MANCHESTER SCHOOL OF ARCHITECTURE

Manchester Metropolitan University

CPU

Transport for Greater Manchester

Future Mobility Symposium 2020

Public Report

June 2020

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SYNERGY

Acknowledgements

We would like to thank Innovate UK and the Research and Knowledge Exchange at Manchester Metropolitan University for supporting the Future Mobility Symposium 2020.

This event was organised in collaboration with Transport for Greater Manchester. In particular, we would like to thank Nicola Kane, Hannah Tune, Anna Craciun and Chris Allwinter from the Strategic Planning, Insight and Innovation team for their valuable input.

Our sincere thanks go to our speakers: Nicola Kane, Renos Karamanis, Dr George Economides, Melissa Giusti, Andy Shilladay and Dr Delia Dimitriu for their informative talks and inspirational provocations.

We would also like to offer our thanks to the CPU Lab staff and CPU Atelier students at the Manchester School of Architecture, and to all the participants for helping us to make the above event a huge success.

The Complexity Planning and Urbanism Laboratory Team
Manchester School of Architecture

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June 2020

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Introduction to the Future Mobility Symposium 2020

As part of the Innovate UK Government funded Centre for Connected Autonomous Vehicles (CCAV 2) project 'SYNERGY', the Complexity Planning and Urbanism Lab (CPU-Lab) at the Manchester School of Architecture in partnership with Transport for Greater Manchester (TfGM) organised the Future Mobility Symposium 2020 in Manchester on the 14th January.

This half day event was planned around Connected Autonomous Vehicles (CAVs), to explore their potentials, pitfalls, government policies, current projects and research conducted in this area. The event included a panel of experts from industry, academia and government to discuss issues and share their views around the implementation of the technology, upcoming projects, policy work and potential concerns. This event featured a number of provocations from experts in the field followed by a round-table discussion.

The provocations and discussion revolved around the following themes:

- Disruption to existing services
- Benefits (for mobility)
- Risks
- Urban Transformation / Changes required to City Infrastructure

Event Agenda

13:30 – 14:00	Arrival
14:00 - 14:10	Welcome and Introduction *Mr Ulysses Sengupta, Reader and Director of Complexity Planning and Urbanism Research Lab, MSA, Manchester Metropolitan University*
14:10 - 14:30	Future Mobility and CAV *Nicola Kane, Head of Strategic Planning and Research, Transport for Greater Manchester*
14:30 - 14:45	Urban Simulation and CAV *Solon Solomou and Sigita Zigure, Complexity Planning and Urbanism Research Lab, MSA, Manchester Metropolitan University*
14:45 - 15:30	The Future of Mobility: Provocations *4 x 10 minute provocations from invited speakers/experts in academia, industry and government bodies: Renos Karamanis (Imperial College London), Dr George Economides (Oxfordshire County Council), Melissa Giusti (Highways England), Andy Shilladay (Vehicle Technologies Ltd)*
15:30 - 15:50	Coffee Break and networking
15:50 - 17:00	The Future of Mobility: Roundtable Discussion
17:00 - 17:40	Feedback and Group Discussion *Chair, Mr Rob Hyde, Senior Lecturer, Manchester School of Architecture, Manchester Metropolitan University*
17:40 - 17:55	The Future of Mobility Funding Landscape *Dr Delia Dimitriu, Connected Places Catapult*
17:55 - 18:00	Closing remarks from the chair
18:00 - 18:30	Drinks and Networking

Speakers in the Order of Presenting

Ulysses Sengupta, Reader in Architecture and Director of Complexity, Planning and Urbanism Research Lab, Manchester School of Architecture, Manchester Metropolitan University

Ulysses Sengupta is a reader at the Manchester School of Architecture (MSA) a collaboration between Manchester Metropolitan University (MMU) and The University of Manchester (UoM). He is the founder of Complexity Planning and Urbanism (CPU), a research centre and related Masters atelier at the Manchester School of Architecture. CPU uses a complexity framework to develop new digital tools, computational thinking and urban theory addressing future ICT disruptions and spatio-temporal dynamics in urban processes. The research is transdisciplinary and spans Future Cities, Smart Cities, the Internet of Things, agile governance and cities as complex adaptive systems. CPU research engages with planning for evolutionary and emergent city systems, digital participation and inclusion, data platforms for resilient cities and urban simulations for sustainable future scenarios.

