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Driverless Cars and the City

Emerging technologies are blending mega-data, mobility and urban strategies with far reaching implications for our cities, governance and urban realm. Automated movement could undermine or support the development of sustainable, dense, urban cores; it is within this context that the ULI UK Infrastructure Council developed the Driverless Cars Conference.

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Automation of vehicles form part of a broader digitalisation of our environment, it aligns with the rise of the sharing economy and the advances of data enabled intelligence. Autonomous Vehicles (AV) will not only have implications for car companies and transport, but also the insurance industry, revenue base for councils, health, and workforce in the wider community. Like other instance of disruptive transport paradigms (sailing ships, canal boats, railroads, motorways, airplanes) automated transport will reconfigure city form and transforms how the urban environment is used.

Autonomous Vehicles implications to our urban environment include:

- Greater road safety, reduce injuries, wider health and social benefits.
- Increased mobility for non-licensed travel, with benefits for elderly and disabled.
- Increased roadway utilization, potential increase in public realm, development.
- Increased mobility also creates potential to induce urban sprawl,
- Heterogeneous mix of transport types, controlled by policies.
- Large reduction (e.g. 94%) of vehicle insurance claims related to human error.
- Most of economic and environmental benefits derive from sharing, not just automation.
- Business model shifts from ownership to access – pay on demand (like 'Uber').
- Close collaboration between AV providers and government policy developers to ensure wider community benefits and mitigation of unintended consequences.

Closer than you think

Driver assist, cruise control and real time transport applications with GPS settings that allow people to travel to a destination in the most efficient way already exist, yet as shared by Professor John Miles, Cambridge University it is the merging of these realms that will allow for a more agile and spontaneous travel. Unlike other transport revolutions such as motorways the urban environment does not have to be transformed to meet AV transport needs. Current public transport modes are not the most efficient method of transport with buses seen as the most problematic according to Prof. Miles, where outside of peak times they are rarely utilised to their full capacity and emit more CO_2 per passenger per km than cars. Solutions such as car sharing or autonomous pods bookable via a mobile phone app and emitting only 10g of CO_2/passenger/km could provide a more efficient solution.

Utilisation of data combined with spontaneous agility will allow AV's to fit most city transport needs, by anticipating conditions and choosing less utilised roads instead of utilising congested larger roads often utilised by traditional public transport, therefore improving mobility in congested cities. Roads that are less utilised could create more space for private development or public realm, however it will be important for cities to put regulatory framework in place and not just leave this opportunity to private sector operators.

In the UK 34 families experience a road fatality per week and Iain Forbes, Head UK Government's Centre for Connected and Autonomous Vehicles (CCAV), Department for Transport anticipates the increasing automation of vehicles will significantly reduce fatalities and provide wider implications in particular for productivity and business. Through the CCAV the UK government are leading a coordinated approach to collaborate with policy makers, automotive industry and internationally yet enable an environment for entrepreneurialism with funding and trials in Coventry, Milton Keynes, Bristol and Greenwich. Common challenge that the UK and other nations face include:

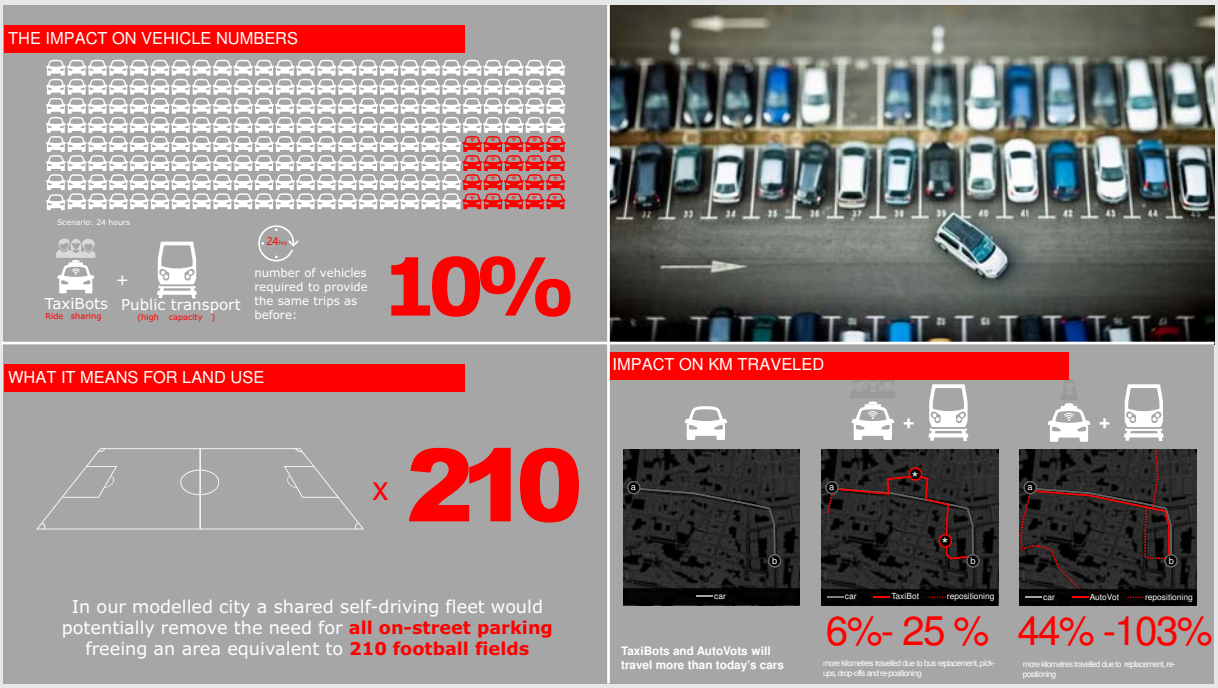
- Legislation is slow to respond and adapt to the rapid pace of change of vehicle automation;
- Cybersecurity needs enhanced to protect the privacy of data, however at the same time the data should be accessible for the purpose of analysis, research and wider market innovation; and
- Ensuring public acceptability of AVs, however predictions of a 90% road accident and improved mobility should reduce these concerns.

