The Future of Demand Responsive Transport

Foreword

The ability to get from place to place has been fundamental to the development of human civilisations throughout history. In today's dispersed society, this observation is more valid than ever.

Our growing cities require large volumes of their citizens to move seamlessly from where they live to where they work and to where they play, across a densely populated space. In rural communities, the need to access services, work and leisure presents different but equally significant challenges.

If a society fails to provide the necessary connectivity for its population, it will become unattractive and unproductive while it runs the risk that its isolated citizens become excluded.

In our developed economy, personal transport is becoming increasingly less efficient and viable while the traditional planned nature of public transport is becoming too expensive to provide while failing to deliver the flexibility needed by its users.

A well-developed demand responsive transport solution has the potential to unlock this conundrum by fusing the flexibility offered by realtime digital apps to capture and package demand with the capability of public transport to meet that demand.

It is feasible to envisage tailored demand responsive transport solutions meeting the needs of big densely populated cities and of more diffuse rural communities while also providing strong links between these contrasting worlds.

In particular, the potential for demand responsive transport offerings to glue together major public transport arteries such as intercity rail services and their dispersed catchment areas seems like a huge opportunity.

As an essentially flexible approach, demand responsive transport is likely to generate a range of different delivery solutions stretching from community based volunteer delivery to fully commercial offerings.

With this background, the future for demand responsive transport in a wide range of guises seems like it promises to be a core part of a connectivity solution for a digital 21st Century.

Richard McClean
Railway Division Chair, Institution of Mechanical Engineers
Managing Director, Grand Central

A more sophisticated approach to how we think about and organise travel, through a more demand-responsive passenger transport network, will lead to positive benefits for people, places and the planet.

It will reduce the number of unmade journeys which lower people's work and life aspirations and can leave them isolated. It will address concerns about under-used capacity and our carbon footprint.

This project moves us beyond silo-thinking and towards creating something we all feel we share, own and reach through the public realm with less regard for ownership models and mode-centric constraints. This has been a perfect opportunity to explore a joint piece of research with the Institution of Mechanical Engineers. We are working together

to create a space to discuss how to make transport more accessible and inclusive for all. Our creative and collaborative approach opens up a space for people to share their thoughts and ideas about future innovations in policy and practice with like-minded organisations.

I would like to thank all the participants who took part in the research and in particular Philippa Oldham, Head of Transport and Manufacturing at the Institution of Mechanical Engineers for chairing these sessions with me and for working with us to complete this report. Thank you also to Grand Central for sponsoring the creation and launch of this report.

Bill Freeman
Chief Executive, Community Transport Association

Who we are

Institution of Mechanical Engineers

The Institution of Mechanical Engineers (IMechE) was established in 1847 and has some of the world's greatest engineers in its history books. We are one of the fastest growing professional engineering institutions. Headquartered in London, we have operations around the world and over 115,000 members in more than 140 countries working at the heart of the most important and dynamic industries such as the automotive, rail, aerospace, medical, power and construction industries.

Community Transport Association

The Community Transport Association (CTA) is a national charity working with thousands of other charities and community groups across the UK that all provide local transport services that fulfil a social purpose and community benefit. We are for, and about, accessible and inclusive transport. Our vision is of a world where people can shape and create their own accessible and inclusive transport solutions so everything else in life can be accessible and inclusive too.

Introduction

ABOUT THE PROJECT

In May 2017, the Community Transport Association (CTA) and the Institution of Mechanical Engineers (IMechE) launched a new partnership project to consider what was driving the interest and growth in demand-responsive transport and what that meant for access and inclusion in the UK's passenger transport network.

In the future more and more of us are going to make journeys without fixed routes and timetables in vehicles we don't own or with people we don't know. Demand-responsive transport (DRT) is on the rise and more information is needed to understand what that's going to look and feel like.

Demand-responsive transport (DRT), such as door-to-door and dial-a-ride services, is core business for community transport. This is a growing market with commercial operators moving into the space as technology driven solutions are bringing down barriers to entry.

There is a strong appetite from consumers for more shared and demand-responsive transport which blend the benefits of private car use (not needing to adhere to fixed schedules or routes) but without having to own the vehicle. Many people find that the up-front and ongoing costs and driving licence entitlements prohibit vehicle ownership, especially younger people.

It is likely that a confluence of political will, regulatory change, business opportunity, increased congestion and changing travel habits, will eventually make DRT models financially sustainable in their own regard. In the meantime, almost absent from these big picture conversations, is the role of the voluntary sector and those unable to access the travel market.

This project shares what we believe are the major breakthroughs that will lead to demand-responsive solutions being much higher in the passenger transport mix, considering how far that can go in terms of being accessible and inclusive to all. We are not attempting to have the first and last word on this topic, but to introduce a more human voice to the conversation which illustrates the tone and terms we feel innovations within passenger transport need to be discussed in future.

Within this we focus on gaining a more sophisticated view of how to manage and support demand more effectively by considering how older people and those with disabilities make choices about when to travel and how they can make the most of their journeys.

We also consider how the regulatory environment and the design of our transport network fits with these innovations suggesting changes where necessary. In particular, we need to ask how many of us will have this as our main experience of transport and how we make sure this boosts access and inclusion for the most vulnerable and potentially isolated groups in our communities.

DRT has the ability to help us reduce our emissions by sharing journeys and taking vehicles off the road, reducing congestion and improving air quality within our cities, towns and rural communities. It provides the opportunity to deliver accessibility to all by ensuring that vehicles are fit for purpose. DRT has the ability to improve the quality of life for those individuals who use the service rather than alienating them. It has an advantage of being able to offer a personalised approach to individuals rather than a timetabled untailored solution.

Methodology

In creating this report the opening assumptions were:

- A noticeable set of changes are happening in passenger transport leading to a greater proportion of journey being 'demand-responsive' in the future.

- This will be characterised by more journeys without fixed routes and timetables in a vehicle that the passenger doesn't own.

- There is a strong appetite from consumers for this.

- This will lead to measurable social and economic benefits that will offset any disruptive effects on existing markets.