Nicola Kane, Head of Strategic Planning and Research, Transport for Greater Manchester

I'm currently enjoying the challenge of developing and delivering Greater Manchester's 2040 Transport Strategy. I'm a chartered town planner (MRTPI) and qualified transport planning professional (TPP) with a deep interest in how transport can improve people's lives and the places they live, work and visit. I was awarded transport planner of the year 2017 by the Transport Planning Society for my role in leading the development of the 2040 Transport Strategy. I enjoy leading teams, encouraging collaborative working, and promoting the profession through my role on the NW Transport Planning Society committee. I have particular experience in transport policy and strategy development, travel behaviour change, masterplanning and development planning. I am also a member of the Institute of Transport Studies' Advisory Board at the University of Leeds. Specialties: Transport Strategy and Prioritisation, Transport Policy, Travel Behaviour Change, Accessibility Planning, Spatial Planning.

Solon Solomou, Researcher, Complexity, Planning and Urbanism Research Lab, Manchester School of Architecture, Manchester Metropolitan University

Solon is a researcher at the Manchester Metropolitan University. Previously, he graduated with a Master of Architecture with the CPU Masters atelier at the Manchester School of Architecture. He is interested in the prospect of using digital tools to understand and model the development of cities. With the use of complexity theory as a guide and data as fuel, he seeks to reach an informed state that allows for the accurate use of positive design interventions to enhance the natural progression of the urban realm. His PhD research topic is 'Combining market led economic modelling and urban spatial modelling'.

Sigita Zigure, Researcher, Complexity, Planning and Urbanism Research Lab, Manchester School of Architecture, Manchester Metropolitan University

Sigita Zigure is a researcher at the Manchester Metropolitan University. Previously, she graduated with a Master of Architecture with the CPU Master atelier at the Manchester School of Architecture. She is interested in socio-technical processes with a particular focus on future mobility technology in cities. Currently, she is a PhD student and she is also working as a research assistant on the Project Synergy. Her PhD research topic is 'Autonomous Vehicles and Socio-Technical Transitions'.

Renos Karamanis, Researcher, Imperial College London

Renos is a PhD candidate and research assistant in the Transport Systems and Logistics Laboratory at Imperial College London. His research area revolves around ride-sourcing and how the introduction of Autonomous Vehicles (AVs) could transform the market. During his PhD, Renos initially developed an agent-based modelling framework of AV ride-sourcing fleets in urban environments to assist policy insights and the testing of operation algorithms by researchers. Additionally, Renos developed a double-auction assignment and pricing methodology to serve as a substitute for surge pricing by ride-sourcing firms. His research also considers how AV fleets could optimally allocate resources using network theory. Outside his research at Imperial, Renos has been involved in developing the underlying software for Hyphen, a Dubai-based startup focusing on smart mobility, in a team of Imperial College consultants. He is also involved in Shift, a project which aims to capture the impact of AVs in London, in a consortium with Imperial College, TfL and Oxbotica.

Dr George Economides, Team Leader for Connected and Autonomous Vehicles, Oxfordshire County Council

After completing his doctorate in chemistry, George worked in Motorsports to facilitate the transfer of innovation from the racetrack to the wider world, where he quickly rose to Head of Strategy. In 2017, he joined the Oxfordshire County Council's Innovation Hub, to lead the first CAV-dedicated team at a UK local authority. He is currently involved in numerous projects, including DRIVEN, MultiCAV, Maas:CAV, OmniCAV etc. In 2019, George received the TaaS Award for Future Mobility Champion of the Year.

Melissa Giusti, Innovation Manager, Highways England

Melissa started her career in Italy, after graduating in City and Environmental Planning at University of Florence she was involved in planning and GIS projects at local and regional level.

After few years, she moved to the UK and completed a Master in Transport Engineering and Planning at the University of Salford. After completing the MSc she joined the engineering firm Atkins as ITS Consultant working mainly on Smart Motorways projects. During that time Melissa also spent one year on a secondment in the Innovation team of transport for Greater Manchester, working on European projects developing on Mobility as a Service concept.

Andy Shilladay, Technical Director, Vehicles Technologies Ltd

Andy actively leads the development of advancing technologies which bring benefit to society as a whole. He is primarily focused on delivering Connected Autonomous Vehicle technologies in the research space, wholistic decarbonisation platforms and advanced passive security technologies in the open source Wi-Fi sector and couples this with other automotive focused research and D&D projects including those focused on electric vehicles and STEM projects. He has over 20 years' automotive development experience, working closely with OEM's and key development suppliers. His comprehensive knowledge is across multiple automotive projects and engineering functions gained from working on full vehicle and system delivery within this space. Andy's background means he is fully conversant with current techniques for delivery of automotive engineering and he carries an understanding of the interactions and limitations within development between real world testing, simulations and system test work against project requirements.

Rob Hyde, Senior Lecturer, Manchester School of Architecture, Manchester Metropolitan University

Rob is a Principal Lecturer at the Manchester School of Architecture. Previously Rob has been a Masters Unit leader in the Manchester and Birmingham Schools of Architecture as well as being an associate/visiting lecturer and Guest critic at numerous Universities. Rob also has extensive diverse experience within industry being employed by and setting up several practices, working nationally and internationally and on award-winning projects.