Sharing made possible by AV delivers proportionally more benefits than the automation itself

Optimised sharing of driverless cars rather than automation itself that will transform city transport and traffic operations according to Miller Crockart and Paulo Humans from PTV Group. On average each car is only used for 50 minutes a day while for the remaining 23.1 hrs a vehicle it takes up valuable urban land due to the need to be parked somewhere. Real life scenario testing by PTV Group proves efficiencies in terms of reduced number of vehicles required through varying demand periods, opportunity for increased streetscape or parking station re-use and improved user flexibility. However potential consequences of AV's if not controlled could lead to increased vehicle kilometres due to vehicle repositioning, diversions and induced demand - driven by convenience resulting in additional trips.

Viewing the emergence of AV's through conventional car capacity could increase kilometres travelled from 30%-90% but increased efficiencies and flexibility could be achieved if vehicle type, capacity and demand response were managed. Miller and Paulo highlighted that Governments and urban policy will have an increasingly important role to play as AV's enter the wider market. The management of public domain, city level data, people movement and anticipated new business models will mean Governments have an enabling role to play to ensure AV's provide wide reaching benefits without long-term consequences.

Real City – What If… Lisbon, Portugal by PTV Group



Source: Joint Presentation PTV Group and ITF

Transport simulation comparing the end-state of only shared cars on city roads to the current state of urban transportation provided a showcase of benefits and consequences of the proposed solutions.

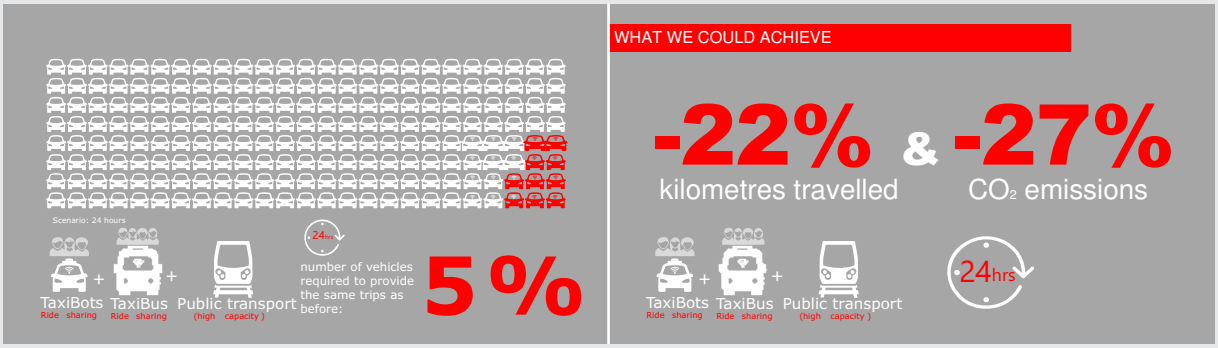
If "taxi-bots" (i.e. ride sharing) were to replace all conventional cars and buses, the **number of vehicles on the roads each day would be reduced by 90% (or 65% during peak hours)** – with huge impacts not only on mobility per se, but also on city form.