- This will lead to a marked improvement in the quality and availability of accessible transport for the most vulnerable and isolated groups in our communities.

- There needs to be a new set of workable rules to govern how these systems and markets will operate in future.

STAGE ONE – WORKING GROUP

There was an initial meeting on the 17th May 2017 at the Institution of Mechanical Engineers, Westminster with a working group of participants. These included representatives from community and commercial transport, consultants and academics.

The working group discussions were designed to refine the goals and methods for the project. Identify how to frame the questions and line of enquiry and finally, identify important stakeholders to be involved and consulted.

The first working group meeting also shared the opening assumptions that needed testing before refining project goals and exploring them further with other audiences.

The working group stimulated a lot of new voices and ideas and a list of potential contributors for listening days.

STAGE TWO - LISTENING DAYS

July 2017 was used to gain as many perspectives as possible from a range of stakeholders. In total there were five sessions, hearing from individuals who shared their expertise of different aspects of the project.

This included charities working with people with disabilities, Mobility as a Service experts, vehicle manufacturers, local authorities and transport app developers.

STAGE THREE – PRESENT FINDINGS AT 'NEW PERSPECTIVES IN PRO-SOCIAL TRANSPORT INNOVATION' EVENT

This report and its findings will be launched at the Institution of Mechanical Engineers on the 21st November 2017.

What is demand responsive transport?

Demand-responsive transport is a user-oriented form of passenger transport characterised by flexible routes and smaller vehicles operating in shared-ride mode between pick-up and drop-off locations according to passengers needs

The historical development of DRT has been summed up by, Alexander Spickermann, Volker Grienitz, and Heiko A.von der Gracht, who wrote, 'From an historic perspective, the concept of DRT has been around for some time with experimental flexi-route, dial-a-ride and community car and bus schemes appearing in the UK as early as the 1960's, as part of a series of rural transport experiments following the Jack Committee Report (Ministry of Transport, 1961, 1965). The concept was then refined, developed and expanded in the 1970's in the UK with a range of experimental services appearing (Nutley, 1988). Most schemes, however, were dependent on financial sponsorship from the Government and once the initial funding was removed they soon disappeared'[1].

DRT can be linked directly to discussions about improved accessibility for all across all the transport modes and has primarily been seen as supporting people that cannot access mainstream services owing to mobility issues and remoteness from those services. However it is increasingly being discussed as something in the mainstream as a more viable means of providing services in place of traditional scheduled services along a fixed route.

It gives the opportunity for users to change their travel behaviour. Sharing vehicles will help to reduce the number of vehicles on our roads, reducing our carbon emissions

as well as improving the air quality within our home and work environments. This provides an opportunity for vehicle manufacturers to readdress the designs of their vehicles bettering them to fit the needs and volumes expected to be moved, personalising them to feed the demands of those passengers.

The history of DRT is the history of state intervention. Throughout time, and across the globe, there is yet to be a feasible demand responsive transport system which has managed without state support or private investment.

How we travel today

In this section we will explore a range of passenger transport modes and draw out how they relate to demand-responsiveness. To some extent all forms of passenger transport have a demand-responsive element so we have not solely focused on those that would be labelled as DRT. We have not attempted to consider all forms of transport, but recognise that modes such as cycling are integral to the success of multi-modal networks.

CAR OWNERSHIP AND USAGE

Car ownership continues to increase as individuals are believed to prefer the flexibility this gives them. Once individuals get access to a private vehicle the number of average bus journeys they take decreases very quickly.

The average number of cars is below two per household, but the number of three and four cars per household has, steadily increased in proportion, owing to houses of multiple occupancy.

According to the Department for Transport's vehicle licencing statistics: 'At the end of December 2016 there were 37.3 million vehicles licensed for use on roads in Great Britain.' And 'from 1995-2007, the annual growth in licensed vehicles averaged 690,000 per year, although from the mid-2000s it had already begun to slow somewhat. Following the recession of 2008-9 it reduced further, but did not stop growing, averaging 170,000 a year between 2007 and 2012. Since 2012, the average growth has been 680,000 per year.'

They further highlight that 'during 2016, 41,819 new ultra-low emission vehicles (ULEVs) were registered for the first time, up 40% from 29,965 during 2015. This amounted to 1.3% of all new vehicle registrations - up from 0.9% one year previously and 0.5% two years before[2].'

The government's national travel survey[3] suggest that younger people are less concerned about vehicle ownership with set up costs being prohibitive compared to 20 or 30 years ago, and that "The proportion of young adults (aged 17-20) with a full driving licence has decreased since the 1990s when it was highest for this age group".

The survey goes on to say that "Young people frequently say that the costs of learning to drive and of insurance are the main reasons for not learning to drive. This is likely to have contributed to declining car use amongst the younger age group."

Although the cost of ownership for young people buying a car is very high, it is nothing compared to the cost of buying your first house. Current trends see many young people starting their job whilst still living with their parents and for this group getting access to a car may be less difficult.

One alternative to owning a car is paying for access to one. Carplus write that 'Over the past five years, there has been sustained growth in car club membership - to over 27,500 members using almost 1,100 vehicles in England & Wales outside London.' They highlight that 'Car clubs across England and Wales are currently provided by a mixture of commercial and not-for-profit operators, and significant innovation is taking place.' Geographically, 'there are around two dozen independent and not-for-profit car clubs operating in the UK, often serving single or small clusters of communities.' In their make-up 'these clubs, are mainly constituted as co-operatives or community interest companies, have largely been established by local people to serve local populations'. Interestingly, Carplus also highlight that their work has found 'joining a car club leads to lower levels of car ownership: 16% of respondents had sold a car in the last 12 months and 32% would have bought a private car if they had not joined the car club.' [4]

This upward trend in car sharing is driven by culture change, technological change, and the perceived inefficiencies in other modes of communal transport. However, car sharing schemes suffer the same issues as bus services for their financial viability. They require a large density of people and a helpful confluence of local authority, government, and technology support.

Car sharing is less wedded to the business model of the brokering organisation (e.g. private or charity,) than it is to its beneficiaries, so rather than saying something is good because it has a charitable status, it is good because it has wide reaching social benefits for communities.

