vehicles have a supervising human driver for now).

The advantage of a hybrid human/driverless vehicle fleet is there will (at first) be many scenarios where - for whatever reason - a driverless vehicle cannot be sent out. Perhaps the weather conditions are not suitable. Perhaps the rider has chosen a destination that would require the vehicle to travel over roads that have not been 3D-mapped, or for which the vehicles have not been trained/programmed. In such situations the rider can still be serviced by being sent a human-driven vehicle. As driverless vehicles improve their capabilities they will gradually take over the fleet.

Driverless vehicles in a ride-hailing fleet could come from many sources. They might be owned by a ride hailing company such as Uber. They could be owned by someone else and loaned to the fleet. They could even be the private vehicles of individuals who are sending their vehicles out to work and earn money while they are not using them. For example Tesla plans to have a function on all of its vehicles whereby the private owner can instruct the vehicle to join the Tesla vehicle hailing fleet. In this way, the real cost of buying a driverless vehicle can be drastically reduced.

Deliveries

Another activity that could be transformed is the delivery of groceries and other goods. Supermarkets already offer delivery services, but many consumers find the delivery fee too expensive. The development of driverless vehicles would eliminate the major cost (the salary of the driver). In addition, once you take the human out of the equation you can use a much smaller, less heavily armoured, safer and more efficient vehicle. Delivery vehicles are already being trialled on public roads, such as the vehicle by Nuro AI in California.

Autonomous trucks

Long range transportation is also set to be revolutionised, with platoons of driverless trucks that closely follow a human driven/supervised vehicle. This will create savings in terms of reduced

salaries and reduced fuel/energy costs (because driverless trucks can follow closely in the slipstream of the preceding truck).

What penetration of autonomous vehicles will we see in next decade?

The degree of penetration we will see in Australia and New Zealand will depend to a large extent on how quickly laws can be reformed to make them more receptive to the deployment of driverless vehicles, and how proactive authorities are at communicating that receptivity to companies (both domestic and overseas) that may be considering operating in our jurisdictions. Large companies such as General Motors are planning to deploy driverless ride hailing fleets in American cities in 2019. Waymo already has an unsupervised driverless fleet operating in Arizona, and plans to deploy a driverless fleet for consumers soon. There is no inherent reason why we could not see similar deployments in Australasian cities. But current laws (or at least the presentation of those laws) are not likely to be sufficient to see such deployments in the near future.

What secondary effects (e.g. on real estate, the gig economy) can we expect in next decade?

Urban character

One of the great concerns about driverless vehicles is that they could transform cities for the worse. Many cities rely on foot traffic for their unique character. If everyone has super cheap point-to-point transport on demand, might our cities degenerate into featureless urban deserts populated by hyper-efficient people-moving boxes?

One possible solution is to close off parts of the city to vehicles so that people are dropped off at central points and must walk the “last mile”. There would need to be exceptions, such as for loading vehicles or for people with disabilities.

Congestion and emissions

Another concern is that driverless vehicles, for all their anticipated congestion and emission easing potential, might actually increase traffic. If they are really going to be as cheap and convenient as hoped, then we might expect to see the average person taking a lot more vehicle trips than they used to.

One of the ways this could be addressed could be through congestion charges in high traffic density areas.

Special Lanes

There may be advantages in providing dedicated and separated lanes for use by autonomous shuttles or buses. This would allow for a zone that is physically closed off from potential hazards. Whether there is a need for such closed off lanes may be somewhat debatable however. If driverless vehicles improve as quickly as is hoped then the benefit of having closed off lanes may be a short-

term phenomenon, and public authorities might come to regret spending the large sums required to constrict them.

But there is a more compelling reason for having dedicated lanes for autonomous vehicles. There is huge potential for driverless traffic to be networked in order to reduce congestion. This potential can only be fully realised if there are at least some roads or lanes that are reserved for the exclusive use of driverless vehicles. This could perhaps begin with a driverless vehicle lane on the motorway, which would allow whole columns of traffic to speed up and slow down as a single unit.

Parking

The parking habits of driverless vehicles will be potentially very different. When your vehicle drops you off and drives away, there is no need to have car parking available close to a destination.

Driverless vehicles that are providing transport as part of a driverless fleet will likely spend a lot less of their time parked, as they will be heading off to serve more customers. When driverless vehicles do need to park they might be better served by parking buildings on the city fringe, where real estate is less expensive. And if more and more people are preferring to use cheap mobility services provided driverless vehicle fleets rather than incur the expense of owning a vehicle, then there is less need for private residences to have car parks.

All of this means that it will probably be necessary to revise some of the requirements that relate to parking.

Current requirements for parking spaces within a building to be constructed to permit safe and easy unloading and movement of vehicles, and to avoid conflict between vehicles and pedestrians, may need to be revised. This would create needless inefficiencies for new parking buildings built specifically to cater for driverless vehicles. The vehicles would enter such buildings without any passengers onboard, so there would not need to be as much space to allow for easy unloading, no need for ventilation, and no need to avoid conflict with pedestrians.

At a local level many plans have rules that require new building developments to provide for new parking to cater for the additional demand that the development is expected to generate. The need to impose these requirements on developers should be re-evaluated.

