

West Yorkshire Future Mobility Strategy

November 2021



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Foreword

The publication of our Future Mobility Strategy for West Yorkshire represents a desire for step change in mobility in the region that is firmly focused on local needs, places and people, providing benefits for all in our region, including the hardest to reach communities that could be left behind as technology moves forward.

Our Future Mobility Strategy provides West Yorkshire with a major opportunity to help realise the priorities of our Strategic Economic Framework and Transport Strategy 2040. As our Strategic Economic Framework clearly sets out our ambition is to rebalance the economy and move towards economic self-sufficiency. The focus is to stimulate inclusive growth, tackle the climate emergency and address equality, diversity and inclusion issues within transport provision in West Yorkshire.

We are committed to creating the conditions that facilitate public and private sector investment in Future Mobility, as this will help to support the Combined Authority and partner Districts to deliver inclusive growth and address the continuing climate emergency (declared in the region in June 2019). Improved access to transport for all sectors of society will also help to accelerate the regeneration of our high streets.

We believe that our Future Mobility Strategy will provide long-term sustainable alternatives to the private car, therefore helping improve congestion, tackle air quality issues and providing equality of access to jobs and skills, especially for people currently less able to access these opportunities. We will continue to identify and promote alternatives to the private car, which will be particularly important when considering how new technology can help contribute towards our recovery from COVID-19 pandemic, which may continue to impact travel choices, reduce in public transport capacity and alter working patterns for some time.

I look forward to leading the delivery of this Future Mobility Strategy and action plan and working in collaboration with the public and private sectors, as well as learning from through the leading academic thinking and research based in our Region.

Our Strategy also helps to develop our longer-term pipeline of transport schemes which have been identified as part of our City Region Sustainable Transport Settlement (CRSTS), Connectivity Infrastructure Plan and Bus Service Improvement Plan (BSIP).

Cllr Groves [date]

Future Mobility in West Yorkshire

What is Future Mobility

Where we want to go and how we want to travel to get there is changing. Advances in technology, changes to how we work, and a shift in the way we access services and buy goods have all influenced how we travel.

Future Mobility looks at how innovation, technology and new ways of travelling can help to create a better, more inclusive, and greener transport system that meets our changing travel and transport needs.

This includes new modes of transport, such as e-scooters, new public transport services, such as on-demand buses, and new technology like autonomous cars which will improve the equality of access to transport system. It also considers new ways of planning and purchasing transport services, for example through apps, and innovative ways of getting the goods we need into our town and city centres.

Purpose of this Strategy

The purpose of this Strategy is to establish how new technology and innovation in transport can help to achieve the region's wider objectives to build a more prosperous, inclusive region, improve people's quality of life, and reduce carbon emissions, and how future mobility might assist in the long-term recovery from the COVID-19 pandemic. The Strategy sets out the principles and priorities for our work on Future Mobility to meet our wider ambitions over the short, medium and long term (0-2 years, 2-5 years and 5-10 years).

Ongoing engagement with key stakeholders, elected members and the wider public has been vital to the development of this strategy and has helped to identify opportunities to develop the region's capability to deliver our Future Mobility priorities and action plan.

Technical notes have been developed for each key theme as an evidence base for specific aspects of Future Mobility, set within the West Yorkshire context. These will help inform the future policy, strategy and decision making on funding.

Our Future Mobility Objectives

Objectives for Future Mobility in West Yorkshire have been defined in line with our wider regional priorities:

1. Development of a radically enhanced, gender neutral and more cohesive public transport network.
2. Supporting and enabling inclusive growth, diversity and contributing towards productivity.
3. Contributing towards the region's objectives of becoming zero carbon by 2038 with significant progress by 2030.
4. Helping achieve modal shift targets for bus, rail, walking and cycling whilst reducing reliance on private car use as outlined in the WY Transport Strategy 2040.

5. Helping to reduce transport related emissions to make a positive contribution towards tackling the Climate Emergency.
6. Helping to better plan and manage all of our transport networks to transform the affordability, ease and experience current and future users.
7. Contributing towards the Region's recovery from the COVID-19 pandemic.

Our Future Mobility Principles

The Future of Mobility: Urban Strategy, launched by Department for Transport (DfT) in March 2019, outlines the government's approach to maximising the benefits from transport innovation in cities and towns and sets out the principles guiding government's response to emerging transport technologies and business models.

The development of these principles was informed by the responses to the Future of Mobility Call for Evidence, published in July 2018, seeking views on emerging trends in transport innovation and exploring how industry, government and cities could work together to help harness these opportunities.

We have used the DfT's principles as a basis for developing a set of Future Mobility principles for West Yorkshire to ensure new technology and innovation meets the needs of our residents and businesses and supports our wider ambitions. Additionally, as a diverse geographical region, we have extended these principles to meet the needs of rural areas as well as those of our towns and cities.

These principles will help guide our approach to funding trials of new technology and services in West Yorkshire. The principles have been tested with stakeholders and have been shaped as a result of their feedback.

Table 1 – West Yorkshire (WY) - Future Mobility principles

No	Future Mobility principle	How this could be applied
1	New modes of transport and new mobility services must be safe and secure by design	Continued monitoring of safety across the lifetime of projects – particularly of pilots projects. Support for the development of national standards and regional regulatory powers.
2	The benefits of innovation in mobility must be available across society, including those who have limited access to technology.	Encourage benefits of mobility that are available equally in both rural and urban areas and across diverse demographics including people who do not own a smartphone, have access to the internet or access to a bank account.
3	Public transport and active travel should remain the priority for meeting travel demand, in line with the West Yorkshire Transport Strategy	Investment in priority for public transport, walking and cycling alongside behaviour change and ticketing incentives to ensure that public transport is an attractive option for the different journeys currently being made by other modes.
4	New mobility services must be part of a wider transition to zero emissions	Investment in low and zero carbon technology to ensure that we reach our target of becoming a zero-carbon city region by 2038.

No	Future Mobility principle	How this could be applied
5	Mobility innovation must help to promote more efficient uses of limited road space, for example through sharing rides, retiming of journeys, increasing occupancy or consolidating freight	Ensuring that new modes are not promoted in such a way to encourage additional trips and single occupancy vehicle use. Spreading demands of travel across our network will be particularly important in the economic recovery from COVID-19 to enable public transport to cope with increasing numbers of passengers.
6	New mobility services should seek to improve affordability, inclusion, ease of access and user experience of travel	Key considerations will include the integration of ticketing with existing modes and ensuring that new modes integrate with existing provision through the provision of mobility hubs. Utilising digital connectivity to allow a wide range of user groups to be fully connected throughout their journey. Ensuring that digital and other information provided is accessible to all users.
7	Data from new mobility services must be shared where appropriate to further knowledge and understanding of travel in the region and improve the operation of the transport system	Agreements with new transport operators and solution providers should include appropriate data sharing with the Combined Authority to enable monitoring of how new services are meeting our objectives, particularly on inclusion.
8	New mobility services should support inclusive growth ambitions and productivity, improving access to jobs, training and community services for a diverse range of customers	Consideration needs to be given to where new mobility modes will be commercially viable and prioritise limited public funding to areas where new mobility services are not commercially viable but meet objectives, particularly on equality, diversity and inclusion.

West Yorkshire Mobility: Challenges & Opportunities

With a population of two million, West Yorkshire is a diverse, polycentric region made up of major cities, towns and countryside which all have distinctive economic roles and priorities.

West Yorkshire is growing, with 13% more people living here than in 1991 – a trend that is set to continue in the next 20 years with the population forecast approaching 2.5 million by 2041. At the heart of the North of England, it is an attractive place to live, increasingly attracting highly skilled service sector workers as well as offering new tourism, cultural and leisure opportunities.

However, despite our many strengths West Yorkshire has some challenges, with 22% of people living in areas defined as being among the most deprived 10% nationally.

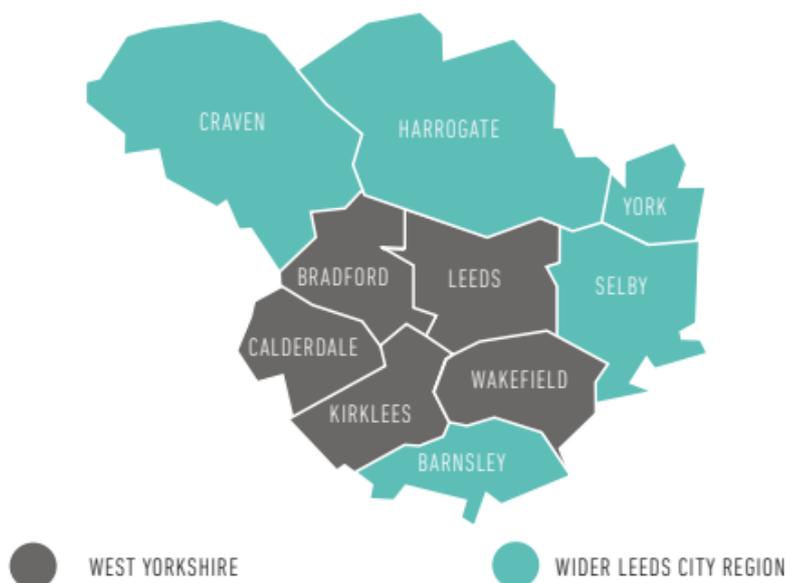
Additionally, as the population has increased, transport congestion and air quality have become major constraints to inclusive growth. Despite advanced fuel efficiency, carbon emissions from transport have only seen small reductions over recent decades.

In order to rebalance the UK's economy and spread the benefits of growth into the North of England we need to address the key challenges facing our region:

Our six key economic and transport challenges¹:

1. Tackling persistent poverty and stalled living standards
2. Transport impacting access to jobs and training
3. Reducing the productivity gap
4. Transport constraining growth
5. Making sustainable travel the obvious choice
6. Decarbonising the transport network

Figure 1 – West Yorkshire Districts and the Wider Leeds City Region



¹ Developed as part of our Transforming Cities Fund bid <https://www.westyorks-ca.gov.uk/media/3372/lcr-tcf-sobc-final.pdf>

The Role of Future Mobility in Our Ambitions for West Yorkshire

Supporting Economic Development

The **Strategic Economic Framework** sets out our ambitious vision “to be recognised globally as a place with a strong, successful economy where everyone can build great businesses, careers and lives supported by a superb environment and world-class infrastructure”. The framework establishes our investment and decision-making priorities for how we will achieve this vision.