- **10%** of vehicles required to deliver transport needs for a 24hr period
- **35%** of vehicles required to deliver transport needs during peak periods
- **80%** reduction of off-street parking thus creating new challenges in terms of the management of the freed urban spaces in order to lock-in the benefits for the society for the long-term.
- **30-90%** increase in vehicle kilometres travelled due to diversions and repositioning

Solution–scenario: shared **"on demand" buses** with a capacity of 6-18 people, bookable 30 minutes in advance via a mobile phone application and boarding taking place within +/- 10 minutes with "pop-up" stops subject to a traveller's current location.

- **5%** of vehicles required to deliver transport needs for a 24hr period
- **230%** occupancy capacity when compared to 80 person bus
- **22%** reduction in kilometres travelled
- **27%** CO_2 reduction

The role of policy-makers for the future developments in the field of autonomous vehicles and car sharing is essential. Some car companies (e.g. Ford or Nissan) are actually very far-sighted and have good intentions to support the change, however they will ultimately have to adapt to this changes with shorter life cycles for vehicles also based around completely different ownership models for vehicles.



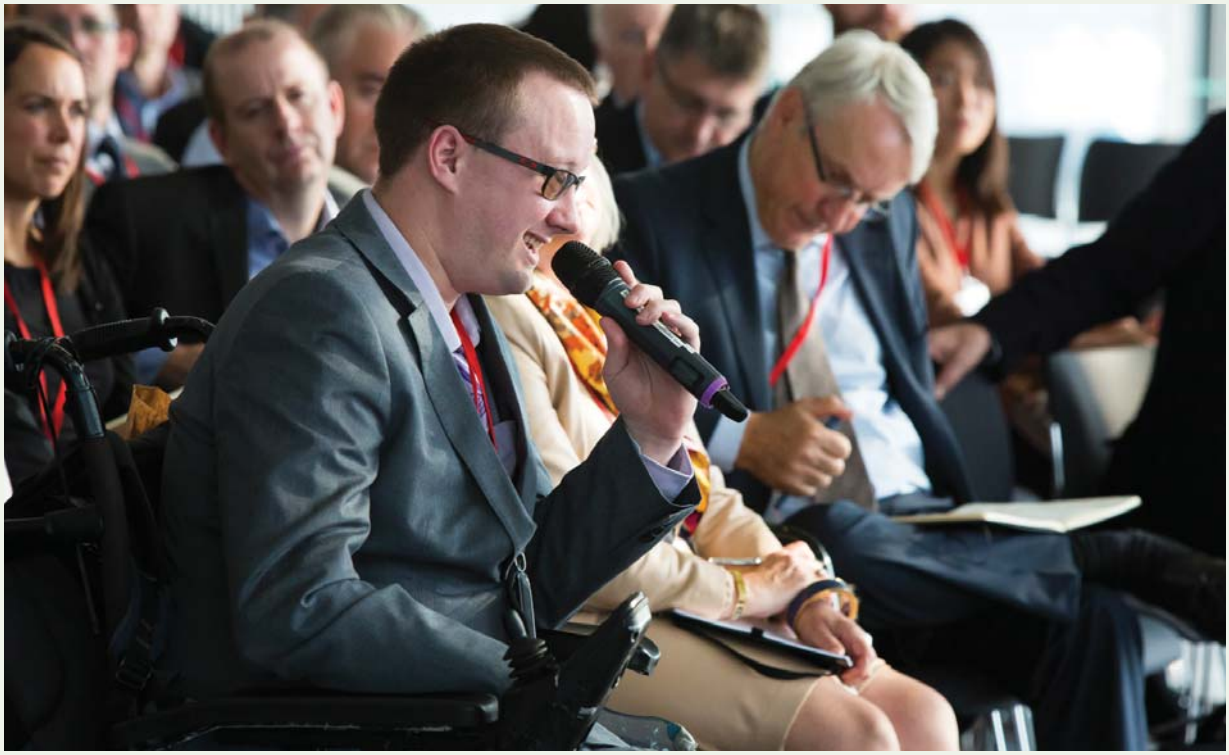
Source: Joint Presentation PTV Group and ITF

Driverless Cars just a dream?

