What is the Future of Private Transport?

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Abstract

Technological disruptions in energy and transportation in coming years will have substantial impact on future private transportation (Saba 2014). It is claimed that by 2030, vehicles will be electrically driven, autonomous, and ownership will shift to car sharing. These changes will have a profound effect on today's societies. They will also come with considerable implications for governments and society in personal mobility, licensing needs, and government legal and regulatory regimes. Successful introduction may lead to road trauma reductions, cleaner and more liveable cities, and enhanced mobility. The paper addresses areas affected and the need for greater knowledge to address the potential challenges.

Background,

Saba (2014) claimed that a number of "disruptors" (major technological developments) are likely to have a significant impact on private transport in the coming years, most notably, electric autonomous vehicles, with a shift from owning to using service vehicles. He claimed that this could happen as early as 2025. Even if these bold predictions only partially eventuate, they are likely to have a profound effect on today's societies (up to a 20% reduction in the number of vehicles on our roads is predicted) with fewer crashes, reduced congestion, less need for parking facilities, environment improvements, greater use of public transport, potential changes in urban living, type of housing, vehicle ownership, etc. A detailed review paper was initially prepared and presented at the Urban Design 2016 Conference in Canberra for information (Fildes, *et al*, 2016).

A workshop was also held in November 2016 comprising members of local and national governments, vehicle industry, consumer groups, and researchers, to identify key issues of concern for autonomous vehicles for each of these organisations. The workshop was initiated by MUARC and Professor Claes Tingvall, Chalmers University, Sweden, also participated. Many of the items, above, were raised as issues requiring further research and knowledge. The need of considering the likely impact of these developments was raised to ensure we are well prepared for this change.

Method

Subsequently, a collaborative research partnership was established between six faculties at Monash University to review and address some of these issues. The partnership was funded by the Monash Infrastructure Institute (MI) and comprises members from the Accident Research Centre (MUARC), Institute of Transport Studies (ITS), Mobility Design Laboratory (MADA), SensiLab (IT), ClimateWorks Australia (Monash Sustainable Development Institute), and Monash Law (Fildes *et al*, 2017). Each participant group was assigned a Work Package to address relevant issues in their area of concern.

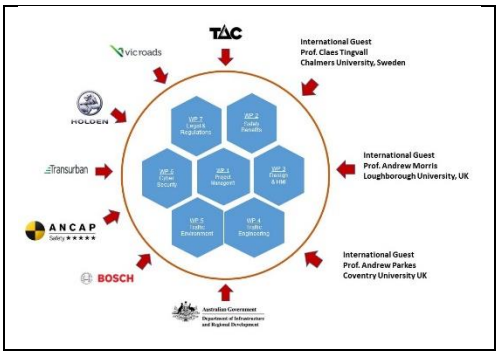

Figure 1. MI Consortium

While these vehicles are expected to offer improvements in traffic flow, social change, and their impact on urban design for Australian cities (Fildes *et al*, 2016), Of particular interest here is the ability of these vehicles in achieveing a ”Towards ZERO” outcome. The need for an onroad trial of autonomous eTaxis in a suitable precinct was especially noted to identify further key issues in their safe use and implementation.

Findings to Date

While this is still very much work in progress, a number of preliminary findings have been identified to date. While a fully autonomous fleet has the potential to achieve zero road deaths and serious injuries among vehicle crashes, the safety outcome among a mixed fleet (non-autonomous and autonomous vehicles) is less clear.

Figure 2. Example of Intersection Complexity (Source: Google.com.au)

Human intervention may play a role (drivers of non-autonomous vehicles or vulnerable road users may take advantage of programmed vehicles). Will drivers of autonomous vehicles rely on the technology completely or choose to take control, appropriately of inappropriately? What is the likely demand and supply of autonomous vehicles when they become available?

Furthermore, other questions arise with the technology and its limitations. While the technology appears to be inevitable, will it be capable of preventing all collisions? Will autonomous vehicles be able to cope with poor road delineation and infrastructure and avoid issues such as the ”trolley problem” (Thomson 1985)? Given the possible delays associated with numerous stoppages, will occupants continue to be attracted with the technology or through frustration, revert back to manual driving.

A number of vehicle scenarios are under development to address these potential safety issues and model the various safety outcomes in terms of savings in deaths and serious injuries. Key to assessing the potential savings in serious injuries and deaths will be the progressive take-up of autonomous vehicles and the rate of fade out of current vehicles in the fleet in the coming years. The work of Dresner and Stone (2005; 2007), IIHS (2008), Litman (2015) and Sivak and Schoettle (2015) has proven valuable in developing these model outcomes.

Discussion

There is little doubt that many of these changes will be forced upon society through disruption and community demand and we need to be prepared for these changes. Considerable public discussions, planning and innovation is required. Science will play a major role in identifying appropriate improved knowledge through new research and development. Greater appreciation of the public’s willingness to accept and embrace these new technologies will be key.

There will be innovative industry opportunities for this new transportation business model that need to be identified and promoted. Government strategies and policies are required in terms of necessary legislation and licensing for these vehicles, as well as a more societal approach. Potentially, the new technology will drive these private transport innovations and governments and communities need to keep up with this progress to ensure it is safe and beneficial for all Australians.

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