Five priorities have been established to realise this vision:

- Boosting productivity – Helping businesses to grow and bringing new investment into the region to drive economic growth create jobs.
- Enabling inclusive growth – Enabling as many people as possible to contribute to, and benefit from, economic growth in our communities and towns.
- Delivering 21st century transport – Creating efficient transport infrastructure to connect our communities, making it easier to get to work, do business and connect with each other.
- Tackling the climate emergency – Growing our economy while cutting emissions and caring for our environment.
- Securing money and powers – Empowering the region by negotiating a devolution deal and successfully bidding for substantial additional funds

A world-class, integrated mobility system is a vital requirement of the competitive, inclusive economy that the West Yorkshire Combined Authority and its partners are working to create. It connects people to jobs, brings businesses closer together, gets raw materials to manufacturers, goods to local, national and global markets, provides opportunities for education, training and investment, and reduces social exclusion so that everyone benefits from economic growth.

The Future Mobility Strategy will contribute towards the objectives in the Strategic Economic Framework, in particular creating a world-class, integrated mobility system and improving connections to employment opportunities and key transport interchanges through demand responsive and digitally enabled solutions that are accessible² and meet the needs of our residents and employers.

Delivering the Transport Strategy

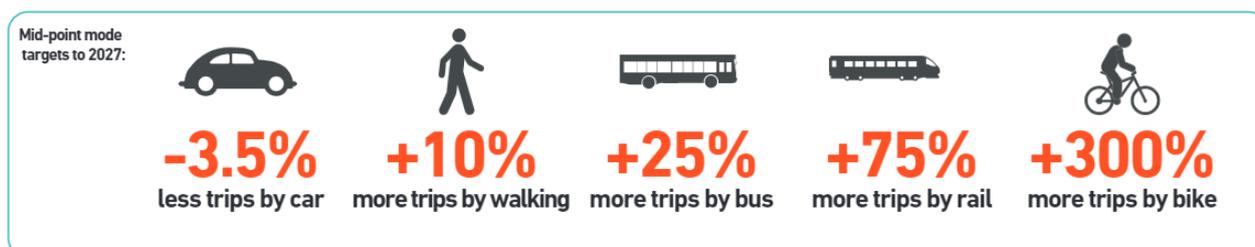
The **West Yorkshire Transport Strategy 2040** sets out a vision to enhance business success and people’s lives by providing modern, world-class, well-connected transport that makes travel around West Yorkshire easy and reliable. The strategy aims to put in place the right transport conditions to meet demand for travel in a sustainable and inclusive way.

² Ensuring that digital solutions are accessible could include providing access to free Wi-Fi at key transport interchanges. Also ensuring that digital solutions are designed with inclusivity in mind to enable them to be used by a wider proportion of the population as possible.

The key objectives that we must address to realise this ambition are:



The Transport Strategy sets ambitious mid-point targets to be achieved by 2027 (against a baseline of 2017) that seek to reduce reliance on private car journeys and substantially grow the number of trips made by using sustainable transport:



These targets were determined before the Combined Authority formally declared a Climate Emergency in line with all the West Yorkshire partner councils. Going forward, it is likely that these targets will be revised as we develop our carbon pathway for transport to meet our ambition for the region to become net zero-carbon by 2038.

The Future Mobility Strategy has been developed to support the delivery of the Transport Strategy and increase sustainable travel practices, through improved connectivity and integration of services. We will better plan and manage all our transport networks to transform the affordability, ease and experience of the people using it.

The Future Mobility Strategy develops several of the themes identified within the West Yorkshire Transport Strategy – particularly the ‘smart futures’ and ‘one system public transport’ which set out our ambitions to make the best use of advancements in technology across all of our transport networks and develop a world class transport system that connects different modes of transport seamlessly into one comprehensive easy-to-use network.

Connectivity Infrastructure Plan and advanced transit system

In January 2021, we published a draft **Connectivity Infrastructure Plan**. The aim is to better connect all of our places, communities and economic assets, within the region and beyond.

This plan sets out a long-term transport infrastructure investment programme for the next 20 years, providing a spatial picture of where improvements are most needed to improve people's quality of life and stimulate inward investment. As part of the development of the new Connectivity Infrastructure Plan, we are at the early stages of developing new proposals for **an advanced transit system**.

The Connectivity Infrastructure Plan will develop a pipeline of schemes for the region. The actions outlined in the Future Mobility Strategy will inform the specific schemes taken forwards as part of the Connectivity Infrastructure Plan. The Connectivity Infrastructure Plan also provides the opportunity to build in planning for Future Mobility services from the outset, to complement this significant infrastructure investment, including the advanced transit system.

Enabling Inclusive Growth

A key ambition for the Combined Authority is delivering inclusive growth. Inclusive growth means allowing everyone in the West Yorkshire to be able to contribute to and enjoy the benefits of a strong economy and a decent standard of living. An **Inclusive Growth Strategic Framework** is currently being developed to inform local and regional policies, plans and delivery programmes.

The framework aims to further embed inclusive growth to enable as many people as possible to contribute to, and benefit from, economic growth. The framework is being developed in recognition that embedding inclusive growth in an integrated and strategic way will support the change required to open opportunities for deprived communities.

The Future Mobility Strategy supports these inclusive growth goals through accessible alternatives to the private car that will help to tackle air quality issues and help provide access to jobs and education, especially for people currently less likely to access these opportunities. The strategy also considers how to ensure how we can support the hardest to reach communities and groups that could be left behind as transport technology moves forward.

Tackling the Climate Emergency

In June 2019 the Combined Authority, in line with most of the region's local authorities, formally declared a climate emergency. This declaration strengthens the city region's ambition to become net zero-carbon by 2038, with significant progress being made towards this target by 2030. The scale of this target is not to be underestimated – with the Tyndall Centre for Climate Change estimating that a 14.5% reduction in emissions will be required year on year to meet this target.

Meeting this challenge will require urgent and collaborative action across all sectors of our economy. However, it will also empower our region to build a modern, sustainable economy supported by an efficient transport network and world class infrastructure.

In order to achieve the objectives, significant action is required in the transport sector to reduce private car use is required, accompanied by a programme of behaviour change and information provision on alternative transport options.

The Future Mobility Strategy, together with the Connectivity Infrastructure Plan and the Bus Service Improvement Plan (BSIP) put in place a structure and series of actions to help enable this change and to achieve these ambitions through sustainable alternatives to the private car use that are easy to use, convenient and responsive to a diverse range of travel needs. These strategies also provide support for the behaviour change required to achieve significant modal shift.

Mayoral Pledges

The election of our Mayor in 2021 has brought an additional dimension to the Future Mobility Strategy. Our Strategy will help the Mayor achieve her ten pledges as follows:

- o *Tackling the Climate Emergency* – modal shift, zero carbon and low emission, sustainable transport are at the heart of the Future Mobility Strategy, which seeks to bring together and enhance existing modes with new technologies to create a more attractive and more efficient public and shared mobility system.
- o *5000 New Homes* – the delivery of new estates is often challenging for traditional modes until a suitable density to support bus and/or rail links is achieved. Future Mobility (car clubs or shared micro-mobility, Demand Responsive Transport and mobility hubs have a key role to play in making transport more sustainable for both new build developments but also traditional housing and employment areas.
- o *Improve Bus Services* – shifting short journeys from car to shared, active and public modes through better joining up and enhancing existing services will **improve bus journey times and reliability** through reduced congestion and broaden the ridership potential of our existing bus network.
- o *Keeping Women and Girls Safe* – enabling women to travel safely by offering a viable public/shared option ends reliance on mini-cabs and friends in areas without quality, regular or 6pm – 6am bus provision, **granting freedom of movement** more generally.
- o *Skills for Young People* – other cities which are adopting ambitious Future Mobility plans are generating significant upskilling benefits across their workforces, including in terms of apprenticeships and university qualifications for young people (e.g. West Midlands and Greater Manchester).
- o *Creative New Deal* – travelling sustainably and fully leveraging the benefits of technology is important to **attracting and retaining creative talent**.
- o *Reducing Crime*– as a result of “more eyes on the street”, modes other than the private car (e.g. e-scooters, walking, DRT, bus, etc.) have a **strong deterrent effect**. This has been noted especially in London where reducing car dominance on streets **has lowered crime** without negatively impacting response times.
- o *Support Local Businesses* - Better links to our town and village centres will enable **more economic activity and creativity** to take place across West Yorkshire, and

free up space that is currently used for motor vehicle movement and storage to instead be used more productively e.g. for markets, events or further development and expansion.

- o *Inclusivity* – Future Mobility offers the chance to **enhance the reach of our existing networks to serve more people**, more often, through a seamless, joined up journey experience. This is in stark contrast to “car based” mobility (20% of men and 30% of women don’t hold a driving licence). Only one-third of households in the lowest income decile have access to a car or van and half of single parent families with children don’t have access to a vehicle. Enhancing and extending a sustainable alternative that is accessible to all is at the centre of our Future Mobility Strategy.

Future Mobility Themes

The West Yorkshire Future Mobility Strategy is focussed around six themes. These themes have been developed to reflect the Combined Authority's priorities in response to our wider ambitions. However, it is likely that these priorities will evolve over time as technology develops and new trends emerge, and in response to the economic recovery from COVID-19.

We have taken an evidenced based approach to developing the Future Mobility Strategy for West Yorkshire, with technical notes developed for each key theme as an evidence base for specific aspects of Future Mobility.