The relative benefit of fully autonomous vehicles will likely only be realised when the service reaches 'full automation' *(level 5 or 6 of a total 6)* and this is still some time-off according to Professor John Polak, Imperial College London. Benefits such as improved employee productivity due to more recovery or working time while travelling should also be observed in light of implications of AV's and their related perceptions and consequences which include:

- 'Autonomous Vehicles' is a term used for the glomeration of technologies to describe 'automation' in cars– for instance warning systems are already firmly in place in new vehicles and not every function in cars can be automated;
- Only extreme automation would have a large impact on transport performance and such a change would not only require a complete restructuring of urban and regulatory systems but would also ultimately make car-driving more attractive –a more realistic state of the city would be that with a heterogeneous mix of automatic and manual forms of transport;
- Autonomous vehicle business models are currently obscure and the marketability of driverless vehicles is problematic due to vehicles likely to be more expensive than conventional cars, potentially limiting people's freedom and mobility;
- "Things Unseen" such as technology and 'big data' cannot necessarily be trusted and generating only limited network performance benefits in urban areas – hence there might initially be plenty of public resistance to change, in turn slowing any progress; and
- Greater attractiveness of travelling could cause a mode shift out of mass transport into automated vehicles resulting in increased long-distance commuting and urban sprawl thus counteracting years of policy efforts.
- Private sector networks such as vehicle and data companies will want to run AV networks but there is a strong need for regulatory bodies such as transport authorities (e.g. TfL) to control the potential consequences of un-foreseen consequences

Large cities such as London are experiencing a reverse switch away from cars to public transport due to congestion and efficiency of movement in densely populated areas. However as Prof. Polak highlighted the increasing public transport reliance in urban areas is also due to high insurance costs and accommodation limits. Initiatives to increase the use of public transport in wider sprawling regions such as the USA has seen a focus on improving commuter experience by creating bus interiors more like café's with increased comforts and free Wi-Fi. Further examples of innovation in transport are already visible such as automated drone parcel deliveries. The question therefore should not be solely based on driverless cars per se but rather how using current and emerging technologies should be used to encourage appropriate behavioural change in urban environments.



People driven - not technology driven people

The emergence of driverless cars and the adoption of new technologies is disrupting traditional laboratory based design and technology methods as highlighted by Professor Dale Harrow and Rama Gheerawo from the Royal College of Arts, Vehicle Design Department. Engaging end consumers in the design process is essential to building new products and technologies as their adoption is based on the ultimate user experiences and culture. Removing the driver from the car does not mean removing the people and fully understanding the behavioural change process will enable autonomous vehicles to successfully integrated into the urban realm.

The College of Arts pathfinder approach has already been trialled during the redesigning of standard ambulance vehicles and is now being implemented to creating more user-friendly taxis for London and delivering the GATEway project. The GATEway projects aim is to identify key principles for the wider implementation of autonomous vehicles on the streets of UK cities as well as to see and analyse people's reactions. Using sentiment mapping the project focuses on:

- Collecting evidence, engaging users to understand the context of their use and last but not least constantly investing in research to be able to respond to evolving customer needs.
- Engagement with new technologies and the link to enabling or limiting people's mobility
- Real-life trials on roads as opposed to using lab-based computer simulations

Iain Forbes Department for Transport
Centre for Connected & Autonomous Vehicles

Miller Crockart and Paulo Humanes, PTV Group
Shared Autonomous Cars will Transform City Transport and Traffic Operations:

Prof. John Miles, Cambridge University
The Future of Autonomous Transport Systems

Prof. John Polak, Imperial College
Technology, behaviour, policy and business: Where to next?

Rama Gheerawo and Prof. Dale Harrow, Royal Collage of the Arts
Changing cities, technology and consumers

Early indications have proven there has been large progress over the past decades in terms of the technologies but there is a need to develop behavioural and perception change in order for a smarter, wider and more equitable use of driverless cars

Implications and Governance

The transition towards more autonomous vehicles will have varying implications for cities, real estate, society, urban environments and governance with many unforeseen consequences yet to be explored. A panel debate chaired by John Worthington from the Independent Transport Commission explored current implications of emerging driverless cars from the perspective of technology implementation, insurance, real estate, and wider transport and urban governance.

Local Government and trials

While there are strong trends towards improved mobility, responsive transport combined with reduced vehicle ownership in large cities, the wider public are still not convinced whether sensors in cars are sufficiently reliable and urban planning is still focused traditional transport modes as shared by Mike Waters project lead for the West Midlands Independent Transport Authority. For example, most neighbourhoods are built around car parking instead of car sharing and when observed in line with increasing local council budget constraints, any solution to the urban transportation efficiency should encourage more to be done for less.

Emerging innovation of vehicle automation and car sharing could support local council constraints as their development could lead to a transport revolution largely funded by the private sector which directly influences planning and ongoing maintenance for infrastructure. UK AutoDrive is a good example of such an initiative whereby the public and private sector are working together to learn from technology trials in Coventry and Milton Keynes to ensure the wider benefits to mobility, business and governance are realised. Whether to allow the transition to driverless vehicles to happen dynamically or to be implemented with a new form of governance to regulate it is currently is still being resolved.