Public transport

There is much concern about the potential for ride-sharing fleets to reduce demand for public transport and make it uneconomic for public authorities to continue providing it in some areas. This is a valid concern, but it should also be remembered that ride sharing fleets could also be a boon for public transport under some conditions. After all, a bus fleet is just another kind of ride-sharing fleet. There is nothing to stop bus companies from incorporating app-based ride sharing technology and driverless vehicles into their services. They could still have bus stops as before, but the riders would be able to indicate when they want to be picked up and where they want to go. Instead of always sending a huge bus at infrequent intervals, the company could provide a better service at a lower cost by deploying appropriately sized vehicles (including smaller vehicles such as shuttles when there aren't enough passengers to fill a bus) at the appropriate times, based on the demand that has been signalled by their customers. The distinction between bus services and taxi services would begin to

blur, except taxis would probably be a bit larger on average in order to serve multiple riders on similar routes.

What regulation is needed to enable and ensure technology benefits Australia and New Zealand?

One of the benefits of driverless vehicles is that they will create high value jobs associated with the development and deployment of the new technology. And because driverless vehicles are merely the start of a wave of robotic automation driven by artificial intelligence, these new jobs will continue to be created for years to come. These new jobs will be particularly important, because they can compensate for the many jobs that will be lost by drivers and the workers in other disrupted industries.

This highlights of the bigger downsides of driverless vehicles. While the technology is likely to eventually penetrate every society and destroy jobs, it is likely that the valuable new jobs will only go to those jurisdictions involved in the early development and deployment of driverless technology.

One of the bigger risks is that Australia and New Zealand will miss out on the initial wave of development and deployment of driverless vehicles. This could lead to our countries experiencing only the job destruction wrought by driverless vehicles, without the attendant job creation that will boost the economies of the early adopters. This could put our economies at a near permanent structural disadvantage.

This is why clear and receptive laws are crucial to ensure that Australia and New Zealand do not miss the window of opportunity presented by driverless vehicles.

Inherent legality

More clarity is needed to explicitly confirm the inherent legality of driverless vehicles on the road. Some doubt may be cast on this by the fact that both Australia and New Zealand are signatories to the Geneva Convention for Road Traffic 1949, which requires that every vehicle shall have a driver. Explicit statutory recognition of the inherent legality of driverless vehicles would remove any doubt, and would also provide a signal that Australia and New Zealand are “open for business” for driverless technology. It may also be necessary to contact the secretariat for the Geneva Convention for Road Traffic 1949 to negotiate an interpretation, amendment, or reservation to the convention to ensure New Zealand and Australia do not fall foul of their international obligations.

Mechanisms to ensure safety

Decisions are needed as to the mechanisms that will be used to ensure the safety of particular models of driverless vehicles, and individual vehicles. The temptation will be to use a system whereby manufacturers must apply for and obtain approval for the driverless aspects of their vehicles. This is what Australia is currently intending to do, while New Zealand has yet to decide.

The problem with such a system is that it puts what could be a very high burden of proof on manufacturers to prove that their driverless technology is safe, and requires government officials to determine whether they have met this burden. Driverless vehicles will be “guilty until proven innocent” in terms of their safety. A company could have a safe product, and could put a lot of effort into demonstrating its safety but could still – due to the complexity of driverless system – fail to get

approvers to understand their systems well enough to obtain an approval. Faced with such a prospect, they will likely concentrate on developing and release their vehicles in other markets, such as the United States. The US federal system does not require driverless technology to be approved. Instead the National Highway Transport Safety Administration encourages manufacturers to prepare a safety assessment and then – if there are any particular concerns about safety – they can take regulatory action, such as product recalls.

Clarification of criminal liability

It is important for driverless vehicles to have a “level playing field” compared to human driven vehicles. If something is unlawful for a human driven vehicle to do (i.e. speeding, failing to give way) then it should also be unlawful for a driverless vehicle to do it. However it is not always clear that this will be so. For example, it appears that – under New Zealand law – it is necessary for there to be a human driver for the offences of speeding or failing to give way to be committed. This means that it would be lawful for driverless vehicles to speed and fail to give way.

If this situation is to be corrected then law reform is necessary to identify who the appropriate offender should be if and when driverless vehicles perform such actions. Sometimes, liability will need to fall on the shoulders of the company that manufactured the vehicle. The reason for this is not really to incentivise manufacturers to develop law abiding vehicles. They are likely to want to do this anyway in order to foster public acceptance for their products and minimise any chance of a regulatory backlash. Instead, the reason is that some sort of liability – even if it ends up being mostly symbolic – is necessary if driverless vehicles are to have the same legal obligations as other vehicles. This is because legal obligations are meaningless if there is no possibility of legal sanctions in the event they are breached.

Clarification of civil liability

In the event that driverless vehicles cause property damage and personal injury, is tempting to leave the allocation of civil liability up to the courts.

The risk of such an approach is that it leaves a great deal of uncertainty as to who will be liable. This may discourage the uptake of driverless technology. Who would want to own or use a driverless vehicle if there was a prospect that they could be held financially liable for it actions? This risk can be avoided by legislating in advance as to the situations when different parties will be liable for damage.