In the following section a summary is presented for each theme together with a set of recommended actions. The recommended actions have been developed in partnership with key stakeholders and our partner councils through the workshops held in Winter 2019/20 and is supported by evidence developed through the technical notes and informed by wider stakeholder through the public consultation held in Summer 2020.

Although each theme is distinct, there are many themes, challenges and opportunities common across them. Additionally, the final theme of this strategy, mobility hubs, looks to draw together some of the core concepts of the other five themes and integrate existing modes of transport.

1. Digital Demand Responsive Transport

Definition – *Digital Demand Responsive Transport (DDRT) is a form of transport typically booked by the user via a smartphone app (or over the phone). The route is created using algorithms before the time of travel. The journey is provided by shared vehicles typically minibus sized that operate flexibly between pick up and drop off locations within a defined area.*

Traditional Demand Responsive Services (DRT) such as door-to-door and dial-a-ride schemes have been around since 1960s in the UK, typically focusing on a specific user group. The advancement of digital technologies has seen the development of Digital Demand Responsive Transport, offering flexible on-demand services to the general public.

There are typically no fixed routes, with journeys being determined by where passengers want to go to within a set operating area. Passengers can ‘order’ and track a vehicle from a smartphone app (or by phone), choose their pickup point, pay and reserve a seat. The app matches passengers traveling in the same direction, dynamically routing vehicles to find the optimal route for their trip.

Contribution towards objectives

DDRT services sit between traditional scheduled public transport (e.g. bus and rail) and on demand taxis in terms of convenience and flexibility and have the potential to improve public transport usage when operators and local authorities work together. By aggregating passengers, on-demand transport services can help to reduce the number of private vehicle miles travelled thus reducing congestion and pollution. DDRT can also expand the reach of the transport system to communities currently poorly served by scheduled services thereby tackling inclusion.

The key roles of on-demand services are summarised below:

- Providing connectivity, diversifying transport options and tackling inclusion by filling gaps in provision of public transport.
- Working as a feeder service providing links into the existing (and future) fixed route public transport network, expanding the reach of public transport services.
- Directing travel to points of interest around a local area.
- Increasing vehicle occupancy.
- Connecting new housing developments and key areas of employment, improving equality of access to employment opportunities.
- Improving inclusion through attracting new customers (younger generation and potentially mobility impaired users).
- Serving “difficult” areas that are challenging to serve commercially by conventional bus, e.g. rural and less dense areas.

Benefits and risks

There are several trials and pilots of DDRT services around the world operating in different contexts including as an alternative to fixed routes during off-peak hours, in remote neighbourhoods or as a replacement for underperforming fixed routes. These trials and pilots have seen varying levels of success in terms of usage, customer feedback and commercial viability. This suggests that every location is unique, and DDRT services should be specifically designed to service the needs of an individual area and developed in partnership with the public sector.

The successful implementation or development of DDRT services can bring benefits to residents, users and local authorities but also face certain risks presented in Table 2.

Table 2. Common benefits and risks of DDRT services

Benefits	<ul style="list-style-type: none"> • Improves public transport accessibility and inclusion • Eases congestion and reducing pollution • Flexible service can better serve demand • Attracts a wider range of users • Ability to match demand and supply • Can be designed for specific use cases, e.g. business park to rail station • Can serve different use cases during day and at peak times • Insights from usage data can be used to inform future transport planning
Risks	<ul style="list-style-type: none"> • Business model not fully proven • Likely funding and financing requirements • Political barriers and multi-stakeholder coordination • Legal barriers (current regulatory framework not designed for these services) • Can experience higher operational costs than fixed route buses • May compete with existing public transport • Lack of data sharing between private companies and local authorities to help identify impacts of services (not a risk if procured) • Some services have been petitioned against for not being accessible to certain groups of people

Key factors for successful implementation in West Yorkshire

The key lessons learnt from UK and international case studies have been grouped below.

Collaboration

- Policy and legal requirements: It is vital that any on-demand service is developed in discussion with policy makers to ensure that it is compliant with existing partnership and legal frameworks and requirements, is beneficial to the overall economy, and does not compete with existing commercial bus networks.

- Public awareness initiatives from marketing or experimental campaigns: ensuring that we apply the lessons from campaigns that have worked well in the past e.g. Connecting Leeds, CityConnect.

Service Design

- Attractiveness of the service: Ensuring that the service will be attractive to the target market. This may vary by location so there is not necessarily a 'one size fits all' approach to service design and marketing.
- Complement existing services: DDRT services should complement existing public transport rather than competing with them. The key is to fill the gaps in vehicle utilisation, accessibility and location. Seamless interchange by timetabling and ticketing with key bus services and other modes will support this.
- Standardisation: A single app or MaaS platform should be the ultimate ambition to make it easier to access, encourage multi modal travel booking and improve the customer experience (see section on MaaS).
- Engagement: Communication, consultation and engagement requirements need to be considered at the early stages of project planning.
- Behaviour change: Implementation of DDRT services can work well as part of a range of measures to improve transport accessibility and manage parking demand.
- Promotion: Ridership can be incentivised using loyalty programmes and gamification (e.g. commuter challenges).
- Monitoring: Customer satisfaction surveys and other independent channels for user feedback should be established to enable performance monitoring of the service.
- Carbon emissions: Low and zero emission vehicles should be sought for services where possible (may not be suitable in more rural locations due to range) to ensure they are in line with our carbon and air quality ambitions.

Pricing

- Pricing models: A common pricing strategy for DDRT is to launch with introductory offers to increase uptake to critical mass, after which prices are sometimes raised to be commercially viable.
- Transparent and fixed pricing: Builds trust with the user and provides reliable income for service providers.
- Pricing incentives: Incentives to use multi-modal ticket products (particularly the MCard) should also be considered. Ticketing offers/discounts, particularly for young people and concessions should be considered as part of the pricing offer.

Data

- Data agreements: Data can be harnessed from DDRT apps to understand customer movements and cater to their mobility needs. In order to ensure that the Combined

Authority is able to process and analyse this (anonymised) data, legal agreements with the service operator would be required.

Work already progressed

The Combined Authority has recently launched a Digital Demand Responsive Transport (DDRT) service for East Leeds. This is a pilot scheme with the purpose of testing the technology and understanding the conditions which are required for successful³ operation of a DDRT service in West Yorkshire and will run for up to 3 years.

This trial looks to support the development of a business case for DDRT investment. A key risk currently as that the business model is not fully proven makes it more difficult to build the case for investment in new services – we are addressing this through the East Leeds trial to test the technology and gain a better understanding of the factors required for successful operation of DDRT. For this trial we will closely monitoring both usage, customer satisfaction and the performance of the app and technology on the vehicles to determine if this approach is transferable to other areas in West Yorkshire.

Recommended next steps

As a result of the workshops held with key stakeholders including DDRT operators, partner councils and industry representatives in late 2019 and early 2020 a series of recommended DDRT actions have been developed. These actions are outlined in Table 3, together with the CA response to the ways in which these might be progressed.

Table 3 – Recommended actions and Combined Authority next steps

ID	Recommended action	CA next steps
Digital Demand Responsive Transport (DDRT)		
Short term (0-2 years)		
DRT1	Identify early DDRT scheme priority areas based on WY objectives, feasibility analysis and market engagement	Workplan of DDRT schemes developed and currently seeking funding through CRSTS and BSIP. The speed with which these can be implemented will depend on the longer-term impacts that COVID-19 has on bus patronage in West Yorkshire.
DRT2	Undertake further DDRT trials to explore business models, technology, public acceptance, impacts and ability of services to help meet our goals	DDRT scheme in East Leeds underway. Five other locations currently under consideration (dependent on funding through BSIP/CRSTS).
DRT3	Carry out an audit of tendered and supported services to identify opportunities for DDRT	Some opportunities for DDRT have been identified through the Bus Network Review. At a more detailed level, this assessment will take place as contracts for tendered and supported services are renewed.
DRT4	Develop integrated ticketing options via MCard platform, with the aim of creating	The development of a Mobility as a Service (MaaS) platform over the coming years may

³ In this context we are not aiming for commercial viability but for levels of patronage that will enable continued operation of the service with some degree of subsidy.

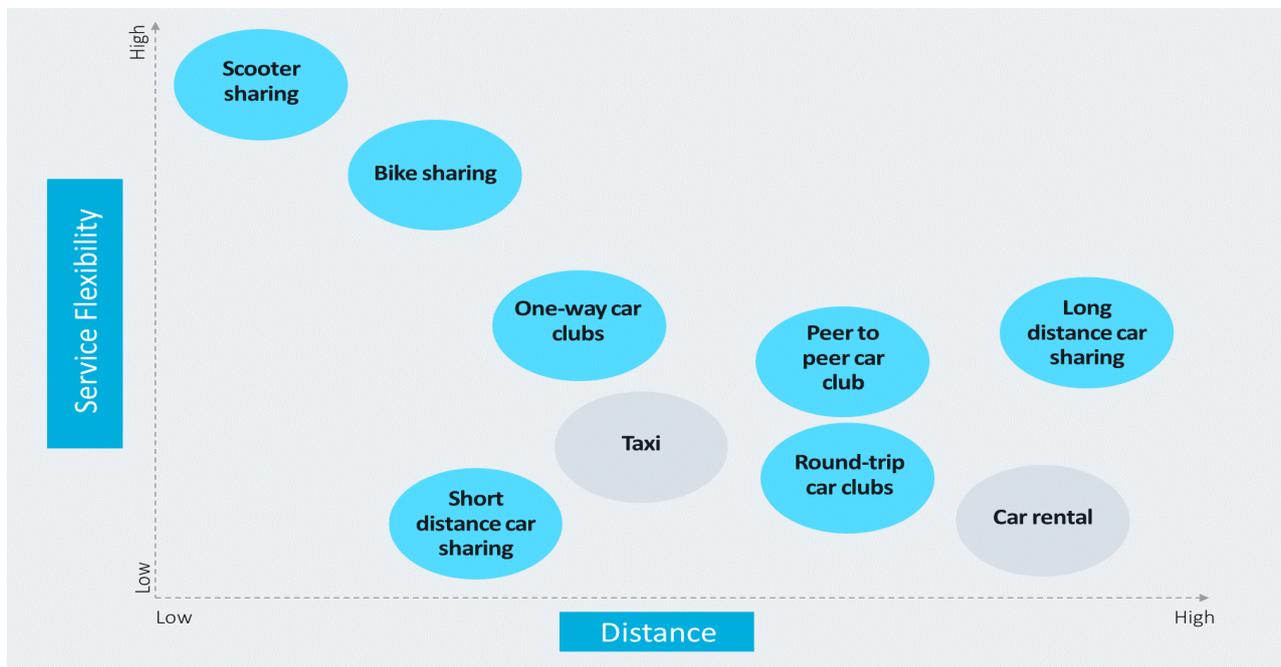
	a multi-journey and multi-modal ticket offer for DDRT	offer integrated DDRT services and other new mobility modes.
DRT5	Work with partner councils, developers and operators to identify opportunities for DDRT to support sustainable travel to new development through planning process	DDRT working group already established and in the process of identifying opportunities for DDRT through S106 and other funding bids.
DRT6	Work with operators to ensure low and zero emission vehicles are used for all DDRT services	Low and zero emission vehicle standards to be developed for future DDRT schemes as the market/funding allows. Also dependant on suitability of technology for operating area.