Insurance Implications

Insurance-related implications of driverless vehicles has received much publicity. Ben Howarth from the Association of British Insurers agreed that increasingly automated vehicles would not result in a paradigm transport shift, however driverless cars would. Currently, £27m is paid out each year in vehicle insurance claims in the UK with 94% due to human errors. Benefits of vehicle automation would not only help reduce congestion and incidence of road accidents but also reduce insurance premiums. However, so far there have been no test results to prove the effectiveness of new technologies in increasing road safety. Therefore, the immediate step that could utilise new technologies without requiring a complete paradigm shift could for instance be monitoring the safety of drivers' driving in partially autonomous vehicles in order to define new insurance premiums.

Another problem with driverless cars which could limit their wide application is the fact that insurance would still be required regardless of whether there is a driver, however the insurance would focus on the cover of repair and replacement as well as any accidents should they happen. If cars were to be shared, who would be responsible for their insurance – the manufacturer, Software Company's or would the responsibility be transferred to the individual users? A potential impact could mean vehicle ownership is too costly leading to a new marketplace based on the sharing economy, making cars a hybrid commodity similar to buying a house and renting out a spare room on Airbnb to earn extra income.

Property implications

How property development responds and prepares for autonomous vehicles is largely yet to be explored, however some large scale private developments such as Argent's King's Cross are already considering the potential to be at the forefront of implementing the technology as shared by Peter Runacres Senior Project Director, Argent. Google chose King's Cross as a location for its regional headquarters partially due to the sites ability to permit the trialling of driverless cars and ability to understanding how they interact with the surrounding communities and the integration of the technology within the public realm. For Argent driverless cares will allow them to move people more effectively around areas of the development, especially to areas with no public transport links and moving around the 67 acre estate is only possible on foot or by bike.

Additional benefits of automated vehicles could be the potential to de-stress them on their journeys to work and allowing for valuable additions to public spaces through reduced car parking. Practical aspects of change and how driverless cars could impact the development industry could be facilitated through, community benefit agreements such as section 106 agreements in the UK, which could be used to incentivise developers to provide for driverless technologies and creating benefiting for the wider community by paying lower rents if living in an AV-friendly development. It is important that any transition needs to be gradual to ensure unintended consequences are managed, an example could be that 10% of a city area is dedicated to driverless cars or 1 lane of a motorways set aside to trial the new technologies and to manage the risks and convince the wider community.

Fiscal considerations

Automated vehicles are likely to lead to an increased capacity on roads, which in turn requires an increased policy involvement according to Paul Buchanan, Volterra. Additional to the above implications considerations will also need to be reviewed in terms of:

- managing surface area proactively – e.g. less space committed to roads or parking;
- congestion charging, which could reduce demand by up to 20%;
- blurring the line between public and private transportation by introducing shared AVs, taxis and buses – however, those would be almost irrelevant in the countryside where private transport would persist;
- limiting the amount of infrastructure provided and introducing road pricing; and
- managing the resulting semi-public realm proactively to ensure community benefits.

The transition towards driverless cars is largely led by the private sector however the government and local councils will have a leading role to play both in terms of encouraging and managing the change itself, and ensuring the resulting new urban landscapes is of benefit to the wider environment. New challenges such as the growing separation between cars and pedestrians in an increasingly automated world will need to be managed, while much more sophistication is still required to model different patterns of behaviour and produce more reliable mobility data (e.g. people are not only travelling to and from work during peak hours, but there is a rise in more flexible working arrangements) to which technology can respond.

Government Policy Implications

Cities around the world are challenged by the implications of autonomous vehicle however their adoption and integration into existing transport systems is on the forefront of many transport policy leaders according to Isabel Dedring, Deputy Mayor for Transport, Greater London Authority (GLA). The constant challenge of congestion, pollution and safety is at the forefront of transport policy-making and delivery for the GLA and AV's could significantly improve but also impact these areas if not managed effectively.

Safety benefits of autonomous vehicle technologies could significantly improve city level policies. A current GLA policy has successfully achieved a 40% reduction in road deaths within 10 years, resulting an increased goal of 50%, however a long term goal of 0% fatal accidents may be achievable given the heightened level of vehicle sensors in AV's. Wider benefit implications are also a concern for governments where such services should not only be limited to those who can afford high-end private vehicles. An example of such limits was the cyclist detection trial for buses which was conducted by the GLA last year but is not feasible to roll out on a wider scale.

Another challenge also highlighted by Prof. Polak is that the increased convenience of not having to drive a car would result in more cars being on the roads which, while great from a consumer and economic point of view, is difficult from the policy point of view as already observed with the fast rising number of minicabs across London. Recent policy developments have also focused on wider aspects of urban transportation, such developing motorways in underground tunnels in order to increase urban realm, creating more space for cafes, parks, housing and to allow for safer pedestrian conditions. Policies to improve peoples' health could also be increased such as making the ultra-low emission zone stricter in Central London.

