

Transport for the North Expert Panel Exhibit 5: Technological change and advancement

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1 Introduction

Section Overview

This paper, drafted in 2019, prior to the Covid 19 pandemic provides examples of long term trends and potential policy developments relating to this theme which are likely to have an impact on travel outcomes, an influence on TfN's transport strategy, and on environmental, social and economic outcomes across the Northern Powerhouse. The current global impacts of COVID-19 are creating significant additional uncertainty, yet the basic conclusions in this note still remain or have been emphasised during 2020.

2. Introduction

Transport and mobility is in the throes of a (r)evolution. Technological change and advancement is occurring across modes of transport – walking, road, rail, water and air – changing business models, altering operational regimes and delivering new services for customers. WSP's 2017 publication '[New Mobility Now](#)' explored this changing landscape segmenting the key factors into the technological headings of Connected (digital connectivity within and surrounding mobility), Automation (of vehicles and services), Electrification (of vehicles) and Sharing (the move towards shared assets and services). The paper explored the implications of these technological changes and importantly the business models that may enable change.

Thinking has continued to develop apace within government and industry. DfT published the [Road to Zero](#) in 2018 which lays out its decarbonisation agenda for the roads sector. The Government Office for Science [Foresight Report](#) into future mobility provided further contemporary insights into technology and service change. Following consultation on the subject the DfT published its [Future of Mobility: Urban Strategy](#) in 2019 which lays out its vision and expectations. Importantly the strategy added a sixth factor to those outlines above, Changing Attitudes, recognising the externalities of change and their impacts on the potential for new modes and services. The government is investing heavily through the [Centre for Connected and Autonomous Vehicles \(CCAV\)](#) and the [Office for Low Emission Vehicles \(OLEV\)](#) with both departments providing policy steer to help shape the direction of change and the [Law Commission Review](#) into Automated Vehicles will shortly enter its reporting phase. The [Department for Culture Media and Sport](#) is investing in 5G communications (particularly in rural areas) and most recently DfT invited bids to the £90m [Future Mobility Zone \(FMZ\) fund](#) were submitted aiming to bring new and emerging technologies to large scale reality.

3. Change is now

It is important to consider that change is well underway in the commercial sector, we have already seen [disruption to the taxi market](#), the ups and downs of the [bike share market](#) and [investment in clean public transport](#), but these are pockets of activity, not uniform across the UK and certainly not uniform across the North. New service models such as e-bike sharing, car sharing, on-demand bus services are challenging normal delivery models and programmes. [Electric vehicle uptake](#) continues to increase month on month and further [autonomous vehicle trials](#) are underway. The key factors, which map the DfT's Future of Mobility, Urban Strategy can be broadly summarised as follows;

- **Data and connectivity** – the digitisation of every aspect of transport and mobility, this being a 'golden thread' through each of the factors below which fundamentally changes the relationships between networks, vehicles customers and places
- **Decarbonisation (electrification)** – adoption of electric drivetrains across all modes and use cases / duty cycles (battery and hydrogen) which could impact all modes
- **Automation** – the application of automated technologies leading ultimately towards fully autonomous solutions which could inevitably impact service models, infrastructure needs, place and movement as a whole
- **New modes** – development and commercial deployment of new modes, everything from micro-mobility to commercial drones and hyperloop which could increase choice and complexity
- **Evolving business models** – how customers access and pay for services and assets (including sharing) and how operators derive revenue streams which could streamline mobility but also result in unintended consequences
- **Customer attitudes** – the shifting needs and expectations of users (and importantly non-users who are target future users) which moves mobility further into a retail landscape.

Bear in mind, the consumer internet only became wide-scale in the mid-1990s. What if the impacts of technology and service change in transport were as seismic over the next 30 years? Predicting the future with any certainty is arguably a fool's errand. What is clear though is that the trajectories of change are well underway. [Bloomberg NEF](#) are predicting global Battery EV passenger vehicle sales in excess of 40 million by 2040. The [SMMT](#) are predicting around 10% of all new vehicles on UK roads being Automated (Level 4) by 2030 and 100% of all new vehicles being digitally connected by 2026. [CoMoUK](#) recent report into car clubs in England and Wales states that 4,700 cars have been disposed of as a result of car club membership with 200,000 miles driven in electric car club cars. These vehicular trends are a challenge for our infrastructure designs, business models and energy needs.