2. Shared transport

Definition - Shared mobility refers to the shared uses of vehicles, bikes or other transport modes which are accessed on an 'as needed' basis by users. It includes a variety of options from services where the vehicle itself is shared – including car clubs, as well as bike sharing or scooter sharing (micromobility), to services where the ride is shared, such as car sharing and taxi sharing.

Shared mobility does not necessarily equal “new” mobility: some shared mobility modes, such as taxis and car rental, have been around for a long time and are not covered under this strategy. However, the convergence of different technological advances has made it possible to improve existing services and create new ones as well as offer new ways of accessing services. Figure 2 summarises the different models of shared mobility.

Figure 2: Shared mobility models⁴



Although public transport is a more traditional shared mode, it is not typically included in the definition of shared mobility.

Contribution towards objectives

Car clubs are proven to encourage a reduction in private car trips, as well as modal shift to more sustainable transport modes – especially by supporting multimodal trips⁵. The following behaviour changes have been recorded once people become members:

- Car club members drive less after joining a car club than they did before becoming a member⁶

⁴ Source: Schwartz, Joachim. Presentation at Car-Free Cities Working Group Seminar, London, 1999. – updated by Steer

⁵ Cohen, A. P., Shaheen, S., & McKenzie, R. (2008). Carsharing: A guide for local planners. Institute of Transportation Studies.

⁶ Such a reduction has been frequently reported for members of car clubs in Europe. In their latest edition of the Car Club Annual Survey for England and Wales, CoMoUK underlined that car club members drive almost 20% less distance

- Car club members typically reduce their car ownership, either through selling a vehicle or deferring planned purchase of a vehicle. However, it can be difficult to measure to what extent members that do give up a vehicle do so because of car clubs. Other factors may affect these decisions such as moving to a new house, a new job or increased costs related to car ownership such as insurance⁷. Thus, it might not be car sharing alone that makes users give up their car or decide not to purchase one, but it may facilitate the decision.
- Car club members tend to use public transport and walk/cycle more often than average – making a positive contribution towards reducing congestion, emissions and parking demand, particularly in urban areas.

Micromobility (e.g. sharing of bikes, e-scooters, etc.) has the potential to not only reduce personal car use, congestion and emissions in cities, but also encourage active and healthy living. The benefits of micromobility may include the following⁸:

- Use of micromobility modes for daily commute can improve the productivity of employees.
- Micromobility has the potential to address inclusion and equality through providing a low-cost travel option.
- Some users record a reduction in car trips, but also a reduction in walking trips upon starting to use micromobility modes.
- Bike share offers health benefits – bike share users cycle more often after starting to use the scheme and almost half of users stated that the bike share scheme was a catalyst to them starting to cycle again⁹.
- Bike share can help address inclusion through engaging more women in active travel – the gender split of bike share includes more women than for general cycling.

Ride sharing, where two or more people share a journey in a private car, can also increase vehicle occupancy and reduce the number of personal car trips made by individuals, helping to reduce congestion, emissions and parking demand locally.

Benefits and risks

Many cities in the UK and worldwide already have provision of shared transport services, most commonly car clubs and bike sharing. E-scooter sharing is rapidly expanding in the USA and Europe but e-scooters remain illegal to use on the road and on pavements in the UK. DfT are currently undertaking a legislative review which may result in changes to the legal status of e-scooters. Whilst this is being undertaken, several trials of e-scooter sharing are underway which will create the evidence necessary to guide final decisions by the government.

Table 4 summarises the key benefits and risks of shared transport services.

compared to an average England resident that owns a private vehicle. In North America, several research studies found that carsharing appears to have reduced vehicle miles travelled (VMT) overall by about a quarter to a third among vehicle-owners (or previous owners) members.

⁷ Otchere and all (2015), The contradiction of Demotorisation in Research on Humanities and Social Science Review, Volume 5, n. 12

⁸ Due to a lack of scooter operators in the UK, no comparable data available for shared scooters. Research from other countries is not yet conclusive on the impacts of scooters

⁹ Bike share User Survey 2019, CoMoUK

Table 4 – Shared transport - key benefits and risks

Benefits	<ul style="list-style-type: none"> • Lower emissions • Easing congestion • Reducing private car ownership & usage (for micromobility) – more efficient use of resources / street space • Improving access and addressing social inclusion and transport access • Improves last/first mile connectivity • Helping employers implement travel demand / behaviour change plans • Car Club specific - helping to normalise electric vehicles (if offered) • Micromobility specific - health benefits to the user through activity
Risks	<ul style="list-style-type: none"> • Lack of data sharing between private companies and local authorities to help identify impacts of services • Social distancing and stricter cleaning regimes required during current COVID pandemic • Vandalism and theft of vehicles • Not accessible by all users • Unbalanced distribution vehicles between city centre and suburbs leading to clustering of vehicles <p>Car Clubs – Specific Risks</p> <ul style="list-style-type: none"> • Underutilised vehicles • Business model/pricing may make car clubs only attractive for limited trip purposes <p>Micromobility – Specific Risks</p> <ul style="list-style-type: none"> • Poor longevity of the vehicles adding to operating costs over the long term, which affects the sustainability of the model • Safety issues due to lack of suitable infrastructure and dedicated lanes for users (safety risks to users and general public) • Inappropriate use of road/ kerb space by users impose risks for vulnerable road users • Parking challenges, potential to clutter pavements, parks and city spaces and cause inefficiencies for pedestrians • Potential to replace public transport or walking trips, particularly for short distance trips • Lack of government support, in terms of policies and funding

Key factors for successful implementation in West Yorkshire

Car clubs

Cities and transport authorities are on the front line of new developments in shared mobility. They can leverage at least three different type of instruments to promote their shared mobility initiatives:

Parking Regulations

- Favourable parking infrastructure and regulations.

- Increase car share visibility through on-street parking access and clear signage and marking of parking areas that can be used by car club cars, including prioritised spaces for shared vehicles.
- Strict enforcement of parking rules.
- Reduce or eliminate minimum residential private parking requirements.

Shared Infrastructure

- Proactive planning and design for shared infrastructure and electrification.
- Leverage car club services to provide an initial demand for EV charging infrastructure.
- Build mobility hubs (an integrated suite of mobility services provided at defined locations) around high-capacity transit stations, large residential development or park and rides locations.

Marketing and Outreach

- Support car club initiatives with strong leadership by local politicians and decision makers including active use and promotion of the car club by the local authority and the wider public sector.
- Integrate car club strategy and climate-related plans (low emission zones, climate change or local transport plans).
- Integration of public transport and car club payment through multi-modal cards or passes (MCard).
- Technical assistance to local officers.
- Public awareness initiatives from marketing or experimental campaigns.
- Data gathering for effective monitoring to improve services.

Bike share

Some of the key factors in successful implementation of bike share include:

Operational

- Strategically located bikes adjacent to major destinations and at rail/bus stations/mobility hubs.
- Fully automated systems allowing users to check bikes in and out and providing real-time availability of bikes via website, smartphone and at docking station terminals.
- Suitable density of docking stations / distribution of bikes and coverage across the city to make the service convenient to users, considering how bikes can integrate with wider public transport and identifying locations that address inclusion objectives.

- Effective management of bikes across the network to ensure bikes are available to meet demand.
- Ease of using the mobile application and making payments for the service via the app improves user acceptance.
- The make and model of the micromobility vehicle also plays a key role in user acceptance, in terms of weight, manoeuvrable capabilities, safety gears, seating position, etc. This also adds to longevity of the vehicles, thereby reducing costs of servicing and maintenance.

Appropriate local context

- A sizeable potential user base e.g. located in areas where there is likely to be higher demand.
- Location of bikes in areas of high residential or employment density and large flows where bike share can offer a “last mile” solution e.g. from rail stations to major employment sites.
- Topography of the city can be an influence though less of a constraint if e-bikes are deployed.

Local authority support

- Marketing and outreach activities to promote use of bike share (CityConnect already deliver this in West Yorkshire for active travel).
- Strong leadership by local politicians and decision makers including active use and promotion of the bike share scheme by the local authority.
- A supportive strategy and policy environment to create conditions conducive to cycling in the bike share operating area, through infrastructure improvements to encourage and support cycling and deter car use.
- Financial support to facilitate the delivery and operation of a scheme.

Transport operator support

- Integration of public transport and bike share payment through multi-modal cards or passes.
- Inclusion of bike share information in public transport information materials.
- Integration of bike share into public transport journey planners.

Support from other large organisations

- Local support to promote usage and address inclusion - for example from large employers / education sites / destinations.