Unregulated development of AV's is not possible and the GLA like other city regulators cannot be successful without the automotive industry being supportive and cooperative, especially during the early stages of policy-making. Sharing data in order to understand the wider benefits and to price the transport externalities appropriately will be key in enabling policy development. On the other hand and as highlighted by Chris Choa, private sector organisations require a clear sense of direction from government before they can commit to investing money in transformational technologies. As AV technologies are bound to have wide-ranging impacts (as the congestion zones did), so there are many questions still to be answered, one of which is how to incentivise the private sector to take in the risk and invest. A suggested solution during the debate was to offer a percentage of the a value captured in terms of rising land value due to lower congestion from driverless cars.

Conclusion

Autonomous movement represents the merging of ‘Smart Car’ and ‘Smart City’

The vision for the future with Autonomous Vehicles is one that still needs to be defined with parameters that allow for a constant modification as we learn and test according to John Worthington. Over the past 30 years and for the next 30 years to come, we will undoubtedly witness changes in the ways space and time are used, in particular in terms of the use of vehicles and transport networks in the expanding and increasingly more populous urban areas. Such change is bound to be transformational, yet incremental and transitional at the same time such as city bike-share schemes. It also inevitably involves changing consumer expectations, new policies and different car industry norms.

Sharing generates more economic and environmental benefits than the AV technology itself but the consequence of greater mobility could also create negative impacts in terms of urban sprawl and pollution however the higher level of data insight should allow government to more accurately manage such conditions. Emerging business models that AV’s could create are many while ensuring the benefits are shared AV network providers could expect collateral uses of freed-up areas as incentives for investment and risk.

Intercity movement and freight routes were highlighted as likely areas for AV implementation aligning with today’s cruise control technology. Engaging people in the transition is essential to ensuring the wider benefits of AV is fully integrated in their adoption. Timing if the transition to AV’s is very close in property and urban development terms with 90% of the attendees believing driverless cars will become main stream within 15 years.

The implications of driverless cars on urban realm is being explored across the Urban Land Institute with the ULI UK Infrastructure Council taking this topic on board as a key theme.

All the presentation slides from the Driverless Cars and the City Conference are available online: **click here to view**

Speakers

Iain Forbes, Head, UK Government's Centre for Connected and Autonomous Vehicles, Department for Transport

Iain Forbes is the head of the UK Government's Centre for Connected and Autonomous Vehicles, a new policy unit based jointly in the Department for Transport and the Department of Business, Innovation and Skills. The Centre aims to help ensure that the UK remains a world leader in developing and testing connected and autonomous vehicles.

Prior to joining CCAV Iain worked in No10 as a Private Secretary to the Prime Minister, covering issues including transport and the devolved administrations. He has previously worked in both the Department for Transport and the Home Office, advising on innovation, science and technology, security policy and environmental strategy.

Paul Buchanan, Partner, Volterra

Paul is an economist with 25 years' experience in the planning, economic and financial appraisal of a wide range of public and private sector transport investments and policies. He has a particular focus on the links between transport and economic development and has advised on public private partnerships for expressways, urban toll roads and metro and light rail projects representing existing and potential concessionaires, financiers and governments. He led the economic appraisals of both the Jubilee Line Extension and Crossrail.

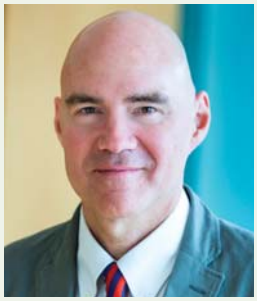
Paul's career has included work for Halcrow and Travers Morgan before ten years as Director at Colin Buchanan and Partners. He came to Volterra from the position of Technical Director at SKM Colin Buchanan. His international experience includes four years based in SE Asia and also spans Europe, South America, Australia and NZ. Paul has provided strategic advice with an international perspective to cities ranging from Shanghai to Auckland, London to Jakarta.

Miller Crockart, Vice President Global Sales & Marketing Traffic Software at the PTV Group

During his career, he has acquired extensive expertise, in particular in the automotive, rail and metro sectors, public transport planning and road traffic and pedestrian capacity planning and simulation. From building railway signaling and train control centers through to managing Olympic and major event transport simulation and planning projects he has developed a unique knowledge of what it takes to plan and deliver transport networks around the world.

Miller Crockart was born in Zimbabwe, grew up in Johannesburg and Paris, and then in London and Birmingham.

He studied International Affairs and Politics at Sophia University, Tokyo and has lived and worked in Japan, Hong Kong, Australia, Great Britain and Germany during his professional career. He speaks English, Japanese, French and German.