Activity in this space has two dominant themes. Firstly, large corporations are trying to get better at managing travel requirements of a large workforce whose default was to drive to work, requiring the devotion of ever larger areas of a company's estate to parking with the implications for congestion, air quality etc. The other was more organic, consumer-led approaches, albeit very much driven by those companies that are creating the interface for people to interact and share.

[1]http://www.sciencedirect.com/science/article/pii/S0040162513002217

[2]https://www.gov.uk/government/statistics/vehicle-licensing-statistics-2016

[3]https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/551437/national-travel-survey-2015.pdf

[4]https://www.carplusbikeplus.org.uk/tools-and-resources/annual-survey-of-car-clubs/annual-survey-of-car-clubs-201516/

Liftshare illustrated the first model by sharing examples from their work of supporting corporations like hospitals and manufacturing companies to manage their employees travel to work. Postcode data enables the mapping of travel patterns and grouping into clusters around common journeys, but the difference largely comes through positive culture change exercises. Arguably this is easier to achieve with a captive audience such as a workforce for a single employer where there will be many coinciding journeys.

Some examples were:

- Norwich Hospital, where 7,500 staff descend on the hospital daily and fill the car parks. So the patients can't park and there is a huge amount of problems.

- Jaguar Land Rover have the largest car sharing scheme in Europe and are saving around £1.5m a year. The scheme is so successful they have managed to shut down a car park and open up more factory space.

The benefit of a Liftshare solution is that it can be on an ad-hoc basis. However, once you find the option that fits your preference, for example you find someone you connect with, you can continue sharing.

Liftshare reviewed this model of various stages of ownership, starting from buying a new car, outright. The second tier is that you share that car with family and friends. The next tier is you share it with a trusted network. And then the last one is that you share it with everybody. The result is that the more you share the cheaper the car gets and, less of the car you own.

THE BUS MARKET

The Department for Transport's (DFT) data for the year ending March 2016 showed there were an estimated 5.04 billion bus passenger journeys in Great Britain, around two-thirds of all public transport journeys[5].

Focussing on England specifically they note that bus passenger journeys had decreased by 2.6% compared with the previous financial year and bus mileage was down 2% over the same period. This was largely owing to a 12.3% reduction in mileage on local authority supported services outside London.

It is important to note that there are variations across regions. In London, patronage has been generally going up, but fell in 2016 for the first time since 2012. Overall, there were 4.5 billion journeys made by bus in England in 2015-16, the lowest figure since 2006.[6]

Local authority tendered services are intended to fill gaps in the network where a service may be deemed to be socially necessary (for example, enabling access to employment) but is commercially unattractive owing to insufficient demand and local geography. Figures from the Campaign for Better Transport show that the total budget for supported buses in England has changed significantly since 2010 when the total amount of funding was £298.2m; by 2016-17 the figure was £199.7m[7].

In 2016 KMPG created a report for the DFT which reviewed the English Regional Bus Market and showed the long-term trend of decline, albeit with huge amounts of variability and patterns in different parts of the country. A huge number of factors combine making it difficult to understand the more localised picture. One key factor is competition from private car use.

Local authorities would ideally subsidise those in supported services, where budgets have been squeezed. However, that no longer happens if the commercial operators cannot make the commercial services work and they tend to drop away. This then leads to a situation where there is a smaller network and so it becomes less useful to passengers. In turn this leads these users to resort to a means such as private car ownership.

The knock on effect is to take fewer journeys by bus, which can lead to a downward spiral. The secondary impact then is an increase in private cars on the road, adding to congestion and poor air quality. Passengers want their bus services to be reliable and punctual; this is inhibited by congestion.

In terms of satisfaction with services the Transport Focus Autumn 2016 report[8] showed that overall, 87% of passengers were satisfied with their service, with 65% of fare-paying passengers saying that it provided value for money: a rise from 63% in 2015. On the punctuality of their service, 73% of passengers were satisfied – a fall from 75% in 2015.

The Transport Focus Bus Satisfaction Survey figures for 2015 show that across all of the indicators, passengers using a free pass had higher levels of satisfaction than fare-paying passengers.

Brighton and Hove is one of the country's areas with growth in bus passenger numbers. This is due to the success of the primary operator delivering a good service and offering multi-operator ticketing arrangements. This improves the ease with which you can move from one bus to another seamlessly. In addition to this there is the social enterprise Big Lemon. Currently all of Big Lemon's coaches run on used cooking oil and the buses operate on batteries which are charged by solar panels located on the roof of the bus depot.

A small proportion of the bus market is provided by community bus services operating just like any other public bus service. As they have their routes and timetables registered with the traffic commissioner, they are available to members of the general public. Unlike commercial bus operators, however, community transport (CT) providers who run a community bus route on a section 22 permit must do so without a view to a profit. Community bus services in England, Scotland and Wales are run using section 22 permits which allow community transport operators to run local, not for profit bus services, for the benefit of the community. Some of these will be commissioned or supported by local authorities. They are a significant part of the CT sector's commitment to ensure that everyone can get where they need to be, no matter their circumstances.

Data from the Office of the Traffic Commissioner in February 2015 showed that since 2009 there were 240 organisations operating section 22 services. Of these, 77% were in England, 14% in Scotland and 9% in Wales. These organisations held a total of 826 section 22 permits.

Issues and trends in the bus market were a key area for discussion at our first roundtable. As it stands the current provision in the bus market is not meeting enough people's needs in some way, shape or other. There was acceptance from bus industry participants that they have been quite slow to innovate and change their products. By comparison to the retail market which, for example, has responded in different ways by companies taking their products out and making them more flexible, around a customer's lifestyle, rather than keeping the product as it is. Each of our public transport operators (rail and bus) need to go further with this.

We should not write off the bus. Scheduled services along fixed routes should not be underestimated or undervalued, because people like predictability and the confidence that it will be there tomorrow. This won't always mean they are regular users but they want it there in case. Indeed the withdrawal of services is met with resistance.