Currently Rob leads Professional Practice and teaches studio within the CPU Post Graduate Research Atelier. Within the School of Architecture and wider Manchester School of Art Rob has Managerial responsibility for Employment, Employability + Enterprise and developing related external cross-disciplinary collaborative networks between academia and industry focussing on both employment and research. He is also an active invited member of a number of committees/ working groups in organisations including Manchester Architects, Greater Manchester Chamber of Commerce (GMCC), the Royal Institute of British Architects [RIBA/ RIBANW]. Robs current research interests include: The application of complexity science onto the urban realm, disruption and impact on Future/ Smart Cities and Transdisciplinary.

Dr Delia Dimitriu, Strategic Development Director (R&D Programme), Connected Places Catapult

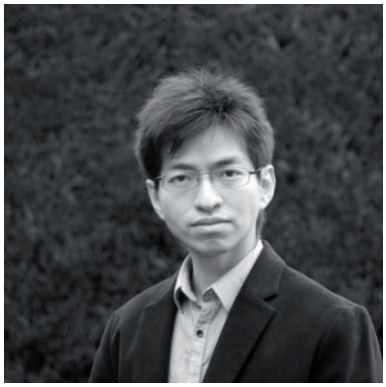
Dr Delia Dimitriu has an internationally recognised experience in transport & environment related research, with focus on sustainability and future mobility. She is one of the few European experts contributing to the low carbon transport agenda as part of the H2020 Programme, working on decarbonising transport policy, research and practice. Her input in the EU-US cooperation programme on Decarbonising Transport for a Sustainable Future was instrumental in developing scenarios for regions and megacities, signalling the need to work on zero carbon cities. Delia was part of a team that won the 2007 Nobel Peace Prize for its work on climate change and is a Lead Author of the IPCC Fifth Assessment Report: WG3-Mitigation, Chapter 8-Transport. She is an EC-DG Move adviser on STRIA (Strategic Transport Research and Innovation Agenda), but also acts as adviser to the UK-DfT Office for Science, and has joined Connected Places Catapult as Strategic Development Director (R&D Programme)- CPC Associate (from March 2020). Delia is also a Research Fellow with the Manchester Metropolitan University- Faculty of Science and Engineering.

Organising Team

Dr May Bassanino, Project Manager and Researcher, Complexity Planning and Urbanism Research Lab, Manchester School of Architecture, Manchester Metropolitan University

May has over 15 years' experience in conducting and delivering multi-million pounds interdisciplinary projects in the areas of collaborative engineering, process modelling and evaluation frameworks. This expertise has been applied to a variety of domains including Construction, Ecosystem, Social, Design and Energy. Through these projects, she has worked with multiple stakeholders and clients from the UK and across Europe, ranging from small businesses to large companies, as well as academic institutions.

May joined the Complexity Planning and Urbanism (CPU) Research lab at the Manchester School of Architecture as a Project Manager and Researcher in 2019 and since then, she has been working in the area of urban complexity research.



Eric Cheung, Researcher, Complexity, Planning and Urbanism Research Lab, Manchester School of Architecture, Manchester Metropolitan University

Eric Cheung is a researcher at the Manchester Metropolitan University based within the Manchester School of Architecture with interests in urbanism, systems and computational thinking. He engages in teaching within the CPU MArch atelier at the Manchester School of Architecture since 2014, with a particular focus on computational thinking and digital design. He had been a design studio tutor at the University of Nottingham from 2010 to 2013. In parallel to research, he is a fully qualified architect with over five years of working experiences in architectural practice. He is engaged in his research and inquiry into the development of new design software and applications of algorithms, multi-agent simulation, computer geometry and graph-based data structures in architecture and the built environment.

Mahmud Tantoush, Researcher, Complexity, Planning and Urbanism Research Lab, Manchester School of Architecture, Manchester Metropolitan University

Mahmud is a PhD candidate and researcher at the Manchester Metropolitan University. He is interested in how new Information Communication Technologies, with a particular focus on user-generated and Internet of Things (IoT) Big Data, will change the way we understand and manages cities. Mahmud is currently perusing his interest with his PhD, as well as being part of the H2020 Synchronicity project that aims to help cities simplify the adoption of new services that tackle urban challenges using IoT and data technologies.

Complexity, Planning and Urbanism Research Lab, Manchester School of Architecture, Manchester Metropolitan University

Complexity Planning and Urbanism Laboratory (CPU-Lab) (a research laboratory at the Manchester School of Architecture) uses complexity framework to progress applied computational approaches in transdisciplinary urban studies. The laboratory employs novel tools and analytical methods for studying transitions and disruptions based on emerging technologies. The research is transdisciplinary and currently spans Future Cities, Smart Cities, the Internet of Things, agile governance and cities as complex adaptive systems.