What is clear though is that investment profiles are changing; [Daimler](#) has announced that they are ceasing investment in ICE (internal Combustion Engine) technology, [Jaguar Land Rover](#) has inked a 20,000-vehicle deal with Waymo for Autonomous Vehicles, [Alstom and Eversholt](#) have announced the conversion of

trains to hydrogen propulsion in Widnes and the [Metropolitan Police](#) has started to use Unmanned Aerial Aircraft (drones) in high risk operations. The list goes on, but what it is vital to remember is that technology trends change and sometimes [failure happens](#), adoption rates vary between regions, counties and even towns ([EV uptake](#), or Starship's delivery robot success in [Milton Keynes](#) but with less ease [elsewhere](#)) and much of this technological advancement is subject to huge amounts of uncertainty and risk whether that be commercial, legislative, or the propensity / willingness of people to change.

Against this background of uncertainty there are some stand-out examples of governmental agencies (at all levels) pushing ahead with aspects of this agenda. In Dubai, His Highness Sheikh Mohamed bin Rashid Al Maktoum has announced a goal that "by 2030, 25% of all transportation trips in Dubai will be smart and driverless" this being underpinned by the [self-driving strategy](#). In [Sweden](#) the Prime Minister recently announced a ban on the sale of ICE cars from 2030 bringing broadly into line with its Nordic neighbours. [New York](#) has approved introducing congestion pricing to enable the refurbishment of the Subway and in California the [Clean Cars 4 All programme](#) not provides scrappage but \$7500 mobility credits under the Alternative Transport Option (ATO) 'Scrap and Forget'. The Dutch [Mobi Punt](#) concept of mobility hubs has been incorporated into a number of the FMZ bids (inc. TfGM and WYCA), and there are around 250 [Low Emission Zones](#) resulting in very different mobility approaches, for example those in [Stockholm](#).

4. What this means for the North

Whilst such developments are undoubtedly exciting we must consider their applicability to the needs of communities and businesses across the North from a societal and spatial point of view, particularly the urban vs. rural. Just because a technology or service succeeds in one location does not mean it will succeed in another across the North. We should also consider those mobility needs based on socio-demographic factors the aspirations of our younger people are very different from our elderly (as seen through [declining car use in the young](#)) and the needs of an [aging population](#) who may live and have to [work longer](#). The changes above lead us to a number of key drivers which define future uncertainties within the technology change landscape.

5. Initial List of Key Uncertainties

Uncertainty	Alternative Positions & Implications
Data and connectivity	Digital everything: Mobility becomes fully digitised and ubiquitous, digital-as-a-mode allows reliable, immersive home and hub working, networks, vehicles and customers are connected
	Digital resistance: push back from all-encompassing digitised future, cash and analogue remains important, human interactions are valued
Move to decarbonisation	Electric dreams: Transport and mobility become fully electrified (battery, hydrogen and other sources) for all use cases
	Mixed fleets: Non-core trunk haul, heavy duty and freight remain too hard to achieve and liquid fuels (carbon based and/or synthetic) remain widespread
Realising automation	Autonomous future: Transport becomes autonomous for all due to cheap technology and operational costs, and widely accepted benefits
	Robotic resistance: The public simply do not trust technology, use-cases are therefore limited, regulation restricts use cases, and potential benefits aren't realised
Embracing new modes	Mobility revolution: New modes become a reality – hyperloop for fast trunk haul movement between cities, autonomous airways for shorter trips, micro-mobility solutions for the last mile
	Mobility evolution: New modes are embraced where commercial cases allow, disparity between city and rural locations. Transport landscape complicated with myriad interfaces and inequities of choice
	Transport evolution: Promised modes fail to materialise or are commercially unsuccessful, transport gradually evolves within the same broad modes
Evolution of business models	Always on, on-account: Mobility considered as a utility, informed decision making, turn up and go, pay on account is the norm
	Fragmented future: the market remains fragmented, customers buy what they need, when they need it
Shifting customer attitudes	Morphing mobility: overarching willingness to share assets, to use new service offerings and contribute to wider common goals. Ownership is obsolete, attitudes have shift significantly from today.
	Sticking to the norms: ownership and aspiration rule, new modes fade away, personal transport becomes more important



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