Providing a vehicle with one driver to enable the mass movement of people works and is cheaper than the alternative of providing several smaller vehicles with a handful of passengers in each. This mode has the ability to take significant numbers of cars off the road therefore reducing emissions and congestion.

Much of what people desire from a demand-responsive service can be done with a good bus service, but expecting someone to turn up at a bus stop 200 yards away, which has got no shelter, no timetabling on it and hoping a bus will come along some time, is probably not a satisfactory model for the future.

One of the main ideas cited as driving bus services to be more demand-responsive is data. Historically traditional operators have very limited information on their customers, e.g. how frequently they actually use the buses, where they go from and to. Technology is improving traditional bus operators' ability to use data to know where services should be better deployed. We may look back in five or ten years' time and wonder why we send a bus on a fixed route just on the off chance that some people may want to get on it.

COMMUNITY TRANSPORT

Community Transport is a catch-all term to describe a range of services with the common aim of providing transport to meet a social purpose and community benefit on a not-for-profit basis. They are typically run by charities and other not-for-profit entities.

Community transport helps to address quality, availability and affordability of transport options for people that can't drive and don't have access to a conventional bus service, especially in rural areas.

Using everything from mopeds to minibuses, typical services include voluntary car schemes, community bus services, school transport, hospital transport, dial-a-ride, wheels to work and group hire services. Community transport benefits those who are otherwise isolated or excluded, enabling them to live independently, participate in their communities and access education, employment, health and other services.

Much of the growth and evolution of the community transport we have today followed bus deregulation three decades ago and has been underpinned by a permit system, unique to the UK, which sets the rules and standards for how not-for-profit transport operators should work. It was known then that a predominantly commercially run bus network would leave unmet needs, both in terms of accessibility for people with limited mobility and availability of services.

Hallmarks of community transport include the emphasis being placed on access and inclusion, meeting unmet needs and high levels of volunteer involvement. Their business model is often more resilient in that they have the ability to attract charitable funds so are not solely reliant on fares or subsidies

like bus companies and they are not looking to make a profit or needing to pay dividends to shareholders.

The creation of a demand responsive community transport service can often be as a result of the withdrawal of a commercial or subsidised service. In rural areas, such as parts of Dorset, DRT is often seen as the only viable alternative when bus services are withdrawn, so it's not so much a choice.

Local authorities will often signpost to community transport and other DRT type services when asked to advise people who have lost commercial or subsidised bus services, which may sometimes be taken from the same pot that others subsidised services would have been funded from.

Community transport operators have privileged insights in the worlds of people whose lives and choices are diminished by not being able to get to the places they want or need to be. It is their everyday experience of rarely using public transport or not owning a car that influences the services they create themselves and a broader narrative about access and inclusion within passenger transport. This is much more than offering alternatives to private cars, buses and taxis. It features in discussions about opening up public services, connectivity to our rail network, and trying to enhance and support access to our mainstream bus networks.

At the time of writing this report there is a set of challenges to this regulatory settlement which is having a destabilising effect on community transport operators and the people who rely on their services. Whilst the Community Transport Association is addressing these issues outside of this project its important from the perspective of trying to address transport needs that the outcome includes recognition and protection of the distinctiveness of community transport services and the social value they deliver.

COMMERCIAL DRT MODELS

There is a perception that the traditional CT model for DRT was one that had been left alone over the last two decades, but recently more interest has been shown in this model from commercial operators.

Interest and questions throughout the project were to establish whether this position of 'something' happening could be seen as the trigger for more companies, especially commercial bus operators, to create DRT products to match their traditional bus offer.

One hypothesis for this was that commercial operators were used to working at scale with the efficiencies of having a single platform or 'back office' from which they could run a multitude of services. This approach did not have the benefits of the on the ground, small-scale view, a small community organisation might have that would enable it to run a more personalised and localised bespoke service for local residents.
The thinking is that technology is enabling commercial operators to combine the benefits of scale with the benefits of getting a granular view of demand that they could mobilise in running profitable DRT.

[5]https://www.gov.uk/government/collections/bus-statistics#publications-2017

[6]http://www.bbc.co.uk/news/uk-england-37691160

[7]http://www.bettertransport.org.uk/buses-crisis-2017

[8]http://d3cez36w5wymxj.cloudfront.net/wp-content/uploads/2017/03/04160441/Bus-Passenger-Survey-Autumn-2016.pdf

Firstly, in our research it did feature majorly in future thinking for commercial operators.

One transport operator said they believed they were future proofing their business, but always having to balance that with commercial viability, hence the initial focus on peak travel.

ArrivaClick wanted to think about the whole market and not just individual segments and finding a model that would work for them. ArrivaClick is an intelligent, on demand and flexible minibus service that takes multiple passengers heading in the same direction and books them into a shared vehicle. The service was set up to transport passengers between Kent Science Park and Sittingbourne station.

There are similar models, such as Stagecoach's Little and Often, which although following fixed routes and schedules, has the feel of a demand-responsive minibus service in terms of plugging a gap in the mainstream bus network and is being trialled in Kent.

CASE STUDY: Slide Bristol

Slide Bristol is believed to be the first service of its kind in the UK, positioned as a cross between a bus and a taxi. It was launched in 2016 by the international transport operator RATP Dev.

The 'Slide Bristol' app enables people to book a ride to work from a nearby location at a preferred time during peak commuting hours on Monday to Friday. The technology offers a convenient pickup point and calculates the optimal route to the passenger's place of work based on others requesting a similar journey. RATP Dev believe they are addressing a unique set of demands and a number of important public policy concerns. They focussed on Bristol as they saw a critical mass of potential early adopters who were looking for alternatives to driving or bus services because of concerns about congestion, parking and inflexibility of fixed route and scheduled services. Services are provided in 8 seat vehicles so operate under private hire rules. Its commercial viability is owing to a more intelligent picture of demand leading to a reduction in unproductive journeys with few seats filled, rather than a set of assumptions about cost reduction. Although it's entirely commercial and reliant solely on maintaining demand this type of service is comparable to what RATP Dev might provide in other regulated and publicly commissioned markets in other countries.