Future Mobility Challenges

Profound changes in the ways people and goods move is expected to happen with the introduction of autonomous vehicles on roads. While this transition presents exciting and potentially transformational opportunities, it also brings challenges and uncertainty surrounding the effects on existing services, stakeholders and cities.

The Future Mobility Symposium 2020 was organised on the 14th January as a stakeholders engagement workshop with 50 members from academia, industry, government, and general public in Manchester, UK. Participants were asked to discuss and respond to four questions in order to frame challenges for future mobility from their own perspectives. The four questions were part of a systematic process of problem framing/structuring, starting with identification of objectives, leading to barriers, affected stakeholders, and finally identify the Future Mobility challenges.

This section introduces the questions explored at the workshop.

What is the desirable outcome for future mobility?

In recent years sustainability has been at the forefront of transport related strategies and policies. Sustainable mobility has been described as requiring actions to reduce the need to travel, to encourage modal shifts, to reduce trip lengths, and to encourage greater efficiency in the transport system. Concepts of smart and intelligent mobility have also entered the discussion about the future of mobility, however there is still ambiguity regarding how innovative technology will affect the sustainable mobility goals and outcomes.

Several changes in city and urban dynamics can be triggered by the advent of Connected and Autonomous Vehicles. This provides a simultaneous opportunity to rethink mobility, cars, and cities. Transport technologies historically have affected the shape of the built environment. Innovations in transport have allowed cities and economies to grow, but they have also caused adverse effects in urbanised areas such as reduction in air quality, accidents, congestion, and often costly commuting.

We asked participants to identify desirable outcomes for future mobility from their perspective in four groups: government, industry, academia, and general public.

What can be done to achieve the desirable outcome?

While the governance and the industry plays a significant role in steering the future of mobility, the outcomes will be affected by public attitudes and uptake of new technologies.

So far the primary focus of the government (in the UK) has been on industrial and economic competitiveness of AV, which has materialised through R&D projects, trials, and demonstrators. However, in order to capitalise on promised AV benefits, focus on other areas outside the technological innovation realm will be necessary. The aim of this question was to steer the discussion towards naming actions by involved actors towards the desirable outcomes discussed in the previous question.

Who will be the stakeholders affected and how?

This question allowed the participants to identify how future mobility challenges will affect them. Because of the multidisciplinary representation of participants at the Future Mobility Symposium 2020, this question also allowed to discuss those effects with stakeholders from other industries and backgrounds.

What are the challenges/barriers to be mitigated; shapers to be amplified; conditions necessary to achieve these outcomes?

The future of mobility is full of unknown unknowns - challenges that have yet not emerged in the discussion. The automotive industry is rapidly turning into a mobility industry or ecosystem - new service models, technologies, sharing schemes and focus on greener journeys - are all challenging existing familiar transport domains. What does that mean for decision makers? What can and should be done to navigate the road towards future of mobility that is beneficial to all - the economy, the environment, and to the users.

Workshop Outcomes

The outputs of the workshop were collated and analysed to structure potential issues connected to future trajectories. Workshop results for all five roundtable discussions were then analysed and combined thematically. This section presents the findings of each question.

Q1: What is the desirable outcome for future mobility?

The following figure illustrates the thematic breakdown of answers for Question 1 resulted from the roundtable discussion.

