AV meets PT: the future of automated vehicles in public transport

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Short abstract
This paper gives an overview of the projects and pilots with automated vehicles as public transport in the Netherlands as well as the remaining research questions and preliminary results of passenger related studies regarding expected ridership.

Abstract
The technology of automated vehicles is developing rapidly and the vehicles offer a lot of benefits. They claim to be safer, more environmentally friendly and they can provide transport for everyone, including people who currently don’t have access to transportation. The focus seemed to be on the development of automated private vehicles, but the focus seems to shift from private transportation to automated public transportation.

The Netherlands has been pro-active in testing automated vehicles on public roads. This paper gives an overview of the projects and pilots with automated vehicles as public transport in the Netherlands as well as the remaining research questions. Also, preliminary results of passenger related studies regarding expected ridership and perception are discussed in this paper. Information was gathered by performing desk research and conducting interviews with twelve public transport authorities. During these interviews we spoke about threats and opportunities as well as feasibility, visions and knowledge gaps. Subsequently we spoke about what the future of public transport would look like and how we can anticipate on these upcoming technologies. Lastly we asked about (future) pilot locations with automated vehicles. These locations are included on a map of the Netherlands.

In general the interviewed parties agree that the public transport on trunk lines will remain the same. The parties expect more possibilities with automated vehicles as first/last mile solution to and from trunk lines. They stated that the main challenges for public transport is the accessibility of public transport, the aging society and declining population as well as keeping public transport
feasible. A study conducted by Scheltes et al. shows that automated vehicles can fulfill the last-

mile gap by simulating door-to-door transport with automated vehicles near the Delft-Zuid train

station, the Netherlands. The simulations show different operational scenarios with a reduced

average total travel time of over six minutes (1). One of the risks mentioned during the interviews,
is the risk of drawing people from active modes, such as cycling and walking, to the automated

public transport system. A study conducted by Hezaveh et al. shows great opportunities for AV’s
to complement public transport, but also shows the possible impact on the network due to

excessive demand and the risk of people moving from, for example, active modes to automated

vehicles. Furthermore, automated public transport might remove mobility barriers for captive
drivers which will increase the demand (2).

In many places in the Netherlands there is or has already been experiments with automated

vehicles (3 – 4). These pilots, experiments or demonstrations are often focused on the technical

aspects. However, the challenges regarding the deployment of an automated vehicle extends

beyond the technical level. The interviewed parties indicate that it is important to focus, with the

upcoming pilots, more on the traveller and the position of the vehicle within the existing public

transport network. The interviewed parties stress that it is important to think about the long-term

implementation.

The current public transport contracts as we know them, will likely change with the arrival of

automated vehicles. Concessions are already becoming more flexible and space is created to

experiment with new concepts such as automated vehicles. During a concession, it is possible to

experiment alongside the established service and a transition path can be mapped out. Tendering

an automated shuttle has not (yet) taken place in the Netherlands (5). The public transport

authorities are clear about the future: automated vehicles in public transport do not come with a

‘big bang’ but will gradually find their way.

Literature
1. Scheltes, A.F., Homem de Almeida Correia, G., van Arem, B., Happee, R., Wiggenraad, P.B.L.
(2015). Improving the last mile in a public transport trip with automated vehicles using an agent
based simulation model: A Delft case study.
vehicles on transit ridership. Transportation Research Board 98th Annual Meeting, Washington,
DC, USA, January 2019.
4. Boersma, R., van Arem, B., Rieck, F. Driverless electric vehicles at Businesspark Rivium near
Rotterdam (the Netherlands): from operation on dedicated track since 2005 to public roads in

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