Many of these initiatives led from the bus market are currently focused on small-scale journeys serving those passengers who are often simplest to serve in terms of being able to make use of new technology and having the least complex needs. Again, this speaks to the need to focus on the most commercially viable model, by having a critical mass of passengers wishing to travel at similar times and who won't need specialist support or care on their journey. As a consequence we are not currently seeing these models develop to encourage or incentivise travel between peaks.

Outside of bus market led initiatives there are other business models such as Driving Miss Daisy, a growing model in the UK which started in New Zealand and Canada around 15 years ago. It currently has over 30 franchises operating across the UK. These range from sole traders using one car, to businesses running larger fleets and multiple franchises. It is attractive to entrepreneurs because they can buy into an established brand and access its systems, training and support. It positions itself as a companion service, going beyond transport provision into accompanying clients to appointments and visits and liaising with family and carers.

MOBILITY AS A SERVICE (MAAS)

Mobility as a Service (MaaS) is the integration of various forms of transport services into a single mobility service accessible on demand. Originating from a model introduced in Helsinki, Finland, the most notable example of its usage in the UK is the system being piloted in the West Midlands.

The White Paper published by the MaaS Alliance in September 2017 stated that 'A fundamental principle and core motivation behind deployment of MaaS is that it is a user centric, customer-centric, market-centric proposition within a societally grounded context. MaaS aims to become the best value proposition for both private and business users, by helping them meet their mobility needs and solve the inconvenient parts of individual journeys, as well to improve the efficiency of the entire transport system.'[9]

The Transport Systems Catapult state, 'A key risk facing MaaS investment is that there are few examples of profitable MaaS-style business models, operating at scale[10]'. Marcus Enoch highlights 'that the low density of users is a fundamental problem to the success of DRT, as like any collective mode, it operates most efficiently when demand is concentrated to provide a high utilisation of resources'[11]. The debate around MaaS has often centred on how to make those who can already access transport able to access a different mode of transport. To reimagine transport as a public good we must also consider how MaaS can broaden and deepen the impact of our transport network. In order to achieve this, regulators, businesses, and community organisations, must consider how the allocation of subsidies can encourage marginal travel.

RAIL

DRT is not limited to our road network but can provide a direct link into rail. When thinking about DRT in rail there are two dominant ideas:

1 One is the benefits of the 'open access' services, which are not part of any franchise and have been set up to create demand and popularity where there is a stronger element of needing to understand and fulfil passenger demands.

2 The other, which could support open access routes and others is the 'first mile, last mile' approach of trying to make a fixed route, scheduled service more accessible by helping people get to or from a location on that route.

Clearly demand-responsive, does not always mean something is immediately on-demand, but there is a growing interest

in a 'turn up and go' approach as being trialled by Arriva Rail London, which they are looking at replicating across all their other franchises in the UK.

CASE STUDY: Grand Central

Grand Central is an open-access passenger train operator, which means it doesn't receive subsidy from, or pay any premium to, the Department for Transport. It carries passengers from London Kings Cross to York and the North East and to Doncaster and West Yorkshire. It is part of the Arriva Group owned by Deutsche Bahn. As an open access service it is arguably more demand-responsive that other rail services, perhaps more comparable to the strategy and business thinking of a commercial bus route.

Success has been built on exploiting a business opportunity based on finding a potential market and finding a way of meeting that demand. This has meant gaining an appreciation of how people want to travel and aiding their personal mobility by creating an option that makes sense to them. Finding practical ways of community engagement has helped. This has led to a detectable savviness in customer behaviour with many appreciating the value of making a slightly longer journey to an outlying station instead of trying to get into a bigger city with the additional costs and inconvenience of congestion and high parking costs.

Grand Central is mindful that more can be done to reach out to those who rarely or never use rail and the agencies that can help them access their trains, such as community transport. Volunteer involvement in helping people access the stations and trains is already in place.

This requires innovation in technology to aid the discovery of this travel option within a general industry wide need for smarter journey planning tools.

Grand Central places a premium on the need to continually innovate. It can be argued that innovation in the rail industry is contingent on the process of franchising with significant emphasis on innovation at the bidding stage, rather than being a permanent and growing activity within the lifetime of a franchise.

TAXI MARKET

Although not a major focus of discussion through the projects workshops it is important to consider the place of the taxi market, given that many of the developments in DRT cite some element of being 'like a taxi' suggesting that, similar to buses, consumers are looking for something more or different from what they have today.

A statistical release from the DFT in September 2017[12] showed that the total number of licensed taxi and private hire vehicles and licensed drivers in England reached record levels in 2017, driven by a 23.6% increase in licensed private hire vehicles between 2015 and 2017. There were also 356,300 driver licenses in 2017, 59,000 more than in 2015.

These statistics include business models using app-based technology, such as Uber, which although cannot be drawn out in the data, must account for a significant part of this growth. Indeed, much of the policy narrative around taxis and private hire vehicles focuses on the impact of these business models in 'disrupting' this market.

We know that adults with mobility difficulties (who are not only wheelchair users) are more likely to use taxis or Private Hire Vehicles (PHVs) than people who do not. However, it is only just over one-third of licensing authorities who require disability awareness training for taxi and PHV drivers.

These DfT statistics show that PHVs make up nearly three quarters of the market, but only 2.2% were wheelchair accessible, which is similar to the position in 2015. Taxis are better in that nearly 60% are wheelchair accessible, partly explained by initiatives such as Transport for London's 'Conditions for Fitness' licensing policy which includes this requirement, along with similar policy in around 60% of authorities. In rural areas wheelchair accessibility is lowest at 15%.

Success has been built on exploiting a business opportunity based on finding a potential market and finding a way of meeting that demand. This has meant gaining an appreciation of how people want to travel and aiding their personal mobility by creating an option that makes sense to them.