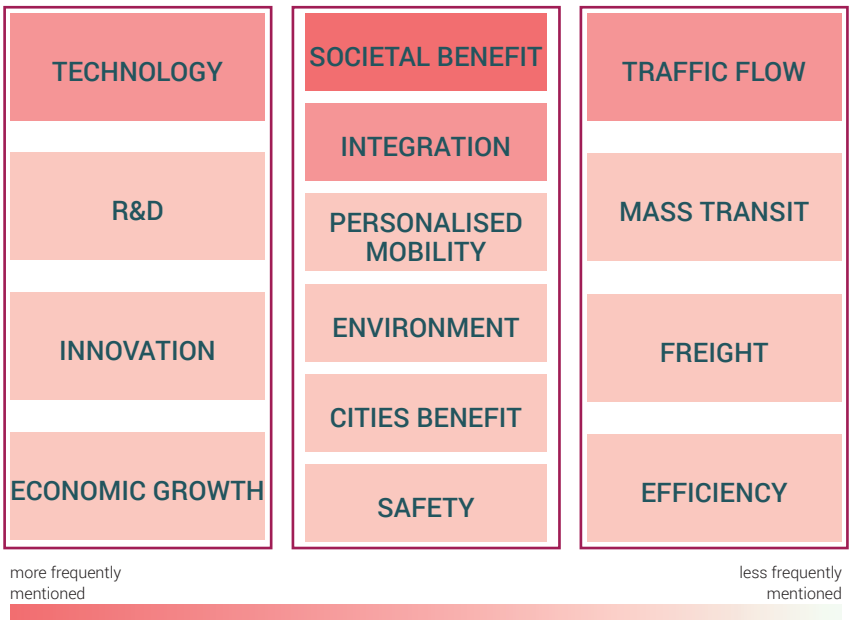


Figure 1. Q1 most common topics of discussion grouped thematically

The most commonly discussed desirable outcomes for **future mobility** were related to **societal benefit**, which echoes the broader discussion about mobility in media and governance. Societal benefit includes outcomes such as **accessibility, inclusivity, and affordability of mobility,** as well as reduced accident rates as highlighted in the following quotes:

"Looking at the carbon issue, Future Mobility needs to be a shared service, based on end users' needs" Academic participant.

"Future Mobility is about reducing traffic, congestion and emissions" Industry representative.

"Future Mobility is about improving the whole journey"

Government Representative

"It is about being aware of older people's needs who are not running cars and the limitations they have" General Public representative

"Desirable outcome is to reduce the reliance on single occupancy car use, instead, use electronic buses, bigger buses so you can take on bikes and trolleys. Creating demand responsive network requires city wide planning or region wide – like an oyster for the north, that takes you across the city" Industry representative

Other common desirable outcomes mentioned were related to **technology, integration, and traffic flow**. Particular focus while discussing Question 1 was placed on prospects of innovation as outcome, increased availability of data leading to new research directions, knowledge transfer, and moving towards shared mobility services across city regions, modes of transports, and linking innovative technologies to mass transit and freight, as highlighted below:

"Data can be used where gaps lie, for future planning and to help with planning infrastructure. There is also a big move towards open data, such as travel statistics, traffic signal data, that can lead to better efficiencies in using the data" Government representative

Environmental and overall cities benefits, related to congestion, traffic flow, and air quality were also discussed as current concerns and desirable improvements for the future.

"Future Mobility is about designing more efficiently and understanding the needs of the public"

Academic Participant

Q2: What can be done to achieve the desirable outcome?

The thematic breakdown of answers for Question 2 from the roundtable discussion are represented in the following figure.

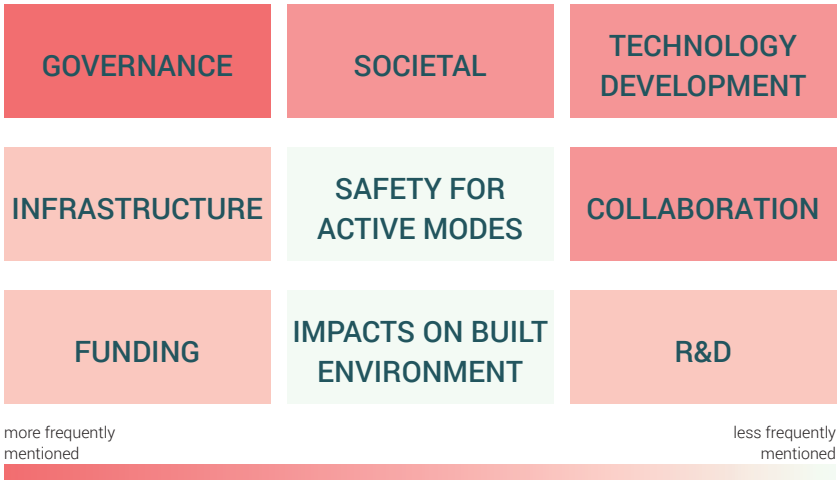


Figure 2. Q2 central common subjects of discussion

For this question, participants were asked to discuss actions and pathways that can be made by decision makers in order to achieve the desirable mobility trajectories discussed earlier.

Areas concerned with governance were addressed most frequently, with participants suggesting **governance actions** such as **creation of policy frameworks for data regulations and standards, integrated transport strategies, development of legitimacy for policy measures, streamlining the regulatory environment.**

"We need more integrated strategies – as time goes on, transport and energy are more interlinked – there's no point everyone moving to electric vehicles or autonomous electric pods if we can't generate electricity or you've got nowhere to charge" Academic representative.

Regarding the industry and technology sector, the **need for responsible innovation and collaboration that benefit the environment and the public** was vocalised with engagement of public and stakeholders in those processes seen as an important step. This in addition to the need for **targeted investment and funding to accelerate positive impact trajectories**, as referenced in the following remarks:

"Open collaboration, particularly in automation is important" where "Industry and Government having public and private partnerships" Industry representatives, and,

"There is a need for target funding, where the gaps are" Academic representative.

