Problem Statement

Benefits and costs of automation for bus rapid transit

TD 18-10

Technological Drivers of Change

Problem Description

Question	Response
Description of the problem and purpose of the proposed research	The introduction of automated vehicle (AV) technologies[1] will likely have a profound impact on the transport network. Public transport offers particular opportunities for early adoption of AV technologies. Automation of buses could potentially offer a number of benefits, including: • Increasing the productivity and capacity of services by: – reducing spaces between vehicles, – enabling operation in platoons and – reducing accidents and increasing speeds on dedicated bus ways and bus lanes. • Driving down operating costs through automation and facilitating improved service levels through: – facilitating more flexible on-demand services, – longer operating hours for services and – improved viability of marginal services (outer suburban and regional communities). The proposed research project will **assess the benefits and costs of high/full automation or 'driverless operation' for bus rapid transit (BRT)**. This is an area that is generally considered to be a potential early application and use case of automated vehicles. Research on the expected benefits and costs will help us assess the viability, including cost competitiveness, and feasibility of automated BRT compared to conventional vehicles. Automated buses and shuttles are already being trialled across the world, including at Sydney Olympic Park. This research will help us determine if there is a business case for scaling up trials, and will help inform future service planning and infrastructure (including future bus fleet) investment decisions.

[1] Read https://future.transport.nsw.gov.au/technology/roadmap and https://future.transport.nsw.gov.au/plans/future-transport-strategy

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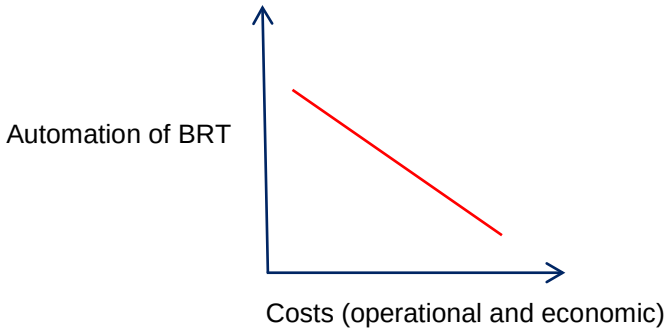
Hypothesis & Variables

Question	Response
For explanatory research, please describe a clear hypothesis with variables for testing **For exploratory research,** please describe how the proposed research will contribute to future explanatory research	It is hypothesised that automated BRT operations (level 4/5 or driverless) will help us deliver greater value for money in delivering public transport services. 

Strategic Criteria & Alignment

Question	Response
Alignment with strategic theme	This Problem Statement is aligned with the Transport for NSW (TfNSW) Strategic Research Theme of 'Technological Drivers Of Change'. The theme is focused on new technologies that will impact and influence how transport is planned, delivered and managed over the next decade and beyond. The Technological Drivers of Change research theme is intended to assist TfNSW anticipate and be well-positioned for disruptive change. The Future Transport Technology Roadmap identified 12 emerging and developing fields of technology that will transform transport as they mature, interact and converge over the next 10 to 20 years. The Roadmap looks at how these technologies can unlock value in our system and customise and personalise transport services for our customers across the state. This Problem Statement is aligned with the Roadmap strategy 'Transform Mass Transit Networks' as it aims to improve their efficiency, deliver better service frequency and reduce transit times, increasing the attractiveness of these services for customers.
External driver of change analysis **Outline how the research will better position TfNSW to respond proactively to macro drivers of change**	In this Problem Statement and proposed research project, there are a number of external drivers of change that present opportunities to TfNSW. **Economic** The project will focus on economic factors such as the viability and cost competitiveness of automated public transport operations. The project will also help inform investment decisions, particularly in supporting business case development for automated bus and shuttle operations. **Political** The project reflects the political and public expectations for proactive, rather than reactive, planning. **Technological** The project will focus on the benefits and costs of adopting automated vehicles for public transport services.

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Question	Response
Forward looking	The Problem Statement is future-orientated in that it looks at the potential costs and benefits that may assist with preparing for future technology. This will be able to assist with preparing for future transport projects and investment decisions for the years ahead, between 2036 to 2056.
Potential research impact	The potential research impact is significant. The research will provide TfNSW with the opportunity to proactively plan for the impacts of innovative technologies. The research will also help inform service planning and infrastructure investment decisions, particularly in supporting business case development for automated bus and shuttle operations.

Technical Criteria

Question	Response
Innovation **Outline how the proposed research will result in new knowledge**	The proposed research will result in the generation of new insights into the potential benefits and costs of automated public transport services.
Basis in completed research and/or observed practice	TfNSW has not done any comprehensive research or modelling on the potential benefits and total costs of high/fully automated or driverless BRT. Existing modelling techniques and economic appraisal methodologies/cost-benefit analysis are not well-suited to assess the benefits and costs of new innovative technologies such as AV.
Feasible data requirements	The data requirements for testing the hypothesis will mostly be quantitative, and some could be provided by TfNSW and our partners currently trialling automated vehicle technologies or investigating their costs/benefits.

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Level of Collaboration & Resource Requirements

Question	Response
Level of collaboration **Please select the level of collaboration required to complete the proposed research**	**1. 'Quick-Fire' Research** ☐ Intense bursts of research activity (e.g. under 8 weeks). Intended to make use of 'hackathon'-type environments, where students/researchers work collaboratively and intensely on particular problems involving data interrogation and visualisation.
	2. Undergraduate Final-Year Research ☐ Suitable for final-year undergraduate students (e.g. capstone, Honours) as part of the research requirements for their undergraduate degree (i.e. 1 to 2 semesters).
	3. Higher Degree Research ☐ Project may form whole or part of a postgraduate research degree (i.e. Masters, PhD), and contribute to new knowledge (i.e. 1 to 3 years).
	4. Major Collaborations and Funded Research ☒ Project may form the basis for a significant collaboration agreement between TfNSW and the relevant research institution, including major competitive grant funding (e.g. Australian Research Council funding with TfNSW as an industry partner).
Comments	This is seen as a multi-year collaborative opportunity, possibly between TfNSW, the Roads and Maritime Services, research institutes and federal government bodies such as the Bureau of Infrastructure, Transport and Regional Economics, and Austroads.
Supporting TfNSW resources	TfNSW will be able to provide data and access to subject matter experts.

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