[9]https://maas-alliance.eu/wp-content/uploads/sites/7/2017/09/MaaS-WhitePaper_final_040917-2.pdf

[10]https://ts.catapult.org.uk/wp-content/uploads/2016/07/Mobility-as-a-Service_Exploring-the-Opportunity-for-MaaS-in-the-UK-Web.pdf

[11]https://www.researchgate.net/publication/42800012_Why_do_demand_responsive_transport_systems_fail

[12]https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/642759/taxi-private-hire-vehicles-2017.pdf

Emerging issues and ideas

This section considers some of the issues and ideas that emerged from the workshops and interviews held at the listening sessions.

CHANGING CONSUMER PREFERENCES AND DEMANDS

The goal was to understand the ideas and issues which shaped consumers' behaviours in framing their own transport needs and choices and how this may differ between certain groups.

The enquiry led down two paths – one which saw greater use of DRT as a lifestyle choice, which competed with alternative modes of travel on factors such as convenience and cost. The second option saw DRT as an instrument of necessity to deal with market failure and public policy imperatives, such as environmental concerns. Clearly these paths cross each other in many ways, but there remains a distinct difference between a narrative about necessity (for example, finding a viable way to address loneliness and isolation in a rural community) and choice (for example, commuters stopping using their car to get to their local station and choosing another means which lessens the hassle and cost of congestion and parking).

Looking at the general population and how people use services today shows what is important to them and considers where a demand-responsive service fits in. Our discussions focused on bus users.

For customers who use the bus now, we know that punctuality is very important to them, as is the predictability that comes with a fixed route and timetable, and knowing that there will be seats and the environment will be right. Flexibility is important but so is wanting to know where and when you catch a bus, and get off it. It is ensuring that the service provided is of good quality and at the right price. If that can be delivered by DRT or a traditional bus service, then either will succeed. If people do not want to use the bus in its current form it is clear there is a gap in the way that the bus is provided that means it is not meeting enough differing needs.

More needs to be done to encourage people to not travel when they don't need to and when they are traveling it should be alongside others sharing modes. This could be using public transport or car sharing. Businesses and local communities have a role to play in changing our behaviours to drive a reduction in the number of vehicles on our roads and improving our transport network's efficiency. It is about getting people to be comfortable with sharing their ride with other people whereas previously, they may have preferred travelling alone. Driving down the price of shared travel may be one way to achieve this.

Getting a better insight on what is going to happen to the population means there could be some focused effort on those hardest to reach, most poorly served people where DRT solutions could make a real difference. One of the biggest problems is that for vulnerable people, who have minimal access to transport, their world quickly becomes very small, because they feel nervous using the mainstream services, because they do not see the same person every time or they are sharing it with groups of people they are less familiar with.

Going back to the model of DRT fitting with both choice and necessity the challenge is to combine both these imperatives to create a more integrated and collaborative network that meets both needs, mainstreaming DRT to help the most vulnerable but making it sustainable by including lots of other people too.

By putting the needs of those who face the most disadvantage at the centre of the design of any new service or infrastructure from the outset we can create many benefits and save time and money through not having to remedy so many problems that arise down the line. It would enable us to find a better way of balancing and blending the convenience and speed which might be imperatives for many travellers with concerns about confidence and safety that may be felt more deeply by the most vulnerable.

THE ROLE OF TECHNOLOGY

At a simplistic level we know there are many buses and other vehicles out there that remain under-utilised. People want to get from A to B, but are unsure where these buses are parked and believe them only to operate on fixed routes. The solution that connects these things together is technology. If people have a flexible way of knowing or demanding this travel, then DRT can provide the solution.

City mapper ran a trial in London which used data to allow the passenger to have flexibility. The data can provide information on the route that it needs to run, along with obtaining real time information about traffic issues or congestion. It would be able to advise the individual that their journey would be quicker if they were to get off here and walk or go and get another bus. This information is provided to the passenger with enough time so they could make a decision as to whether they should stay where they are or change their route and get off.

If you are going to offer a DRT product or service, you need to have a flexible operating business model and fleet. Running effective DRT is not just about knowing or predicting demand but matching the most appropriate vehicle to fulfilling those needs. If at 9am in the morning we know 25 people want to travel, then a bus would be the best means of doing that, but if there are only two people going then it is necessary to send a more appropriate vehicle.

It is a better use of technology that will create the right platform through which services can make themselves more

discoverable and accessed by those looking for alternatives, whatever model they work to.

Whilst disruption is unsettling for many operators and planners within the system, from a consumer perspective it is democratising demand management by putting it in their hands so they can shape and create their own transport experience. Over time the choices could diminish or lower in quality as the market disruption removes high cost and quality options from the overall offer.

Disruption is inevitable. So whether that happens through technology or by another means the key point is that people's position in the market might change. In the sense that we have technology companies who want to deliver transport and others who believe this change should be driven by the transport operators, there is still more work to be done.

FITNESS FOR PURPOSE OF PUBLIC POLICY AND REGULATIONS

Astrong theme through all of our discussions was the fitness for purpose of regulations and wider public policy issues that may need attention. It is a commonly held view that regulation struggles to keep pace with innovation – i.e. people are innovating faster than the system can cope with.

The workshop and interviews assumed innovation is a necessary component of creating a more demand-responsive passenger transport network and focused on identifying regulatory and public policy issues which potentially stood in the way of this and how they could be overcome.

Much of our thinking about passenger transport is mode-specific and determined by the nature of the vehicles (i.e. how many seats they have; who owns them), which inhibits our ability to think holistically about an individual's needs and how we help them make seamless, multi-modal journeys. Clearly this relates to the need to safeguard passengers and manage markets effectively, but if we take car usage, for example, we have completely different rules for taxi and PHVs, car-sharing and community transport car schemes, that are all contrived in different ways when the journey and the desired outcome for the end-user is the same.

The impact of this is particularly seen when innovation disrupts markets and it has not been readily understandable where new entrants like Uber fit in. New entrants to the markets are contriving their services in a different way and these are providing disruption to how consumers discover and make choices from what is available. This innovation happens very quickly along with the potential negative consequences of fragmentation that it drives in the marketplace.

These unintended consequences, often apply where legislation is drafted with one particular aim and ends up delivering something rather different. This is often because legislation in the UK is technology specific, but actually, it should be objective specific. For example, we have ended up with a situation where taxis are heavily regulated, but PHVs are less so, which was fine until Uber came and introduced a new model, which did not fit with the two different concepts. Getting the legislation right, which delivers objectives rather than referring to technology is the right way forward.