Work already progressed

Car clubs have been operating in West Yorkshire for a number of years, with services offered in all five of the districts, although Leeds has a significantly greater number of

vehicles and locations available than the other four districts. The main service operator in West Yorkshire offers a ‘back to base’ model, where vehicles are required to be returned to the location they were collected from. Other operating models (e.g. back to area, or one way car clubs) can offer more flexibility and have greater appeal to users in some circumstances. Although there are a few examples of small-scale shared bicycle schemes in West Yorkshire (and a planned scheme in Leeds), to date there is no large-scale public micromobility service in place in any of the districts.

Recommended next steps

As a result of the workshops held with key stakeholders including transport operators, our partner councils and industry representatives in Winter 2019/20 a series of recommended shared transport actions have been developed. These actions are outlined in Table 5, together with the CA response to the ways in which these might be progressed.

Table 5 – Recommended actions and Combined Authority next steps

ID	Recommended action	CA next steps
Short Term: 0-2 years		
SM1	Undertake shared micromobility feasibility study to determine potential for micromobility, including engagement with industry and stakeholders	This study could also identify areas where shared transport could contribute towards the economic recovery from COVID-19 pandemic.
SM2	Identify early shared mobility priorities based on WY objectives, feasibility analysis and market engagement	These priorities will be identified as part of the above study
SM3	Work with partner councils and industry to identify opportunities for regional shared mobility models, including joint procurement and service delivery	The Combined Authority is working with our partner councils to explore joint procurement models for shared transport. Joint contract for WY and York car club already exists and work is underway to increase the number of electric vehicles offered.
SM4	Explore opportunities for shared mobility transport (including micromobility) to support the objectives the Connectivity Infrastructure Plan	Shared mobility considered through Connectivity Infrastructure Plan.
SM5	Undertake shared mobility trials to explore business models, public acceptance, impacts and ability of services to help meet our goals. Initial focus could include partnerships with major employers to test business models / technology in small pilots	Funding for this work still to be identified.
Medium term: 2-5 years		
SM6	Develop models to ensure shared micromobility is available to a wide range of social groups, including those who do not have access to bank accounts / smartphones.	Work currently underway to develop ticketing and payment options for those who do not have access to a bank account – this will include shared mobility modes.

ID	Recommended action	CA next steps
SM7	Develop policy guidance on shared mobility services, including planning guidance for implementation of shared mobility in new developments in partnership with local planning authorities	Work with our partner councils to deliver this. Funding still to be identified to take this work forwards.
SM8	Undertake review of parking policies and charging in collaboration with partner councils to identify opportunities to promote and incentivise shared mobility over private car use	Work with partner councils to deliver this. Funding still to be identified to take this work forwards.

3. Mobility as a Service

Definition - *Mobility-as-a-Service is a term used to describe digital transport service platforms that enable users to access, pay for and get real-time information on a range of transport options. The platforms integrate multiple transport services to provide personalised journey planning that can be optimised based on users' travel needs - whether they want to take the cheapest, fastest, or the most environmentally friendly route.*

At present, people have multiple options for getting from point A to point B yet face often have to navigate multiple applications and payment systems to use mobility services that are operated and paid for separately. The intention of MaaS is to provide a user-friendly convenient solution, in which users are only required to use one system to plan, manage and make a single payment under a single platform for an entire journey despite using multiple modes. A well designed MaaS interface can also help to address accessibility issues that some users face when planning journeys.

Contribution towards objectives

By simplifying the user experience, MaaS applications have the potential to decrease private vehicle use by promoting and encouraging alternative modes of transport and multi-modal journeys. The key role MaaS can play in contributing to our objectives are summarised below:

- MaaS has the potential to increase multimodal trips and decrease private vehicle use, helping to achieve our transport targets.
- Encouraging greater public transport use by improving the user experience of planning, booking and payment for travel.
- Support better value travel for users when the application of daily/weekly fare caps and auto-calculation of the best value fares are used.
- If incentives are built into the MaaS platform, it could also help to encourage mode shift towards certain less desirable journeys (for example to help reduce congestion on specific routes/at certain times of day).
- Reduce travel delays and increasing journey times by speeding up boarding/alighting processes by up to double¹⁰.
- Can help those without a car access jobs, education and services more easily by streamlining multimodal travel.

Benefits and risks

The development of MaaS can benefit both passengers and public transport operators, although some common risks exist as well, summarised in table 6 below.

Table 6 – Common benefits and risks of MaaS

Benefits	<ul style="list-style-type: none">• Simplified, seamless user experience
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¹⁰ The World Bank – Public transport automatic fare collection interoperability: assessing options for Poland (2016)

Risks	<ul style="list-style-type: none"> • Passengers have (or perceive) shorter wait times for transit • Increased public transport use • Ability to use pricing and fare structures to encourage travel by certain transport modes or journey types • Increased revenue for public transport operators • Lower operating costs for public transport operators • Potential for improved access, where technology improves the travel experience for older and disabled people • Improve anonymised trip data collected from users
	<ul style="list-style-type: none"> • Challenges with passenger understanding and proper use of systems (CICO systems)¹¹ • Potential for social exclusion, where the technology does not address the needs of all passengers (i.e. the absence of a personal smartphone prohibits travel) • Challenges of private MaaS operators and lack of current regulation • Lack of data sharing between transport service providers • Technology barriers – different technology infrastructures that prevent interoperability or inconsistent data quality • Software developed by transit agencies may not measure up to those of competitive third-party developers • Poor data quality - lack of advanced transit data specifications • Challenges procuring bundled technology systems • Lack of supporting digital infrastructure / viability of IT hardware in low density / rural areas • Challenges developing a commercial offer that is competitive with private car - new services could reduce patronage from public transport rather than private car use as an unintended consequence.

Key factors for successful implementation in West Yorkshire

The key lessons learnt from the UK case studies have been grouped below:

Transport services offered

- **Service Design:** A robust offer of transport services is the most important factor in a successful MaaS solution – research has shown frequency of the service, fare prices, and journey times remain primary factors when a potential passenger is deciding to use the service.¹² The provision of real-time information or smart ticketing services are secondary to these factors. Consideration is also needed of the commercial attractiveness of combined ticket offers to the public.
- **Public transport:** The inclusion of public transport providers is key for the success of digital applications that aim to simplify the user experience into one platform. Mobile

¹¹ In the first month following TfGM's rollout of EMV capability, TfGM expressed that some customers were not checking out / tapping out and thus being charged for an incomplete journey. NFCW.com "[Manchester reports on open loop contactless ticketing adoption.](#)"

¹² Government Office for Science, A time of unprecedented change in the transport system, January 2019.

journey planning and ticketing applications that integrate a few smaller transport service providers but lack integration with public transport providers may experience lower uptake and usage by passengers.

User Experience

- Ease of use: Simplifying the user experience where possible may improve correct use of the ticketing system by passengers and improve the customer experience. Transport for Greater Manchester faced challenges getting passengers using their EMV¹³ ticketing system to complete their journey by tapping out.¹⁴ By comparison, the Swiss Federal Railways' Fairtiq app, which includes all public transport in Switzerland, including trains, buses, trams, and boats, prompts passengers to check-out at the end of their journey and has reduced unclosed journeys (people who omit/forget to tap out) to just 0.1 percent.¹⁵

Data

- Data Requirements: Data requirements will depend on the characteristics of the MaaS system being pursued, but setting common data standards with open APIs and common data formats are key.

Work already progressed

The Combined Authority is working closely with the West Yorkshire Ticketing Company Ltd (WYTCL) to develop the MCard multi operator ticketing offer in West Yorkshire. The MCard is considered to be one of the most advanced smart ticketing system in the UK outside London and allows users to purchase day, week or month saver tickets on buses and trains within West Yorkshire and to pre-load travel credit which can be used to pay for bus fares. The MCard App (available for Android smartphones) allows customers to buy, load and check travel tickets for bus and rail in West Yorkshire, with the phone functioning as the ticket for travel. This is the first multi-modal ticketing app of its kind in the UK.

The Digital Payment Strategy has been developed to set the strategic direction for travel ticketing and achieve the objectives of making the purchase of tickets easier, ensuring that the product range fits customer needs and lifestyles, enabling seamless pre-purchases and gaining a better understanding of how customers are travelling.

Recommended next steps

As a result of the workshops held with key stakeholders including transport operators, our partner councils and industry representatives between November 2019 and February 2020 a series of recommended MaaS actions have been developed. These actions are outlined in Table 7, together with the CA response to the ways in which these might be progressed (subject to feasibility work and funding availability).

¹³ EMV - Europay, Visa and Mastercard – the global standard for interoperation of contactless bank cards.

¹⁴ <https://www.bbc.com/news/uk-england-manchester-49734060>

¹⁵ https://uitpsummit.org/wp/wp-content/uploads/InnovationGuidedTours_Ticketing_web.pdf

Table 7 – Recommended actions and Combined Authority next steps

ID	Recommended action	CA next steps
Short Term: 0-2 years		
MAAS1	Work to ensure the data sharing agreements with bus operators provide the flexibility to facilitate the delivery of MaaS	Data sharing agreements currently in place to enable this.
MAAS3	Work with Operators and West Yorkshire Ticketing Company (WYTCL) to develop the commercial agreements required to deliver MaaS as required. This will build on any Enhanced Partnership arrangement agreed.	Continue to build on the relationship between the bus operators and WYTCL in order to develop commercial agreements required for MaaS.
MAAS4	Further develop the MCard as a smart ticket in line with the BSIP and Digital Payment Strategy	Delivering bulk purchase of single tickets, gifting and mobility credits are the priorities over next year.
Medium term: 2-5 years		
MAAS6	If early feasibility work of indicates Combined Authority led approach is preferable, develop MaaS platform and supporting ecosystem based on scoped business model and specification using phased delivery model, with functionality for those without access to technology	Funding to be identified for delivery
MAAS7	Ongoing analysis of MaaS data and customer travel patterns to inform future development of MaaS platform as well as develop evidence base to support future transport strategy development and investment decisions	Changes in travel trends as a result of the recovery from COVID-19 will influence future strategy and investment priorities
MAAS8	Analysis of ticketing systems and potential interoperability of ticketing between operators across the region	To be developed in line with BSIP. Funding for this work still to be identified.
Long term: 5-10 years		
MAAS9	Explore opportunities to integrate further transport modes, new mobility service and additional functionality into MaaS platform where appropriate in partnership with stakeholders	Funding for this work still to be identified.