Academia view highlighted the **gap between technology and society**, which can perhaps be filled through consultations with the public to understand their needs and then translate these needs to the government. This way, academia can play their role through funding to **connect government and industry**. The discussion identified the need to understand the role of each stakeholder (academia, industry, government), to understand the stakeholders' view and model it, to enable delivering a better outcome.

Furthermore, such research and innovation should involve end users. Technology should not overpower human capital and public should not be excluded from the research process.

It is worth mentioning here that one of the issues raised by Industry while discussing Q2 was about 'Risk Transfer between car manufacturing industry and the government' addressing the need for insurance model on 'autonomous car' as reflected in the following remark:

"The whole idea of autonomous vehicles, not yet established, is for insurance companies to have policies on those cars could potentially lead to the establishment of new market".

"We need more integrated strategies – as time goes on, transport and energy are more interlinked – there's no point everyone moving to electric vehicles or autonomous electric pods if we can't generate electricity or you've got nowhere to charge"

Academic representative

Q3: Who will be the stakeholders affected and how?

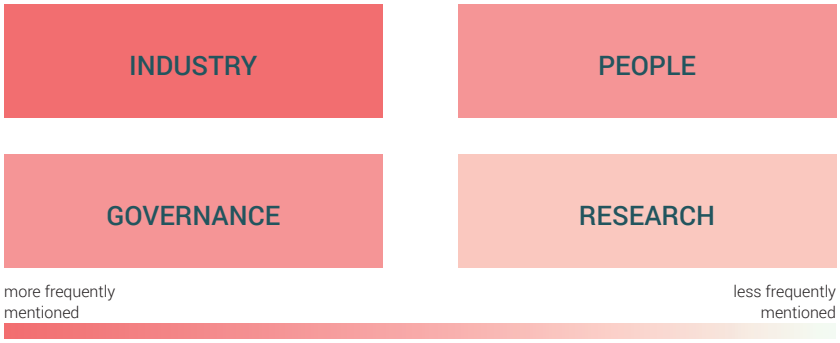


Figure 3. Q3 identified stakeholder groups

For this question, the participants were asked to identify stakeholders affected in future mobility transitions bearing in mind both positive and negative impact. Examples of positive effects for stakeholders included increasing safety of autonomous vehicles can perhaps lead to reducing accident rates and lowering insurance costs, as mentioned below:

"Everyone will be affected. You gain that you don't need a car; you gain that money into your own pocket which can go back into the local economy which is all great; you gain liveability; less severance, less polluted streets. All these benefits come with reducing car dependency, but you also need to consider that you're losing part of your identity. Research done by the DfT pointed out that 92% people consider their car as part of their identity!" Government Representative.

Advances in technology and increasing data availability were mentioned as they open up new research directions and opportunities for academia and interdisciplinary research and collaboration.

"Newer research areas will demand newer qualifications and expertise" Academic participant.

As shown in the diagram above, industry was the most discussed stakeholder group, expressed concerns with issues like **job security and future for drivers,** and reduction in public transport especially railway use. Increasing complexity of systems involving **new types of service models and new data** will challenge governance systems, industry, and users.

For the General Public/Users, data, ethics, security were raised among the concerns as well as behavioural change addressing social research:

"Everyone will be affected"

Government representative

"There are going to be changes in how the different areas of society will adapt to these new technologies. Younger people are opting nowadays to be more invested in technology. They don't have drivers licenses due to extortionate insurance prices. But this is a positive, as the take up of mobility services due to this will be higher in the lower generations" Industry representative.

"*From a hype perspective, sustainability is always brought up as research topics but more interestingly, how will CAVs lead to behavioural changes on a smaller scale? How can design of cities be on this scale & adapt to change whilst still supplying the needs of the current?"* Academic representative.

"there are going to be changes in how the different areas of society will adapt to these new technologies"

Industry representative

Q4: What are the challenges/barriers to be mitigated; shapers to be amplified; conditions necessary to achieve these outcomes?