Our discussions also focused on how competition rules can inhibit innovation. If collaboration is a pre-requisite for greater integration, which is part of the innovation, then these rules need to be readdressed. Participants in our discussions felt strongly that competition rules make it more difficult than it should be for bus companies and other transport operators to cooperate for the public good.

Key questions that emerged were:

- If we are to set up new multi-modal offerings, then who leads on it?
- Who will take the lead in establishing the guiding principles for this?
- Who decides who gets to be involved and makes sure conflicts don't arise?

More needs to be done to make the systems and markets work more effectively to create innovations within the public sphere where services could be organised and/or commissioned in a different way to create local passenger transport networks with a greater element of them being demand responsive.

One recent example of innovation in this space has been the 37 total transport projects funded by the Department for Transport between 2015 and 2017. The principle is that savings can be made for the public purse through combining the commissioning of similar services. However, this approach left out local bus services. This approach enabled transport authorities to have a stronger lead over managing a network moving beyond just having profitable routes and nothing else. This may enable them to incentivise operators to provide a better mix of solutions than they do now.

A CREATIVE AND COLLABORATIVE FUTURE THROUGH DRT

DRT can make a significant contribution to the creation of better, more integrated local passenger transport networks that can meet more needs, being the first and best choice for making a journey.

Through our workshops and interviews we considered different ways that such networks come about and what might offer promising solutions for us in the UK – that were technically possible, politically agreeable and commercially viable.

One of the stand-out questions was whether DRT would simply extract people from other forms of passenger transport, potentially making bus services less viable, and yet not tempt many people out of their private cars.

There was significant interest in models which blend DRT with scheduled services. For example, where demand responsive services starts at the end of a normal bus service, which runs on a fixed timetable as a typical bus would do in the city centre, and then when you get to a certain point it is a flexible demand route to finish it off.

This model can stimulate additional growth on the main routes. In the Netherlands for example, they are using community operators and volunteers to transport people into the arterial points to connect to the fixed route services into the more urban areas. This is connecting all the people from the outlying and rural areas into the main routes rather than just putting the whole thing into a demand responsive mode.

This emphasises the need to address questions of how we enable more people to access rail networks through provision of 'first mile, last mile' type solutions.

Overall, there appear to be three types of impetus that drive the creation of integrated networks.

- Technology led models
- Commissioner led models
- Operator led models

Although not mutually exclusive it is important to consider the nature of each in turn.

TECHNOLOGY LED MODELS

Technology led models are dominant in the discussions about Mobility as a Service (MaaS), accepting that these also have a significant contribution from Commissioners.

Much of the narrative of MaaS is focused on technology aggregating and presenting data to enable smarter journey planning and ticketing making it easier to discover and choose between options. It has been argued that allowing technology to dominate means that the focus is mainly on making the very simplest of problems (smoother journeys for commuters with high levels of mobility) even more simple to solve.

COMMISSIONER-LED MODELS

A mainstream network focusses on the main routes. These all need to be run profitably or subsidised to appeal to operators looking to make a profit, with a parallel market of community transport type services, often demand-responsive.

Understanding how this can readily translate into an integrated multi-modal network needs closer analysis. Successes in this area can come from transport authorities who use their powers, reach and relationships to drive these changes. Transport for London is the closest thing we have to working this way in the UK, given its control over its bus market, but we need to look beyond the UK for examples of how things could be different.

In October 2017 a news item about a French region commissioning its public transport network was eye-catching in the scope and scale of the network it was organizing.

It selected Keolis to run its passenger transport network, Rennes Metropole, including the provision of two metro lines, bus services, a reduced mobility service comparable to community transport, a bike-share scheme, the development of a long-term electric bike rental system, the management of a bicycle customer service centre and real-time car sharing.

In the UK our context, culture and conventions can act as barriers to achieving similar solutions. This is due to so much of our existing network (estimated through our workshops as around 70%) being purely commercial and not paid for or commissioned by the public purse.

The nature of a deregulated transport market will always mean that some journeys are unviable. One of the main reasons DRT services fail is that they become too flexible[13], and that one of the only ways of making them viable is through targeted work such as around airports or train stations[14]. Clearly having a hybrid solution, with a role for community led activity

supporting marginal and specialist needs through demand-responsive services, which complement scheduled services in a more intelligently designed network is a worthwhile and achievable aspiration.

We need to find ways to see networks as defined operating zones, which include multiple modes, a mix of profitable and socially necessary subsidised services (not just tendered bus routes). This is not necessarily about new rules it is about better use and strengthening of existing rules. It is important that this is not over-prescribed to enable innovations and flexibility to experiment in the early stages.

OPERATOR LED MODELS

Technology and network governance can ease the exchanges between operators, but collaboration can and does exist by organisations finding ways to work together for mutual benefit. From our workshops and evidence sessions there is a strong message around rules and the need for better, more imaginative use of commissioning practices to drive innovation, but meaning that those processes are open to innovative groups of organisations that want to work together.

CTA has recently published a paper with Arriva Transport Solutions on how to improve innovation in health transport. Within this it was clear that innovation could come from the community organisations and commercial organisations coming up with a brilliant proposition, which can be taken to the commissioner but there needed to be more openness to such approaches than currently exists.

DRT can make a significant contribution of the creation of better, more integrated local passenger transport networks that can meet more needs and be the first and best choice for making a journey.

[13]http://oro.open.ac.uk/19345/1/enochetalTRB2006failed.pdf
[14]http://oro.open.ac.uk/19345/1/enochetalTRB2006failed.pdf

A new vision for demand-responsive transport

Our vision is of better, more integrated local passenger transport networks that can meet more needs and be the first and best choice for making a journey. Making a greater proportion of journeys demand-responsive is integral to this. The hallmarks of this approach are:

IT WILL BE LOCAL

Most journeys by 'everyday transport' are local – to the shops, school, work, visiting family and friends or for an appointment. Even when we take a train or plane an element of this will be a shorter journey by road to connect us with the station or airport. If we are moving beyond the dominant thinking being about networks as combinations of fixed routes and more to defined operating zones, then we need to understand what the best footprint is for that network to be viable.