4. Connected and Autonomous Vehicles

Definition – Connected and autonomous vehicles (CAVs) use technology that enables the vehicle to assist with the driving and allows communication with other vehicles on the road. CAVs could reduce traffic accidents, improve efficiency of transport systems while fundamentally changing travel behaviours.

The level of autonomy is on a spectrum, with no automation and driver assistance at one end, and full automation at the other as illustrated in the table below:

Table 8 – Levels of automation

Level 0	No Automation The driver performs all driving task
Level 1	Driver Assistance Vehicle can assist with minor, singular tasks (e.g. cruise control)
Level 2	Partial Automation Vehicle can perform steering and acceleration.
Level 3	Conditional Automation Vehicle can perform most tasks but driver intervention required
Level 4	High Automation Vehicle can perform all tasks but driver intervention required in some circumstances
Level 5	Full Automation Vehicle can perform all tasks with no driver interaction required

While CAVs are seen by some as an economic development opportunity, their implementation poses significant challenges for local authorities to ensure the benefits of the technology to social welfare are maximised, and at the same time that negative impacts of are mitigate.

Contribution towards objectives

Connected and Autonomous Vehicles (CAVs) are a transformative technology that have the potential to transform transportation on a global scale. CAVs could contribute towards our objectives as follows:

- CAVs could improve road safety and reduce traffic accidents.
- The use of CAVs for public transport services could improve efficiency of transport systems through smart routing and driving efficiencies, reducing the cost of services and reduced environmental impact.
- CAVs are likely to have an impact on travel demand and congestion thanks to smarter route choices. It is anticipated that if properly managed, CAVs could reduce traffic flow, breakdown and parking demands, whilst also increasing land and junction capacity. However, there is also a risk of increasing private vehicle travel as well as decreasing it: potential factors that could increase or decrease driving overall are outlined in Table 9 (based on the higher levels of automation).

Table 9 – Potential factors impacting vehicle mileage of the higher levels of automation

Increases Vehicle Travel	Reduces Vehicle Travel
<ul style="list-style-type: none"> • Private ownership of CAVs • Empty Vehicles - increased vehicle mileage due to empty vehicles traveling between drop-off/pick-up areas • Increased travel by non-drivers (elderly, minors, people with disabilities)¹⁶ • Increased convenience for door-to-door trip could increase travel demand and shift away from public transportation • It could also encourage sprawl development, which in return would generate more miles of travel¹⁷ 	<ul style="list-style-type: none"> • Increase of shared CAV services (micro transit, car clubs, taxis or ride hailing platforms) could encourage households to reduce vehicle ownership and use¹⁸ • Mobility as a service could increase the number of shared trips taken with CAVs • CAVs as first-and-last-mile solution in combination with public transportation • Decrease in time spent seeking parking

Benefits and risks

CAVs are likely to have both benefits and risks. Table 9 below summarises the key benefits and risks.

Table 10 – Key benefits and risks of CAVs

	User Impacts (Driver)	Wider Impacts
Benefits	<ul style="list-style-type: none"> • Free the driver from driving tasks reducing drivers’ stress, improving travel efficiency, productivity and convenience. • Equality in access: provide critical mobility for non-drivers and people with poor mobility/disabilities. • Improved safety. • Reduced paid driver costs (e.g. Costs for taxis and commercial transport drivers) and potentially reduced cost to the public sector in providing some transport services. • Support MaaS integration. 	<ul style="list-style-type: none"> • Increased overall safety for all road users once full Level 5 adoption. • Reduced energy consumption and pollution. May increase fuel efficiency and lowering emissions. • Potential to increase road capacity and to reduce congestion and roadway costs. • Reduces demand for parking at destinations. • Can support vehicle sharing: Could facilitate carsharing and ridesharing, reducing total vehicle ownership and travel.

¹⁶ Brandon Schoettle and Michael Sivak (2015), A Preliminary Analysis of Real-World Crashes Involving Self Driving Vehicles, Report UMTRI-2015-34, Transportation Research Institute, University of Michigan

¹⁷ Kelly Fleming and Mark Singer (2019), Energy Implications of Current Travel and the Adoption of Automated Vehicles, National Renewable Energy Laboratory

¹⁸ Kristin Lovejoy, Susan Handy and Marlon G. Boarnet (2013), Technical Background Document on Impacts of Carsharing, California Air Resources Board

Risks		<ul style="list-style-type: none"> • Create new high-value jobs.
	<ul style="list-style-type: none"> • Increased vehicle costs (requires additional vehicle equipment, services and fees). • Potential additional users' risk (e.g. crashes caused by system failures). • Cybersecurity: reduced security and privacy (e.g. hacking, location tracking and data sharing may reduce privacy). 	<ul style="list-style-type: none"> • Mixed model: during the transitional phases, CAVs may increase risks to other road users. • Increased traffic problems if vehicle mileage increase because of convenience of driverless trips. • May reduce mobility options if infrastructure repurposed (e.g. walking and cycling infrastructure). • May reduce public transport service levels if demand were to decrease. • May reduce affordable options in the rural areas. • May reduce employment (e.g. jobs for drivers may decline). • Increased infrastructure costs (may require higher roadway design and maintenance standards).

Key factors for successful implementation in West Yorkshire

Among the different case studies reviewed, some key factors stand out as essential for cities and policy makers to successfully encourage implementation:

- Reviewing policies and principles (e.g. road safety, freight, parking access, low-emission zones, infrastructure) to guide and accelerate deployment of CAVs.
- Forming public-private partnerships between government, transportation agencies, cities, universities and private sector to identify opportunities for CAVs trials.
- Taking an active approach to harnessing asset data, especially linked to infrastructure and real time information on how cities are used.
- Developing principles and engaging with transportation agencies to integrate CAVs with mass transit as a potential first/last mile solution.
- Creating standards for CAVs to be able to be deployed at a national and international level.
- Developing an electric vehicle charging infrastructure strategy.
- Developing expertise to independently assess the pilot projects and understanding and evaluating driver behaviour in these vehicles.
- Ensuring underlying digital infrastructure is in place to support vehicle communication.

- Ensuring that the systems (including sensors, maps, and software) are effective and reliable.

Work already progressed

West Yorkshire Combined Authority is one of the 14 partners from 6 countries that form the Automated Road Transport Forum (ART-Forum), an Interreg North Sea Region project studying the impact that autonomous vehicles could have on the transport network and our cities and their regions. This is a three-year project to 2022 covering the following objectives:

- Raise awareness and build capacity among stakeholders.
- Develop policy recommendations that enable authorities to take advantage of opportunities to support strategic goals.
- Facilitate exchange between technological developers, academia and policy makers.

The Combined Authority has two research partners in this projects, DLR (German Aerospace Centre) and Robert Gordon University, to support our studies into how automated transport could be implemented to support our wider strategic goals and develop policy recommendations for the region.

Recommended next steps

As a result of the workshops held with key stakeholders between November 2019 and February 2020 a series of recommended CAV actions have been developed. These actions are outlined in Table 11, together with the CA response to the ways in which these might be progressed.

Table 11 – Recommended actions and Combined Authority next steps

ID	Recommended action	CA next steps
Short Term: 0-2 years		
CAV1	Determine our goals and objectives for CAV within the region and explore the potential for the technology to support our wider regional priorities to set our policy position.	This strategy marks a starting point in the identification of our goals and objectives for CAVs. These will be developed in further detail through the ART Forum Interreg project.
CAV2	Develop partnerships with academic institutions, manufacturers and bus operators to research and test policy objectives for CAVs, assess the potential impacts of technology and adoption scenarios on the transport network in the region and consider future infrastructure requirements to enable CAV development	Policy objectives for CAVs currently being tested through the ART Forum project. A working group with partner councils has been developed to review these objectives. Learning from the ART-Forum project will also help with understanding of future infrastructure needs to enable CAVs. Relationships with operators and manufacturers on CAVs still require some development.
CAV3	Explore opportunities for CAV technology to support the objectives the Connectivity	

ID	Recommended action	CA next steps
	Infrastructure Plan and advanced transit workstream	The Connectivity Infrastructure Plan and advanced transit workstreams are considering CAV technology.
Medium term: 2-5 years		
CAV4	Investigate opportunities for CAV trials in the region to test adoption scenarios, technology feasibility, and infrastructure and regulation requirements, with an emphasis on shared and public transport CAV technologies	Funding opportunities to enable CAV trials need to be identified. Opportunities and potential locations for trials will be explored through CAV working group with partner councils.
Long term: 5-10 years		
CAV5	Study impacts of growing private CAV adoption on transport network to inform future policy and investment decisions	The results of the ART Forum project will help to identify the impacts of CAV adoption on the transport network.
CAV6	Working with the regional and local planning agencies develop a regional CAVs and connected infrastructure plan	We are working with TfN to understand how a plan for CAV and connected infrastructure might be developed (including an understanding of how the underlying digital infrastructure (fibre/4G/5G) will be used to support the role out across all areas, particularly rural areas of the network.)

5. First / last mile freight

Definition – *First / last mile freight is how goods or services in the supply chain are managed at the start and end of their journey. First mile freight relates to outgoing goods or services from a business to a distribution hub (i.e. the first stage in the supply chain) and last mile freight relates to the final stage of delivery of goods or services to the end user (i.e. the final stage in the supply chain).*

First / last mile freight is usually associated with ways to improve efficiency, reduce negative impacts of deliveries/collections, and enhance sustainable freight practices in urban areas. In this regard, it is characterised by the following characteristics:

- Goods and services transported over short distances.
- Fulfilled using sustainable modes such as: on foot, cycle, cargo cycle or electric / low emission vehicle.
- Serving both commercial and residential properties.