Chris Choa, Vice President, AECOM, Chair ULI Infrastructure Council

A native New Yorker, Christopher Choa is based in London and leads the Cities practice for AECOM. He speaks frequently about urban performance and works with city and national governments to develop regional-scale strategies. A graduate of both Harvard and Yale, Christopher serves on the UK executive board of the Urban Land Institute and is on the external advisory board for the Sustainable Urban Development program at Oxford. He is an appointed advisor to the Mayor of London's Infrastructure Delivery Board.

Isabel Dedring, Deputy Mayor for Transport and Deputy Chair of Transport for London
Isabel is responsible for setting and delivering policy across the Mayor's £10b annual transport budget. She has led for the Mayor on a range of initiatives including the creation of TfL's £4b Roads Modernisation Programme and the Tube's 30% performance improvement target. She has been heavily involved in defining and delivering London's new air quality and cycling initiatives.

Isabel's role encompasses delivering new infrastructure, including through TfL's first "Growth Fund" designed to catalyse housing and jobs growth in London. Isabel also leads for City Hall on the Mayor's 2050 Infrastructure Plan for London. Isabel is a qualified US lawyer with a background in regulated industries and management consultancy

Rama Gheerawo, Director of the Helen Hamlyn Centre for Design, Royal Collage of the Arts
With nearly two decades in the design industry, his interest is in people-centred and socially inclusive design. He leads the Centre's Age & Ability research lab which creates design that improves the lives of people of all ages and abilities. He is in demand as a keynote speaker internationally and writes, curates exhibitions and runs workshops for audiences that range from students to business executives to civil servants. Knowledge transfer to business is central to his work, building on a track record of over 150 collaborative projects with the Centre involving organisations such as Gov.UK, Samsung and Toyota. Rama has published widely in both academic and trade press including Volume magazine, New Design and the Journal of Design Philosophy Papers. He has guest edited a number of journals, appeared on juries and advisory boards representing design, and is a member of the Engineering and Physical Sciences Research Council (EPSRC) Peer Review College. He is a Fellow of both the Royal College of Art and the Royal Society of Arts.

Professor Dale Harrow, Dean of the School of Design and acting head Vehicle Design programme, Royal Collage of the Arts
Dale Harrow is keen to explore the changing city, technology, the new consumer and new commercial opportunities to develop innovative design solutions within an established design culture. He has been the principal investigator on a major research programme to develop 'Healthcare on the Move' with the 'Smart Pod' – an Engineering and Physical Sciences Research Council project in collaboration with the Royal College of Art, Helen Hamlyn Centre for Design and four other leading institutions and industrial partners. The project has developed into the redesign of the current NHS emergency ambulance for the twenty-first century, which has been shortlisted for a Victor J. Papanek Social Design Award and nominated for the Design Museum's Designs of the Year 2012 exhibition and awards.

Ben Howarth, Policy Advisor on Motor and Liability, Association of British Insurers
Ben is responsible for managing and developing ABI's policy positions on a range of motor and liability issues including: road safety, especially for young drivers; driverless cars; telematics; and managing the ABI's strategic relationship with vehicle manufacturers.

He joined the ABI in 2015, having previously worked as Research Manager for a public affairs consultancy, advising clients on a wide range of policy issues.

Before that, Ben spent more than four years at DeHavilland, where he was a Parliamentary Analyst and then Operations Manager. He joined DeHavilland after completing an internship in the office of Labour MP Fiona Mactaggart. He has a BA in History and Politics and an MRes in Economic and Social History, both from the University of Exeter.

Paulo Humanes heads the Corporate Strategic Business Development at the PTV Group
As a transport professional he looks back on 17 years of working experience in this field of action. His main focus at PTV Group is to address important global transportation issues at the highest level with players like the OECD, World Bank and the World Resource Institute, among others. To develop business, that better supports the future of cities and the implications mobility and transportation will have on society, subsequent technological and data and policy issues, Paulo currently represents PTV in a number of high level board workshops and conferences such as International Transport Forum (ITF) "Corporate Partnership Board". He is a fellow of the Chartered Institute of Highways and Transport, which he serves in a number of roles.

Before joining PTV, Paulo worked at Jacobs Engineers as a Technical Director for over 10 years, advising clients, as local authorities, research projects and governmental bureaus on a wide range of transportation and major schemes.

Professor John Miles FREng., F.I.Mech.E, Department of Engineering, Cambridge University
John is a Fellow of Emmanuel College, Cambridge and is the Arup/Royal Academy of Engineering Professor of Transitional Energy Strategies at the Department of Engineering. His special interests include the technology and economics of future transport systems, with a particular emphasis on energy efficiency and environmental impact. Recent research and consulting appointments have included substantial work in the areas of electric vehicles and their charging infrastructure, the development of wireless electric charging systems for small and large vehicles, the design and operation of electric buses, and the exploration and demonstration of autonomous systems for personal and public transport.

