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PRESS RELEASE

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Title: **Welcome to the new era of Shared CAV**

My work for Woodall Nicholson and their Mellor bus division alongside some amazing people working together on the Connected & Autonomous Vehicles (CAV) Grand Challenge has led me to believe that bus autonomy is not as far away as people think.

Within the parameters of a public-transit/private-operation collaborative agreement; autonomous public transport systems are possible soon, through Shared CAV.

The idea behind Shared CAV is not new. In 1852, Elisha Otis invented the modern elevator as a form of autonomous transport.

In some ways, Shared CAV can be compared with the elevator. People will be carried safely without a driver along a fixed route, and the service will be on-demand. When related to the conveyance of passengers we call this idea the Horizontal Elevator and the path along which it runs a Virtual Tramway.

Just as the Otis elevator made skyscrapers possible, elevators being the enabling technology, similarly, Shared CAV will revolutionise public transport by enabling 'Mobility as a Service' (MaaS) to scale outside of London, New York and Berlin.

The UK Government recognises the potential contribution CAV can make to economic growth through the enhanced ability to transport goods and people more efficiently and effectively. By deploying emergent technologies and encouraging collaboration across different sectors, the opportunity exists to generate the required improvements in a sustainable manner.

The UK Gov's Innovate Programme and the official autonomy policy unit (Centre for Connected and Autonomous Vehicles) has actioned considerable support through grants for collaborative agreements between companies that can deliver a combination of 3C capability, security, vehicle platform technology, robotic interfaces and Artificial Intelligence, all leading to vehicle autonomy.

Without the full support of local transit and public authorities, roadways cannot be prepared for near-time vehicle autonomy. Colleagues from Mouchel explained during Shared CAV development workshops that roadways selected to host the virtual tramways will need a degree of light infrastructural support to work safely. In some instances, a council, even a parish council might be able to access this potential though their active involvement.

Who will be Shared CAV's early adopters?

We expect there to be high demand for a turnkey solution from:

- Urban areas that are in current grid-lock.
- Industrial estates access through parking lots
- Airports optimising passenger flow
- Feeder routes for hospitals and resort complexes

Shared CAV is for people and the places who understand that the only important 'driver is 'access', not ownership! As the UITP report, **Autonomous vehicles: a potential game changer?**, describes, these places will benefit from the creation of a flexible on-demand system will tackle congestion head-on, by reducing the number of single-occupancy vehicles on our roads, by connecting to and strengthening radial mass transit routes and meeting orbital travel needs that are often less well served by public transport.

{link to http://www.uitp.org/sites/default/files/cck-focus-papers-files/PolicyBrief_Autonomous_Vehicles_LQ_20160116.pdf}

The time is right for a new approach to mobility. An interconnected world needs a transport network delivering mobility options that offer services far exceeding current driven platforms.

Manchester has a benchmark tram system. It brings many parts of the city together and is generally regarded as a success by those that use it. However, new trams come with a massive cost burden and considerable disruption in their construction. Indeed, this may well be the last metropolitan tram project of its size in the UK again?

The Virtual Tramway does not have guide rails or tracks, it is created using GIS mapping tools and relies on predictive analysis data embedded within the maps supported by on-board analytical capability delivered through industrial computers sensors, cameras and CCTV. Integration with the urban traffic systems is achieved using wideband width communications platforms connected to a resilient command centre.

The development teams at Woodall Nicholson engaged with key industry partners and specialists believe that early Shared CAV vehicles will consist of appropriate-sized buses (between 8 and 16 seats) that can work alone, or, as part of a platoon. These buses may be traditionally driven too! A truly three-for-one proposition.

We already have a ground transport mix of rail, trams, buses, taxi, private hire, cycling, walking, etc. Introducing to the ground network autonomous capability and MaaS technology will create widely diverging outcomes, rendering long-term prediction of the behaviour of the system challenging, to say the least. This becomes even more evident when you consider the direction Airbus is taking the single-occupancy travel market, with its intention to test a self-flying taxi by the end of the year.

