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Professor Margaret Sheil AO
Vice-Chancellor and President

7 December 2018

Mr John Alexander OAM MP
Chair
Standing Committee on Infrastructure, Transport and Cities
Department of the House of Representatives
PO Box 6021
R1.109 Parliament House
Canberra ACT 2600
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Dear Mr Alexander

House of Representatives Standing Committee on Infrastructure, Transport and Cities - Inquiry into Automated Mass Transit

Thank you for the opportunity to contribute to the Inquiry into Mass Transit. I am pleased to attach a brief submission outlining QUT's response.

QUT has a long-standing, world-class research reputation for expertise in all the major fields relating to the Inquiry. Our reputation spans automated vehicles, un-manned aerial vehicles, artificial intelligence, machine learning and transportation networks, supported by a multitude of funding partners such as Cooperative Research Centres, the Australian Research Council and industry partners. We also bring extensive expertise in accident and road safety through the Centre for Accident Research and Road Safety. Our Future Mobility initiative has been established to bring together discipline expertise across science, engineering, health, law and business to tackle a range of research challenges associated with the development, testing and adoption of autonomous vehicles.

By way of example a current QUT research project of interest is funded by the iMove Cooperative Research Centre: "Cooperative and Highly Autonomous Driving Safety Study" will be delivered in partnership with Queensland Department of Transport and Main Roads (TMR) as part of TMR's Cooperative and Highly Automated Driving (CHAD) Pilot, with the aim of helping to prepare for new vehicle technologies with safety, mobility and environmental benefits on Australian roads. As part of the project, QUT will be able to purchase a Level 4 (highly automated) Cargo Air Vehicle (CAV) prototype from VEDECOM Tech (the commercialisation arm of VEDECOM Institute, a French research centre of excellence that has strong partnerships with Renault, PSA and Valeo). QUT will own, register, operate and maintain the vehicle as part of this vital research into autonomous vehicle safety.

I also refer the Committee to a recent article by QUT's Professor Marcus Foth in *The Conversation* which explores a number of challenges and opportunities associated with smart mobility, pointing to the need for strong policy leadership by government including appropriate policy settings and

holistic analysis across a breadth of domains. That article may be accessed at https://eprints.qut.edu.au/122917/ .

Our QUT researchers would be pleased to discuss any aspects of our submission in finer detail, if that would assist.

Yours sincerely

Professor Margaret Sheil AO
Vice-Chancellor and President

Submission to the House of Representatives Standing Committee on Infrastructure, Transport and Cities

Inquiry into Mass Transit

This submission relates to the Inquiry into current and future developments in the use of automation and new energy sources in land-based mass transit.

The following points provide recommendations and considerations surrounding the Inquiry's focus on rail mass transit, road mass transit, point-to-point transport using automated vehicles and Commonwealth roles and responsibilities in the development of these technologies.

Mass Transit:

- It is essential to have a transdisciplinary approach to understanding the opportunities and challenges to changing transport options. Automated and pervasive mass transport has the potential to increase equity, not only for mobility services, but for all access-enabled goods and services across society. The effect can be broad-based, changing the economic and behavioural foundations connecting people to services and services to people.

- While there are still many technological challenges to be solved, we need to focus on the conditions for the application of these technologies. We need to understand the context of technology use and investigate aspects such as safety, regulation, urban planning, and technology adoption.

- Conducting immersive studies with communities enables early understanding of opportunities and risks arising from new technologies and their implications for the way we think about problem solving and opportunity development.

- Advances in mass transport options will be incremental and early understanding of future mobility options will enable pre-emptive and positive directing of adoption choices. Australia must learn from the experiences of countries that are further advanced in dealing with the opportunities and challenges presented by automated transport solutions.

- We need greater awareness of proactive regulatory frameworks that can incorporate new technologies, while ensuring transitions from previous regulatory foundations. Without this systemic view, there is potential for unintended consequences from incremental regulatory approaches that merely respond to individual innovations in business models and technology platforms, rather than intentionally and actively fashioning the innovation environment.

- Transport change is not a like-for-like replacement of transport options, but rather a resetting of societal expectations about the role and nature of transport. In this light, we regard mass transport options as being federated and pervasive transport options.

- Any new technology in this space must take into account the behavioural and attitudinal considerations in play – including fears and concerns – whether or not technologists, business and governments consider them to be 'reasonable'. It is imperative that work be done to better understand the services required and the determinants of public engagement and uptake. Current under-utilisation of mass transit provision already points to a knowledge gap, and the move to automation will only increase the need for understanding.

Point-to-point transport using automated vehicles:

- Automated vehicles (AV) increase accessibility options but may also increase congestion.

- AV safety is a paramount concern for AV innovation, but secondary safety effects on other transport options may create significant risk.

- Even more than in railed mass transit, social licence is absolutely foundational to the implementation of AV in point-to-point transport, and it is inherently bound up with issues of trust, confidence and ethics. Any attempt to impose AV use on the community without involving it in designing the limits of automated decision-making is likely to become deeply, politically fraught. A fringe benefit of early, genuine and extensive consultation is that it can have the effect of a multi-channel education/ communication campaign, only with greater and earlier buy-in, providing the community feedback is heeded (and seen to be) in policy design.

- AV require a range of context information sources, including precise information around number of vehicles on the road, the direction they are heading and at what speed. This information will need to come from a sharing of information from all road participants and infrastructure, not only AVs.

- The growth of instrumented AV both sensing and conveying data requires a strong regulatory foundation over the rights and obligations associated with data use including personal information.

- While AVs operate as an adjunct to manual car operation, their inclusion in vehicle eco-systems will have a complex and emergent relationship with the drivers of other vehicles. Much work needs done to understand safety implications for both AVs and other road users (including vulnerable road users).

- Isolating AVs within constrained operational environments is likely to be a more feasible framework for early adoption.

- There is a real opportunity for Australia in the Unmanned Traffic Management (UTM) and the Urban Air Mobility (UAM) space for creating, testing and implementing these approaches (with the added potential for then selling the enabling technologies/systems). UAM presents significant opportunity for improvements in mass transit due to the fact that it greatly mitigates one of the fundamental constraints of road and rail – i.e. UAM works in 3D volumes, not 2D planes as in the case of ground-based AV.

- Adoption of UAM has the potential to radically change the demographic of how we live and work – including the potential to redistribute people to rural/regional areas. This could be performed in conjunction with other autonomous mass transit solutions (for example a hub and spoke model for rural/regional air mobility couple with rail e.g. Skyport at a train station).

Commonwealth roles and responsibilities in the development of these technologies:

- The Commonwealth should invest in technology differentiators that leverage local areas of expertise, including transdisciplinary adoption approaches.

- Australia has some unique environmental and geographic conditions that enable value-add on international investments.

- AVs and the move to electric vehicles are changing the investing proposition for personal transport. As this investment transitions to a software-based platform, more investment is needed in value-add safety, regulatory, and adoption technologies.

- The Commonwealth will have an important role to play in the development and adoption of uniform regulations across the States and Territories to facilitate the uptake and safe implementation of these technologies. The Commonwealth can also play a productive role in encouraging coordination of local government approaches, which will promote both cost efficiency and public engagement.

- The Commonwealth will continue to have a significant role to play in the identification, development, establishment and maintenance of critical infrastructure required for future mobility needs.

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7 December 2018