John is a member of the UK Automotive Council and was founding chairman of the Council's Working Group on Intelligent Mobility, where he was responsible for the production of the Council's Intelligent Mobility Technology Roadmap and several reports on Intelligent Mobility. John is currently a member of IMPACT (the UK Intelligent Mobility Planning and Action Co-Ordination Team) and is chairman of the IMPACT Cities and Supporting Infrastructure Working Group.

Professor John Polak, Transport Demand and Head of the Centre for Transport Studies, Imperial College London
Prof. John Polak is a mathematician by background specialising in the areas of travel behaviour and transport demand modelling.

He is a past President of the International Association for Travel Behaviour Research and a past Council Member of the Association for European Transport and past chair of the AET Applied Transport Modelling programme committee.

He is a member of the EPSRC Peer Review College and serves on the US Transportation Research Board's Committee on Traveller Behaviour and Values. He has served as an advisor to Transport for London on the design of LATS 2001 and the London Congestion Charging monitoring programme and to the Department on the quality assurance reviews of the NTS and of Road Freight Statistics as well as to the Singaporean and Norwegian governments on the modelling road pricing measures.

He has extensive experience of working with ITEA and been in the forefront of innovative transport model development in the UK, contributing to the development of techniques for stated preference data collection, activity based modelling, econometric aspects of discrete choice modelling, the assessment of the welfare impacts of transport policy measures, the treatment of errors in revealed preference data.

Peter Runacres, Senior Projects Director, Argent
Peter joined Argent in 2012. He is part of the commercial team and is managing delivery of Google's UK headquarters at King's Cross. Peter works closely with the Google project team on the design and delivery of this 1 million sq ft building. Peter's background is in Architecture. He has worked in the UK, Asia and the Middle East on projects ranging from the Al Bahr towers in Abu Dhabi to Holland Park School. He was also involved in the Egan initiative – Rethinking Construction – which looked to improve quality and efficiency in UK construction.

Mike Waters, Head of Transport Infrastructure, Coventry City Council
Mike Waters is Head of Transport Infrastructure at Coventry City Council, a CW LEP Executive and Chair of a West Midlands Integrated Transport Authority work stream which sets policy and strategy for intelligent mobility and connected vehicles. Mike has strategic responsibility for Coventry's transportation and innovation agenda and has established a multi-million pound programme of public highway based connected and autonomous vehicle projects in Coventry and Warwickshire.

John Worthington, Chairperson, Independent Transport Commission
Professor John Worthington is Co-Founder of DEGW, Director of the Academy of Urbanism, Past President (1989-91) and current Patron of the Urban Design Group. He is currently a member of the advisory board of Climate Change Capital Property Investment Fund, a Commissioner of the Independent Transport Commission, leading the review of the spatial impact of High Speed Rail and Deputy Chair of the Cambridgeshire Sustainable Growth Quality Panel.

Previous positions include Professor of Architecture and Director of the Institute of Advanced Architectural Studies at the University of York (1993-7); Visiting Professor Chalmers University of Technology, Gothenburg (1999-2002); the University of Sheffield (1998-2008) and the University of Melbourne (2006-2010). John was chairman of the Rotterdam High Rise Commission (2001-2004) and chair of the City of Dublin Urbanism Advisory Panel (2001- 2011), from 2003-7 he was chairman of CABE/RIBA Building Futures and from 2004-9, a Board member for London Thames Gateway Development Corporation.

ULI UK Infrastructure Council

The mission of the UK Infrastructure Council is to promote more sustainable infrastructure investment choices, and to foster an improved understanding of the links between infrastructure and land use. Because infrastructure is the foundation for metropolitan prosperity, and because it provides the physical framework for real estate investment, ULI has identified infrastructure as a key priority.

Through forums, case studies, study tours, and other activities, the UK Infrastructure Council utilises ULI's extensive public and private networks to exercise leadership on infrastructure. For further information visit: www.uk.uli.org/councils-and-forums/infrastructure-council/

Urban Land Institute

The Urban Land Institute (ULI) is an influential global organisation with a mission to provide leadership in the responsible use of land and in creating and sustaining thriving communities worldwide.

Established in 1936, the ULI now has a membership of around 35,000 internationally. With this broad sector membership, the ULI facilitates invaluable opportunities for members to engage and learn from different disciplines and to deepen existing relationships with professionals from around the world. Further information: www.uk.uli.org

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