{link to http://www.dailymail.co.uk/sciencetech/article-4124412/Airbus-CEO-sees-flying-car-prototype-ready-end-year.html}

We are heading towards a chaotic approach to public transport that will work because MaaS operating through size and cost-appropriate electric vehicles (AKA buses) will deliver high definition mobility. Therefore, I have decided to join the TravelSpirit Foundation, which has been established to accelerate the adoption of Mobility as a Service (MaaS) systems that integrate discovery, booking, and payment of multi-modal transport service offerings under an open marketplace, which will give my clients, like Woodall Nicholson, a far greater access to this evolving new market opportunity.

The time may come where costly mass transit delivery platforms such as the 110 passengers 'bendy buses' or even the iconic London Double Decker will be on our roads simply to manage peak 'rush' hour transportation, particularly when platooning smaller buses cannot cope. Size appropriate Big-Taxi and LiteBus will carry the load during normalised traffic periods.

We should dispel one myth; the proponents of Shared CAV are concerned about enabling new on-demand services, not removing drivers from existing scheduled service routes.

The Virtual Tramway system will operate without stations and without a timetable, be on demand. Its frequency will be managed by need.

The main advantages of this first-step, flexible platform are low implementation costs and high replicability. To guarantee the safety of such a new system, similar signage and painted "rails" as would be deployed for Trams will be used to alert people and road users to the fact that an autonomous bus runs on the route.

The system will be safer as people will treat it as a tram and not take the kind of risks they might with a small pod. Think along the lines: how do you drive when next to a bus vs. a car? You exercise more control and provide it with more room.

Crossing a multi-lane junction is challenging even for drivers. CCTV will be installed to stream data in real time to the vehicles navigation system, this will give the vehicle the advantage of seeing around corners. A Virtual Tramway track does not need stations, overhead power or rails but it does need some on-the-ground support, all of which can be managed by councils as small integrated projects. The more Virtual Tramways we create, the lower the costs and better return on investment.

The solution is flexible enough to incorporate future changes and advancements in technology, unlike a real tramway. The vehicles will be able to deviate from their "Virtual Tramway" under certain circumstances only, when safe to do so. In the event of there being a problem the vehicle would stop, and a tele-operator will slowly move the vehicle out of the way of others to allow for transition from manned to unmanned once the system is proven.

All this means that as the system matures beyond the end of the project, it will increase its capability to deal with changing situations and run in a less constrained way as safety permits.

In Summary:

DFT compliant business cases, developed by Transport for Greater Manchester and Steer Davies Gleave and Alliance Manchester Business School have focused on the Virtual Tramway solution operating a 16 Seat Electric LiteBus with the necessary infrastructural support demonstrates a healthy return on investment of 2.6. This number does not include out of hours running and is solely based on new services. The actual number could be as high as 4.0

The key enabler and first step towards the outcomes predicted in the UITP report could be Virtual Tramways. They are low in cost and disruption, predicted to be inexpensive to operate and will be safe. Virtual Tramways is an idea that could open the Shared CAV potential to an infinite number of other vehicles delivering a myriad of functions. This solution brings CAV into urban environments and will not be limited only to electric buses.

The cost of laying and maintaining a tramway or guided bus route can be excessive compared to a Shared CAV solution that has much higher speed of deployment and is scalable. In other cases, Shared CAV can strengthen the business case for a hard infrastructure investment, by widening out the benefits.

The Government are right to promote CAV as an idea, and I am glad to see it feature highly in the consultation for a new Industrial Strategy for the UK. In my view, they may have to accept slightly more constrained (but still driverless) public transport solutions in a step-by-step scalable model. Smart transport and communication businesses are currently researching the platforms and technologies needed to deliver this exciting vision for the future, supported by growing clusters, industry-led consortia, such as, here in the North, the Northern Automotive Alliance and the Northern Robotics Network.

ENDS

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