Horizon Scanning Series

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

Transport and Mobility

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ACOLA Mobility Report

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

The integration of AI (artificial intelligence) in transport and mobility will heavily influence society, and particularly cities in the coming decades. Virtual mobilities already change spaces, interactions, movements, communities, identities, technologies, materialities and the social fabric of the city (Freudendal-Pedersen & Kesselring, 2018; Sheller, 2013). Discourses of urban futures are no longer locally embedded and as such Australia and New Zealand are heavily influenced by the transnational and global connectivity and interdependencies in terms of economic activities and work, migration, intercultural exchange relations, logistics and transport etc.

AI within transport and mobility can affect how we work, where we choose to live and how we shop and socialize. Given that this radical change in transportation is likely to impact many facets of our society, it is essential to have a strong understanding of the new possibilities that will be created. Cities and regions are composed of complex settings of social, technological, geographical, cultural, and digital networks of mobilities (Graham & Marvin, 2002; Sheller & Urry, 2006). Various mobilities, potential mobilities and resources for travel are significant forces that influence how the city, and the sense of belonging to it, develops.

Historically, mobility has contained the idea and promise of frictionless speed (Jensen & Freudendal-Pedersen, 2012; Urry, 2007) that would lead to better and happier lives. Improved mobility has already brought about positive economic and social effects, such as wealth, and an international culture of collaboration. However, through its implementation, it has also resulted in increasing inequalities, climate change and urban sprawl (Freudendal-Pedersen & Kesselring, 2016). It has been proposed that new systems of AI and autonomous mobility can offer solutions to many of the issues that the world is currently facing (Dennis & Urry, 2013). But we need to be careful not to forget the interconnections between social and technological innovations and end up staying in a modern 'technocentric' planning paradigm (Hajer 1999), in which 'seamless mobility' seems to be the unchallenged principle for the efficient organization of societies and cities (Larner, 2000; Tickell & Peck, 2002). AI in transport and mobility is often discussed within the concept of smart cities, and Hajer (2015) reminds us that what we need is smart urbanism rather than smart cities. In this lies an understanding of all the things cities are and not only which technologies we can put into them. The question that needs to be asked is: what makes many Australian cities top the Forbes list of most livable cities in the world? And how can AI in transport and mobility support the livable city rather than undermine it? Cities separated in strict functional spaces for cars, pedestrians and perhaps cyclists, is not the kind of cities that are classified as livable.

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

Autonomous vehicles (AVs) have already been seen in simple closed systems such as trains, shuttle ferries and cars and trucks travelling on highway. The idea of AVs is almost 75 years old (Kornhauser, 2013), but barriers to implementation, including the immense adaptations to the built environment required, have limited their use. Recently, with the invention of wireless communication and sensor technologies, the technical means to create autonomous cars has reached a new level (Lamon, Kolski, & Siegwart, 2006). The implementation of AVs is still in its infancy, so it is hard to give an accurate timeline in terms of when they will make up a significant share of cars on the road. Moreover, there are several levels of car automation, each with varying amounts of human involvement. A number of carmakers expect to have Level 4 autonomation (autonomy in most situations) by the early 2020s (Fagella, 2017), but few are able to estimate when Level 5 (autonomy in all situations) will become widely available. The completely shift to AVs (Level 4+) will be game-changing within the mobility landscape, as it will all but remove humans from the equation. However, Level 4+ AVs will initially be limited to high-end cars for some time because of the high cost of sensor technology and computer-processing power. Consequently, it will most likely take decades to replace all cars with AVs. Due to the slow rollout and varying costs associated with different levels of autonomy, it is likely that AVs with different amounts of human involvement will be on the road at the same time. Another issue to take into account is the love of the car and the feeling of control man has been socialized into for the last 100 years (Conley & McLaren, 2009; Sheller, 2004).

An analysis from the Victoria Transport Policy Institute estimates that Level 4 cars will amount to between 5% and 20% of new cars by 2030. By 2040, this number will increase to between 10% and 90%. 2040 (Litman, 2018). While the wide range highlights the difficulty in planning the integration of this new technology, regulatory approval is key to the successful introduction of AVs to the mass market.