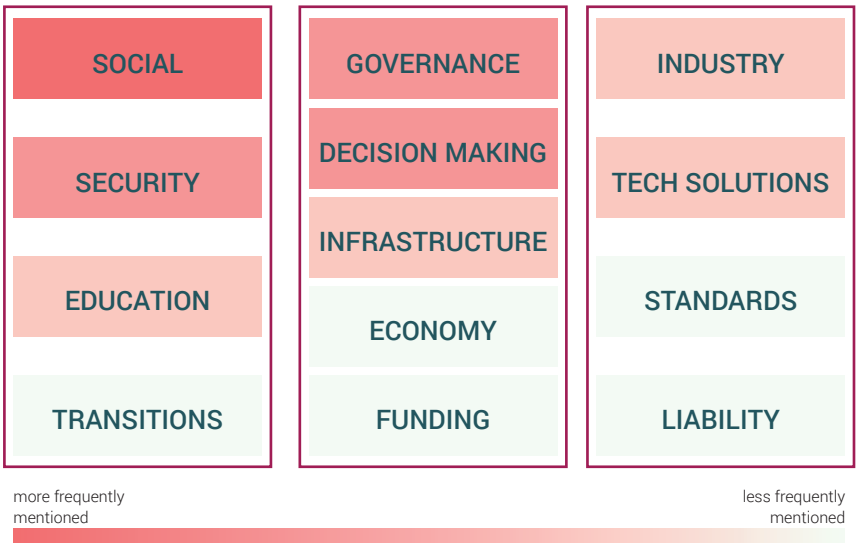


Figure 4. Q4 central common topics of discussion grouped thematically

For the final question the participants were asked to discuss challenges, barriers and enablers for desirable future mobility directions. Many potential benefits of technology advances were communicated, and it crystallised that the acceptance by citizens of the new technologies (such as self-driving cars) and culture around new mobility services (e.g. sharing) will be crucial for maximising the potential benefits of future mobility.

This pointed to many overlapping areas of concern, reflecting the stage and lack of clarity of the ongoing transition. The **lack of clear future visions and methods** to assess actions toward different future mobility outcomes results in a lack of identified pathways and inaction by stakeholders other than industry. However, the ongoing transition is complex and multiple aspects are related. It requires a **collaborative effort from all stakeholder groups** to identify and progress plausible and desirable directions of change. For example: the designation of AV's for public transport/passenger use can have multiple positive and negative impacts at different scales and on numerous related aspects such as accessibility, transport emissions, industry and economy. Stakeholders need to work together to develop decision making frameworks to advance the technologies in a beneficial way within an adaptive process reflecting the evolving situation.

Common emergent themes were reiterated in the panel discussion following the round tables. These included the conservative nature of some sectors; the need for transdisciplinary collaboration; the need to contribute to the design of future mobility solutions rather than concentrate solely on current mobility issues; the growing requirement for cross-sectoral expertise and education; the importance of future pathways focused on societal benefit.

Concluding Remarks and Recommendations

This work brought together the thoughts, ambitions, expectations and current actions of various stakeholders regarding future mobility. Furthermore, the findings presented to shed some light on potentially conflicting ideologies and visions. Some recommendations from the workshop are highlighted below:

- A **long term funding roadmap** to be identified that focuses on the climate change summit. Decarbonisation of the city/region should be a consistent strategy, therefore, Manchester provides a good example of a case study because it is identified as a smart city and it has less challenges than London.
- **Short and long-term plans for funding** should be identified so policies are built on how cities will be impacted, rather than how cities need to accommodate vehicles.
- There is a need to better **understand the views/opinions of various end-users** and how they might be affected with CAVs and to also understand how the adaptation to new trends and technologies with consideration to various modes of transport and cost.
- **Interdisciplinary research** - Transport/Future Mobility is linked to energy and engineering, but also computing and communication, security and the internet of things, as well as social and spatial sectors. Interdisciplinary research starting to happen but still has a long way to go.

Participants

Name	Affiliation
Alexander Roy	Manchester Airport Group
Alexander Wallace	MSSA
Andrew Finlay	Jeff Gosling Hand Controls Ltd
Andrew Saunders	Manchester Airport Group
Andy Shilladay	Vehicle Technologies
Beate Kubitz	Independent transport researcher / writer / consultant
Chris Allwinter	Transport for Greater Manchester
Danielle Worden	Law Commission
Delia Dimitriu	Connected Places Catapult
Deven Kara	Manchester Metropolitan University
Ebrahim Patel	LBi
Elizabeth Mullis	Lancaster University
Eraina Smith	Stockport Borough City Council
Eric Cheung	Manchester Metropolitan University
Felicity Heathcote-Marcz	Atkins Global
George Economides	Oxfordshire County Council
Graeme Sherriff	University of Salford
Hannah Tune	Transport for Greater Manchester
James Bullen	Atkins Global
James Williams	
James Wilson	Stockport Borough City Council
Jessica Corns	Manchester Metropolitan University
Jim Whitty	Smart Power Systems
John Bradburn	WSP
Jon Sandford	Homes England
Jonathan Roby	Manchester Metropolitan University
Junyan Ye	University of Manchester
Ken Halliday	Priestley College
Kenny Court	University of Salford
Luke Blazejewski	University of Salford
Lynne Skipworth	Age Friendly Manchester
Maarja Kaaristo	Manchester Metropolitan University
Maciej Ziarkowski	UCL Centre for Advanced Spatial Analysis
Maryam Al-Irhayim	Manchester Metropolitan University
Matthew Rickard	Manchester Airport Group
May Bassanino	Manchester Metropolitan University
Meisam Babaie	University of Salford
Melissa Giusti	Highways England
Mengting Feng	University of Leeds transport department
Mike Brown	University of Salford
Nick Davies	University of Salford
Nicola Kane	Transport for Greater Manchester
Pankaj Chowdhary	Fusemachines
Paul Battersby	MIDAS
Paul Grayston	Jacobs