Contribution towards objectives

Sustainable first / last mile freight models can have a range of beneficial outcomes through the efficient movement of goods and the reduction of delivery vehicles on our roads. Such practices can help to deliver improvements in congestion, air quality and carbon emissions through reductions in vehicle miles travelled and fuel consumption. In urban areas in particular, where the demand is the greatest and emission challenges often highest, such practices would support the delivery of our carbon reduction targets.

Air quality improvements, alongside the reduction in noise pollution, can help to make our towns and cities better places to live, and support a range of health benefits. Additionally, reductions in delivery vehicles can support the creation of safer walking and cycling environments.

From an economic perspective, sustainable first / last mile freight can provide cost savings to business through lower fuel costs and faster, more efficient delivery practices and support our clean growth ambitions as a city region.

Benefits and risks

The successful implementation or development of first / last mile freight operations can bring benefits to businesses, residents and local authorities in achieving policy objectives, but such initiatives also face certain risks. Table 12 summarises these key benefits and risks for first/last mile freight operations.

Table 12: Common benefits and risks of sustainable first / last mile freight

Benefits	<ul style="list-style-type: none">• Lower emissions• Lower noise pollution• Easing congestion• Improved safety for people walking and cycling• More efficient use of kerbside space• Faster deliveries by cycle (in certain local contexts)
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	<ul style="list-style-type: none"> • Less disruption to office staff • Cost savings through lower fuel costs and avoiding road charges • Helping employers implementing behaviour change initiatives • Helping to normalise electric vehicles • Reducing private car ownership & usage • Improving access & social inclusion
Risks	<ul style="list-style-type: none"> • Lack of available / affordable land for distribution or consolidation hubs • High start-up costs • Lack of regulatory support / incentives • Lack of cycling infrastructure for cycle freight • Unable to achieve required volumes • Lack of (and cost of) EV charging infrastructure • Lack of data sharing between private companies and local authorities

Key factors for successful implementation in West Yorkshire

The key factors that underpin successful operations as highlighted from case studies are as follows:

Volume

- It is crucial to achieve a certain volume of deliveries being routed through a centre to make its operation commercially viable. Operators therefore need to forge strong relationships with high-volume suppliers or a number of different suppliers in order to sustain a facility. However, volume and demand are also a result of the wider economic climate.

Local context and policy environment

- The physical environment and layout of city centres and the level of congestion affects the ease of making deliveries. Cities with historic centres and narrow streets can be particularly strong candidates for sustainable first / last mile cycling and on foot solutions. Restrictions on motor vehicles can also support uptake, as well as stricter parking policies.

Type of business (user)

- Identifying and working with a suitable business type is important in the viability of sustainable first / last mile operations. Certain sectors are better suited than others to the operational changes of such a facility, such as parcel couriers, servicing and utilities, catering, larger retailers, supermarkets and construction.

Motivation for users

- It is important to understand the motivations of end users. The environmental and wider social benefits of first / last mile freight solutions are one component motivating businesses who want to differentiate themselves or enhance their reputation. However, they are unlikely to be sufficient motivation alone.

- Improved operational efficiency, reliability or cost savings are likely to be the principal drivers of change in delivery and purchasing behaviour. A facility must therefore reduce the overall business costs or improve the efficiency of the delivery operation.

Public funding

- TfL's study of consolidation centres¹⁹ suggests that public subsidy was an important factor in many centres' set up and viability, and that few centres survived commercially without a subsidy. However, Cargohopper and Gnewt are both examples of first / last mile freight operators that have not required public funding.

Offer additional services at micro-consolidation centres

- Offering services in addition to first / last mile freight can increase the demand, viability and benefits of a micro-consolidation centre. Examples include:
 - providing storage for retailers who lack space within their own premises.
 - offering delivery collection points for customers (self-service last mile).
 - collecting recycling on the return leg to reduce empty running.

Professionalism of operator

- To build trust and confidence from businesses and end users, it is important for the operator to be professional and reliable in their fulfilment of deliveries.

Promotion

- Some scheme operators have reported that new ventures had not been successful due to a lack of promotion and awareness among businesses and users. Without suitable uptake, sufficient volume will not be achieved to assure commercial viability.

Work already progressed

There are a number of smaller, privately managed sustainable first / last mile delivery organisations operating in West Yorkshire, principally using cargo bikes and other low emission vehicles.

Recommended next steps

As a result of the workshops held with key stakeholders including transport operators, partner councils and industry representatives between November 2019 and February 2020 a series of recommended first / last mile freight actions have been developed. These actions are outlined in Table 12, together with the CA response to the ways in which these might be progressed.

¹⁹ Transport for London (2016) *Rethinking Deliveries Report*

Table 13 – Recommended actions and Combined Authority next steps

ID	Recommended action	CA next steps
Short term: 0-2 years		
FLMF1	Undertake research to further understanding of current first last mile freight practices and their impacts on West Yorkshire.	Potential funding sources for this research are required.
FLMF2	Explore opportunities to incorporate micro-consolidation facilities and/or collection points for personal deliveries within planned schemes in collaboration with partner councils..	<p>Work already underway to deliver parcel lockers at rail stations in WY in partnership with Northern. Further work needed to consider the role of rail stations in first/last mile freight.</p> <p>Collection points (and micro-consolidation facilities where appropriate) to be explored as part of mobility hub programme.</p> <p>Consider the role of micro-consolidation centres in contributing towards the economic recovery from COVID-19.</p>
FLMF3	Work with partner councils to explore opportunities to develop micro-consolidation and micro-delivery (e.g. eCargo bikes) facilities in new developments through the planning process	A last mile/freight working group will be developed – including representation from partner councils.
FLMF4	Carry out analysis to identify areas with the highest potential for micro-consolidation in the region in partnership with stakeholders	This work to be carried out in partnership with the working group. Consultation with key landowners e.g. shopping centres needed to establish potential level of interest.
Medium term: 2-5 years		
FLMF5	Explore opportunities for a trial micro-consolidation centre in the region based on analysis and market engagement in collaboration with partner councils	This work to be carried out in partnership with the working group.
FLMF6	Develop programme to install collection points for personal deliveries at key transport hubs in region	This will be progressed as part of work on mobility hubs pilot programme and alongside rail strategy.
FLMF7	Develop communication plan to promote sustainable first last mile practices with commercial stakeholders and the wider community	Consultation with working group required to develop a communications plan.
FLMF8	Work with highways authorities and commercial stakeholders to develop guidance on parking/loading bay restrictions (including dynamic kerbside approaches) and micro delivery access design standards to support uptake of sustainable first last mile freight delivery practices	Decision to be made by working group on which of these actions should be prioritised

ID	Recommended action	CA next steps
Long term: 5-10 years		
FLMF9	Look to expand programme to install collection points for personal deliveries at all transport hubs in region	This will be progressed as part of work on mobility hubs pilot programme and future transport hub upgrade schemes that may develop.

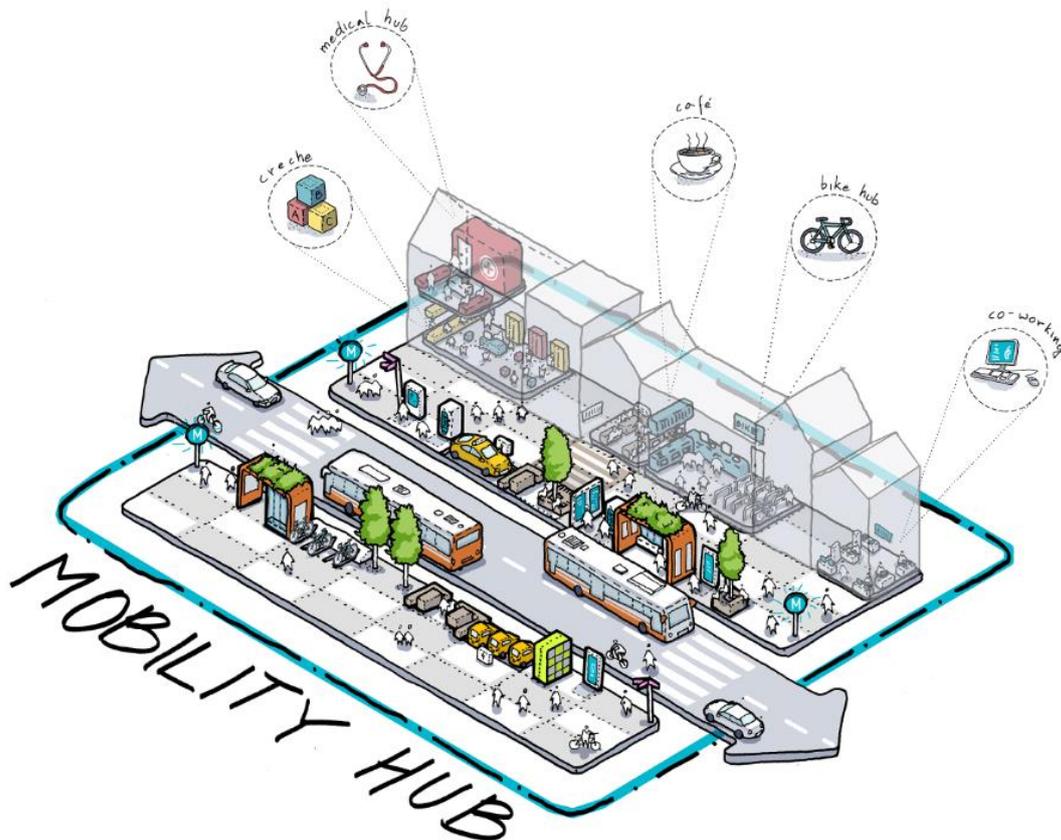
6. Mobility Hubs

Definition – A mobility hub is a recognisable location providing integrated access to a range of transport modes and services, supplemented with enhanced facilities to support sustainable travel choices, increase accessibility and reduce reliance on privately owned vehicles. The size of mobility hubs and the features they offer vary depending on the location, but include the co-location of transport such as access to public transport, shared transport (such as bike hire, car clubs, e-scooters) and bike storage, alongside travel information, public realm improvements, and community amenities (such as cafes, package delivery lockers, co-working space).