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

The sharing economy is expected to play an important role in the introduction of AVs (Copenhagen Institute for Futures Studies, 2018). A report by Deloitte estimates that by 2030, approximately 25% of new cars in urban areas in the US will be shared cars (Corwin, Jameson, Pankratz, & Willigmann, 2016). In addition to this, McKinsey predicts that by 2030 11.5% of global new cars will be shared cars (McKinsey&Company, 2016). A typical privately-owned car is parked 23 hours a day, when it drives it is rarely full (Spieser et al., 2014) and it is a huge waste of resources and space in urban areas. Therefore, it is imperative to view the development and introduction of AVs in the context of other technological developments: for example, the opportunity to integrate the use of AVs with digital solutions based on sharing mobility (McKerracher et al., 2016). Shared mobility is based on the sharing of vehicles (mostly cars) between road users. Traditionally this had the form of renting from a fleet operator, but it has now evolved to include peer-to-peer-based car rental that connects individual landlords to tenants with application-based solutions, on-demand ride sourcing that connects drivers directly to passengers, and subscription services (Østli, Ørving, & Aarhaug, 2017). In recent years, we have seen various examples of application-based solutions: from car-sharing schemes like Zipcar and Drive Now to network-based ride-sharing schemes like Car Plus 2+ and GoMore. The benefit of these schemes is that they improve the efficiency of car-based transportation by increasing either the number of hours a car is used per day or the number of passengers in the car. Ride-sharing provides the opportunity for transport needs to be met simply and efficiently and offers the opportunity to move from private ownership to shared ownership with continuous access to goods and services, thereby utilizing resources in a more efficient way (Hållén & Östlund, 2016). Analyses from the US Department of Transportation shows that if you drive less than 16,000 km a year, a car-sharing scheme is more beneficial than privately owning a car (Shaheen, Cohen, & Zohdy, 2016). Wireless communication will be very important in coordinating resources within the sharing economy: for example, when it comes to matching a transport need with the ability to meet it. The partial transition to online and digitized car-sharing platforms has already provided digitized solutions with an increased market base, while the introduction of smartphones has helped reduce transaction costs (Viegas, Martinez, Crist, & Masterson, 2016). The latest evolution of shared mobility is the relatively new concept of Mobility as a Service (MaaS). The idea of MaaS is that a smartphone carrier can order transportation between two locations, and then find possible travel choices based on different types of transport (Kamargianni, Li, Matyas, & Schäfer, 2016). Transport solutions can consist of public transport, car sharing or bicycles, depending on what fits the customer and his or her journey, and are paid for by a monthly subscription charge. The concept of MaaS also has the potential to integrate autonomous vehicles as they become available, and further improve the efficiency of the system (Østli et al., 2017).

4. What regulation is needed to enable and ensure technology benefits Australia?

To demonstrate what a future transportation system based on shared mobility might look like, the International Transport Forum (ITF) within the OECD used the city of Lisbon, Portugal to simulate and analyze the effect of a complete uptake of a shared, autonomous driving fleet of vehicles. The study found that the implementation of this system would reduce the number of cars in the city by 90%, completely removing the need for on-street parking, and reducing off-street parking by 80% (Viegas et al., 2016). However, in 2017 the Aspen Institute underlined that these spatial opportunities highlighted by the ITF are by no means a foregone conclusion. They suggested that to encourage a system of shared transportation, governments need to shape markets and focus private sector attention and investments, by mobilizing infrastructure, talent and other assets to support the right kinds of AV-based solutions (Bloomberg, 2017).They forecast that, without the right planning and regulatory controls, there would be a danger of AVs creating more traffic, congestion and sprawl as a result of the increased convenience and comfort that lead passengers to use AVs instead of mass transport and to travel further distances. This was also the conclusion of a recent report made for the Danish Ministry of Transport, Building and Housing. The report estimates that congestion will increase by 149% in big cities if AV is implemented as individualized transportation as we know it today (Transport-, Bygning og Boligministeriet, 2018).

Ensuring that larger scale, environmentally friendly transport is available through infrastructure projects should be a priority, because it will ensure major financial and environmental savings in the long term. AVs should therefore be seen as transport options that support investments in more sustainable forms of transportation. Investments in different kinds of infrastructure and urban development are the main ways that public authorities can influence the use of different means of transport and mobility. Investing in transport infrastructure can be used as a framework for urban development, based on an integration between urban and transport planning (Hickman, Hall, & Banister, 2013). When this approach is used, innovative transportation schemes can be imagined and developed, and this new transportation scheme can be more effectively linked with the new AV technology. This integrated approach to planning is critical in terms of encouraging a greater level of shared mobility usage that derives mainly from mass transit use, walking, cycling etc. Governments can also act to help promote more technologically advanced transport options: for example, supporting AV ride-sharing companies with lower taxes, cheaper parking and dedicated lanes. In the future, government direction can help shape transportation solutions that will allow full utilization of multi-modal transport options.

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