Peter Ramsey	WSP
Purva Dewoolkar	University of Manchester
Ransford Acheampong	University of Manchester
Raya Pavlova	Manchester Metropolitan University
Reiji Nagaoka	
Renos Karamanis	Imperial College London
Rick Holland	Innovate UK
Rob Hyde	Manchester Metropolitan University
Shambhavi Joshi	Manchester Metropolitan University
Sigita Zigure	Manchester Metropolitan University
Solon Solomou	Manchester Metropolitan University
Soufiene Djahel	Manchester Metropolitan University
Steve Hillier	Manchester Metropolitan University
Suzy Jones	RIBA
Ulysses Sengupta	Manchester Metropolitan University
Wei Gai	MSA
Yahya Gamal	University of Manchester
Zohra Abbas	Manchester Metropolitan University

Annex 1: Future Mobility Symposium 2020 Poster

Annex 2: Future Mobility Symposium 2020 in Pictures

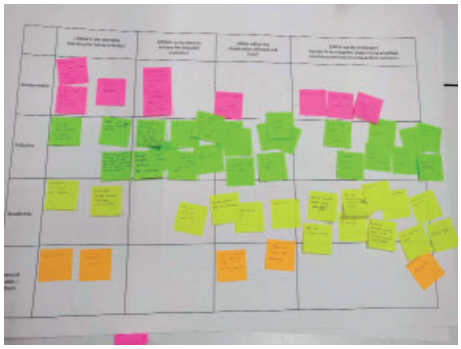


Figure 5. Workshop Output, Table 1

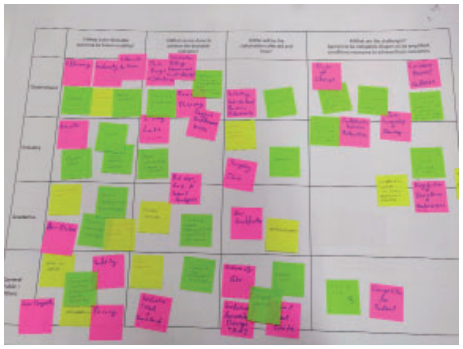


Figure 6. Workshop Output, Table 3

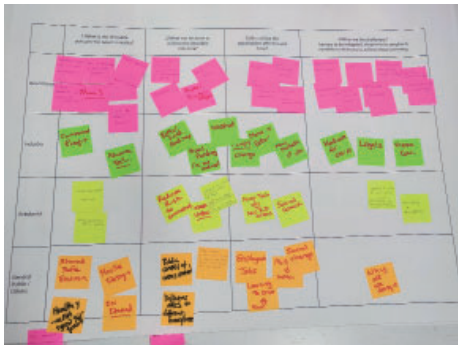


Figure 9. Workshop Output, Table 2

Figure 7. Workshop Output, Table 4

Figure 8. Workshop Output, Table 5

Figure 10. Future mobility Symposium 2020 presentation, Ulysses Sengupta

Figure 11. Future mobility Symposium 2020 presentation, Nicola Kane

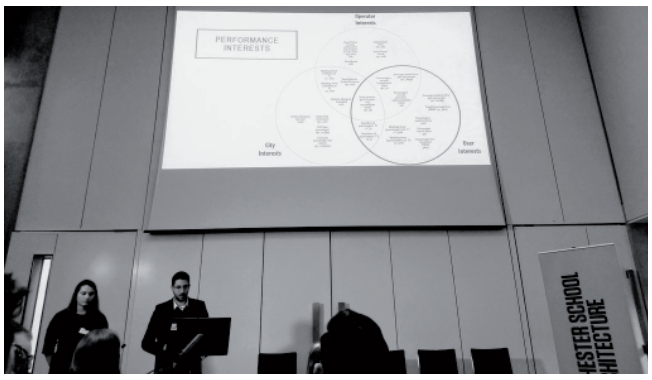


Figure 12. Future mobility Symposium 2020 presentation, Solon Solomou and Sigita Zigure

Figure 13. Future mobility Symposium 2020 presentation, George Economides

Figure 14. Future mobility Symposium 2020 presentation, Renos Karamanis

Figure 15. Future mobility Symposium 2020 presentation, Andy Shilladay

Figure 16. Panel Discussion at the Future Mobility Symposium 2020

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