Mobility hubs look to bring together in one identifiable location existing transport, future mobility, and community functions. By joined up transport services more effectively and providing a single location for accessing a range of modes, there is an opportunity to maximise the benefits of more sustainable transport and minimise the negative effects of private car travel such as congestion, poor air quality and inequalities.

Mobility hubs are seen in this strategy as a unifying theme, bringing together aspects of the five other future mobility themes alongside more traditional transport modes. Each mobility hub should be tailored to meet local needs and the surrounding environment, with consistent branding to ensure they are clearly identifiable. The illustration below shows a potential concept for large hub deployments in West Yorkshire in a location such as a key transport hub, developed for the Future Mobility Zone bid.

Figure 3: Large Mobility Hub Concept Sketch



A small mobility hub could be defined as a location that is served by at least one public transport and at least one shared mode (e.g. car club, bikeshare) or delivery lockers for parcel collection. While some rail stations in West Yorkshire already fall into this definition (Kirkstall Forge and Horsforth which have car club bays nearby) and there are car club bays located close to bus stations and stops, these services are not particularly well integrated with each other or presented to the public as a coherent service offer in the way that a Mobility Hub would.

Contribution towards objectives

The development of mobility hubs can contribute towards our objectives in the following ways:

- Improve access to public transport and improve integration between transport modes. This can support wider access to jobs, education, training and services.
- Help to reduce the reliance on private vehicle use through promotion of sustainable transport modes with a positive impact on air quality and carbon emissions.
- By co-locating transport options and community amenities, the need to travel for everyday activities can be reduced, particularly using of private vehicles.
- Improved pedestrian and cyclist access and help to encourage walking and cycling locally, with environment and health benefits.
- Improved public realm can have a positive effect on the local economy. Designs can help to create a sense of place for community, attracting more people to the local economic hub (e.g. the high street).
- A sense of community can also be reinforced by a cohesive and strong branding and marketing campaign.
- Health and wellbeing benefits of improved public realm e.g. green space, reduced dominant of cars, improved local air quality, visibility of active modes (bike sharing).
- Improved first and last mile connectivity, further connecting and extending the transport network.

Benefits and risks

Mobility hubs have been trialled in many European cities. Examples include the Vienna Mobile Station Simmeringer Platz, established in 2018. The hub offers a range of mobility options including public transit, e-bike sharing, car sharing, an e-charging station, an e-cargo bike along with secure cycle parking, a bike pump and information screens. Further examples of cities with mobility hubs across Europe include Bremen in Germany, Bergen in Norway, Linz in Austria, Amsterdam in the Netherlands and Flanders in Belgium.

The table below summarises the key risks and benefits associated with Mobility Hubs.

Table 14 – Common benefits and risks of Mobility Hubs

Benefits	<ul style="list-style-type: none"> • Supports seamless journeys through provision of infrastructure and access to transport modes • Encourages more sustainable travel
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	<ul style="list-style-type: none"> • Promotion and facilitation of active travel modes • Improves first/last mile connectivity • Ability to serve the needs of different users • Improves accessibility and can cater for those with disabilities with inclusive design • Provision of information to help people make more informed travel choices • Design can help to create a sense of place for the community • Fosters integration between new transport innovation and existing transport services • Physical enabler of MaaS • Provides an opportunity to test and support transport innovations • Can reduce the need to travel (when incorporating non transport features such as a café or co-working space)
Risks	<ul style="list-style-type: none"> • Success is closely related to location, most successful in areas of high travel demand • Commercial viability (particularly in rural areas) • Take time to establish and require careful planning as it is collaboration between multiple partners • Require adequate space to implement a hub in the densest urban areas • Tensions from the local community for example if parking spaces for private cars are taken away • Securing buy-in from stakeholders is necessary for successful implementation • Not having coherent branding across a region will reduce visibility and awareness • Insufficient grid capacity in the energy network will may limit the ability to install high powered EV charging infrastructure • Co-ordinating multiple services from multiple operators in one location

Key factors for successful implementation in West Yorkshire

Significant investment and local commitment are required for mobility hubs to be successful. The key lessons learnt from the UK and international case studies have been grouped below.

- **Planned as a network:** there are examples across Europe where mobility hubs have been successful in cities and regions through implementation as part of a network. By planning and implementing as a cohesive network there is potential for mobility hubs to have neighbourhood and region wide effects, rather than a localised impact.
- **Successful integration with operators:** it is important to establish working relationships with each operator. This can be achieved by establishing open communication channels with and between operators. Motives of the operators should be aligned with that of the mobility hub to offer services that best serve local needs and demands.

- **Recognisable (including branding and marketing):** branding that is recognisable and coherent across the region or network of hubs is powerful in increasing the visibility and awareness of hubs.
- **Site selection:** the success of a mobility hub is closely related to its location, with trials and existing hubs proving that mobility hubs are more beneficial in areas with high demand for travel, particularly where there is access to employment, shopping and other needs.
- **Right features in right location:** the services provided at the mobility hub should serve local needs and should be tailored to local users. Demand is also an important consideration. Whilst hubs in more rural locations may not have adequate demand to satisfy the commercial operation of shared micromobility services, services such as EV charging may be better suited.
- **Accessible:** a mobility hub can become a component of the local community; therefore, it is important that they are inclusive and accessible by all types of user. They should promote inclusivity and follow the design standards for disabled people or those with mobility impairments.
- **Monitoring:** there is great potential for mobility hubs and their networks to undergo expansion and development following their first implementation. Therefore, it is vital to monitor the impact the hub has on travel behaviour, demand and wider transport objectives as these insights are extremely valuable in forming an evidence base that can be used in the planning of additional hubs, or future hub development.
- **Knowledge sharing:** As mobility hubs are still an emerging concept, particularly in the UK, there is great value in learning from the successes and failures of other mobility hubs and mobility hub trials in UK and internationally.
- **Supporting policy that provides appropriate incentives:** For a mobility hub to be effective, shared transport, public transport and active modes need to be clearly established at the top of the travel hierarchy, with appropriate supporting incentives to encourage their use. This includes pricing mechanisms that encourage use, as well as making those modes attractive to use, and disincentivising private car use.

Recommended next steps

Actions recommended by consultancy Steer are outlined in Table 15, together with the CA response to the ways in which these might be progressed.

Table 15 – Recommended actions and Combined Authority next steps

ID	Recommended action	CA next steps
Short Term: 0-2 years		
MOB1	Identify opportunities and develop strategies to integrate within existing programmes and schemes, through scoping the existing transport operators.	Opportunities to integrate mobility hub concepts will be explored, particularly at key transport hubs or locations of high travel demand. Additional funding may be required to support additional services and improvements.
MOB2	Identify suitable trial sites to develop WY mobility hub concepts in different settings, including engaging with and securing buy-in from local stakeholders.	Four trial sites currently under development – a further ten included in CRSTS and BSIP funding bids

ID	Recommended action	CA next steps
MOB3	Development of a coherent marketing and branding strategy for the mobility hubs across the region.	A marketing and branding strategy will be developed for mobility hubs, to be linked in with existing public transport branding in West Yorkshire.
MOB4	Develop models for procurement, management and ongoing funding, with acknowledgement of the increased difficulty as mobility hubs involves multiple operators.	Work is underway to develop procurement models for shared transport. Further work will be undertaken in collaboration with partner councils to develop models for mobility hub delivery which can be tested through pilots.
MOB5	Develop monitoring and evaluation strategy, including stakeholder engagement to gain an understanding of lessons learnt and update and improve models for wider roll-out.	A monitoring and evaluations approach for mobility hubs, along with a communication and engagement plan, will be developed and trialled through the pilot schemes.
Medium term: 2-5 years		
MOB7	Undertake a wider rollout of mobility hubs, building a network across the region of larger and smaller hubs depending on the urban density, travel demand and land use type (e.g. residential, employment, high-street). This process should involve continued monitoring and evaluation.	To build on learning from first stage mobility hub trials. Funding for this work still to be identified
MOB8	Develop a knowledge sharing programme for the region, for different hubs to come together and discuss their successes and failures. Lessons learnt should be implemented across the region.	To be developed with partners as mobility hub rollout progresses.
MOB9	Undertake a wider roll out of a regional MaaS programme, involving the integration of all services and technologies provided across the mobility hub network.	To be developed as a deliverable through the MaaS programme. Funding to be identified.
Long term: 5-10 years		
MOB10	Implementation of a cohesive mobility hub network across the region, including rural hubs serving communities that are more isolated and disconnected from public transport.	To be developed with partner councils and stakeholders. Funding to be identified.

Next steps

The actions identified within each of the thematic chapters in this document will all require some funding to progress. Some actions which just require staff time may be resourced within the Combined Authority and other actions which require a level of capital funding may be delivered through an existing funding stream for example LTP, West Yorkshire Connectivity Infrastructure Plan, Connecting Leeds (LPTIP) or Transforming Cities. Where an action requires revenue funding to be committed, there may be an opportunity to deliver at least part of this through business-as-usual activities (for example trials of DDRT services).

There will however be a requirement for additional funding from external sources to progress some of these actions. There are several potential sources for this funding, including:

- making an application to Government – this is already underway through the CRSTS and BSIP funding bids; and
- using some of our devolved funding powers to progress the actions identified in this document.

Almost all of the actions identified will require the buy in and continued involvement of key stakeholders including our partner councils within West Yorkshire. Several key groups will be utilised in order to keep key stakeholders informed – these include the expert groups set up to help create the strategy.

As yet we do not know what the longer-term impacts of the economic recovery from COVID-19 will be – particularly on the ability for public transport services to return to 'normal' service levels over the coming years. There is therefore a level of uncertainty about how quickly some of the actions identified in this strategy can be delivered. The actions identified within this strategy will be reviewed in six months' time and if any changes to the timing or priority level of each action is required it will be made at that time.



Find out more

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