Technology is enabling us to gain a more granular view of demand that can be used to run efficient, personalised DRT services that offer a localised bespoke solution for local residents.

The Bus Services Act has strengthened the powers of local leaders so they can shape their local transport networks for the benefit of their passengers, who have also been given a greater say over what they should look like. Total Transport also provides a body of new thinking which shows the benefits of linking the commissioning and provision of services such as school and hospital transport with the wider network. This could be a significant driver in taking a more creative and collaborative approach to enabling a more effective integrated local passenger transport network.

IT WILL BE RESILIENT AND SUSTAINABLE

DRT can lead to the reduction in the use of private vehicles. It can also lead to making much better use of capacity in passenger transport by reducing the need for larger vehicles running with spare capacity at certain times of the day by using smaller vehicles that only make the journeys that are required.

Including providers that involve volunteers as drivers and work on a not-for-profit basis could add greater resilience to the network.

IT WILL BE ACCESSIBLE AND INCLUSIVE

By putting the needs of those who face the most disadvantage central to the design of any new service or infrastructure from the outset we can create many benefits and save time and money through not having to remedy so many problems that arise down the line.

By blending the demands of those who use DRT through choice as well a necessity we can find a better way of balancing the convenience and speed which might be imperative for many travellers with concerns about confidence and safety particularly those who are most vulnerable. When this is achieved a shift in mind-set can enable us to think about Social Mobility as a Service without ever needing to use the name.

IT WILL BE CONNECTED

Many of the innovations we hear about in the transport space are about personalisation and autonomy.

If we are being pro-social then we must champion the merits of a shared transport experience where taking a journey with others helps our physical and mental well-being. So much of what we do is about enabling people to feel independent, but we need to be alert to this creating isolation. We should not write-off the benefits of building a level of interdependence between separate groups with differing needs into our future thinking.

IT WILL BE MULTI-MODAL

Lack of confidence about the first or last part of an end-to-end journey might mean it never takes place or someone drives all the way.

DRT helping with the 'first mile, last mile' may encourage a modal shift, for example, someone may be encouraged to use a train if a demand-responsive solution can enable certainty and confidence for them getting to and from the station. It will also enable us to see community transport as not just providing an alternative to conventional passenger transport but something that complements it and can support access to it.

IT WILL BE BUILT FROM THE GROUND UP

As technology and consumer preference make institutional boundaries and silos less relevant we start to think differently about the depth and reach of our networks.

The risk with this is it can be a 'year zero' approach which is not grounded enough to discover the richness of what is there already. Our view is that this approach works best when we aim for a more integrated passenger transport network being built from the ground up. Building on existing assets and capacity within communities from the 'ground-up' is authentic and rooted in the experiences of people who know the patch and the priorities.

Recommendations

There is a need to build a new coalition of interest around greater use of new powers held by local authorities to create local passenger transport networks through commissioning models that are more prevalent in other countries within Europe. We can only achieve this by:

- CTA and other willing partners promoting greater inclusion of voluntary sector activity in passenger transport networks and Mobility as a Service.

- The Department for Transport and Innovate UK changing their funding competitions from being focused on individual modes to look more holistically at supporting Mobility as a Service and Demand Responsive Transport. This would provide a huge opportunity for community transport providers to position themselves to be part of the supply chain, either commercial or as a partner for one of the larger charities. Such competitions would reinforce the sustainability of these community transport groups as they would either be supporting peaks in demand or perhaps meeting some complex specialist needs that they've got expertise in.

- The Department of Communities and Local Government working with the city Mayors and local councils to address what is required by their towns and cities. One approach is concession-based where a council could pick topics e.g. reducing congestion. Local CT groups or transport operators could then submit solutions that were innovative and non-typical. The councils would then evaluate the bids and see what they could achieve by demonstrating gains to the economy or cutting carbon emissions for example.

Contributors

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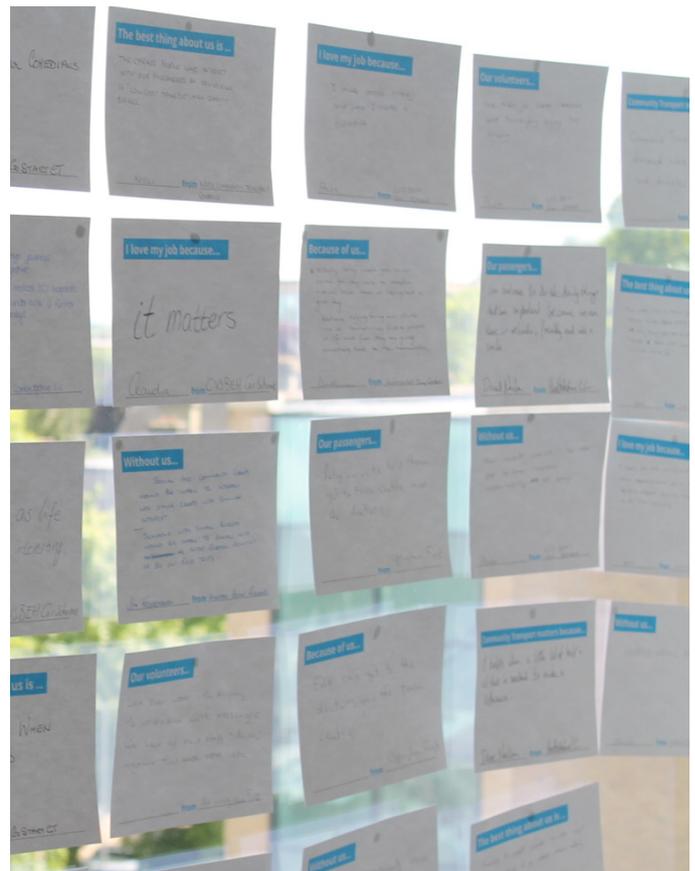
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