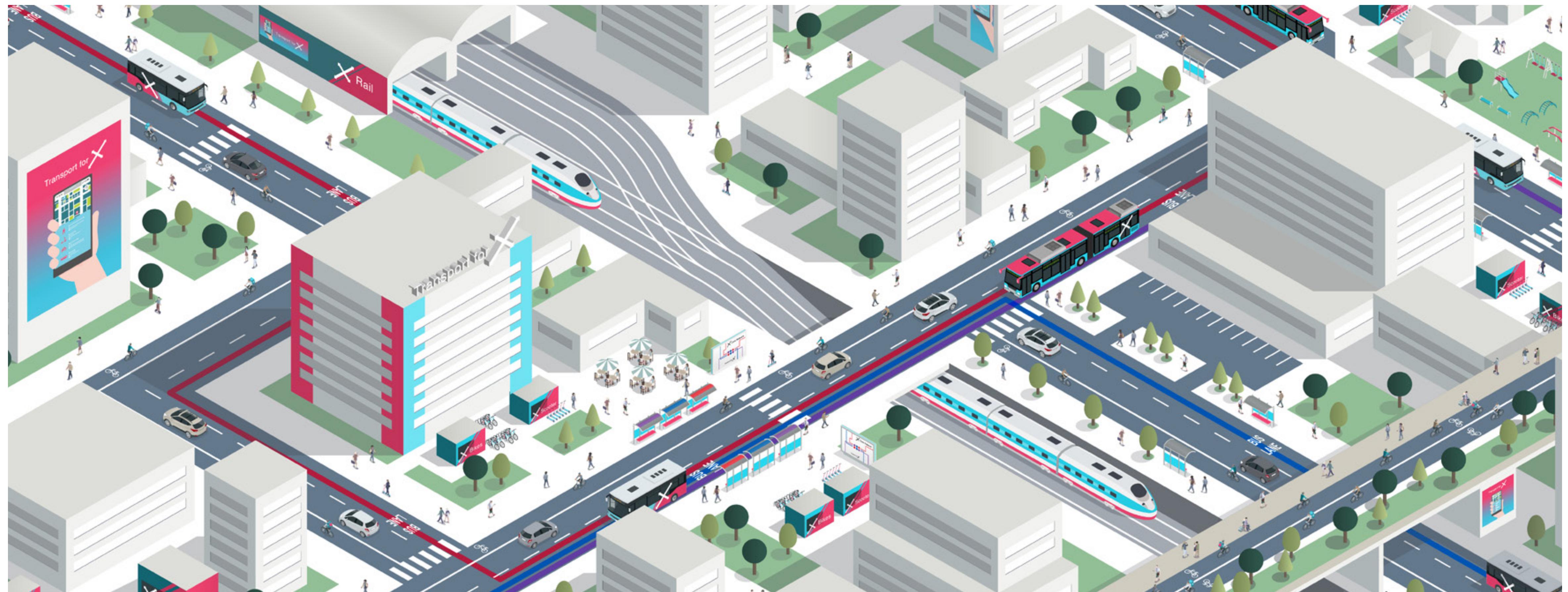


Tomorrow's Public Transport System

A vision-led approach to transforming urban mobility



Executive Summary

What practical steps can transport authorities take to deliver complete urban mobility whilst supporting delivery of the UN Sustainable Development Goals?

The future of public transport is characterised by uncertainty. While the climate crisis requires a fundamental shift in travel behaviour to secure a transition to net-zero, exponential technological progress is beginning to significantly impact transport business models and has the potential to reshape how we think about personal mobility.

The transport industry also faces structural challenges such as the rise of ride hailing and the potential future impact of autonomous vehicles. These trends are being accelerated by effects of the COVID-19 pandemic, which has seen public transport operators across the UK require emergency funding to keep services running.

As pandemic recovery sees a return to travel, transport authorities have an opportunity to develop a vision of a future integrated transport network that addresses the climate emergency, is attractive to travellers, responsive to changing technology, and meets local policy objectives.

Defining a vision

This report aims to help authorities define a vision of a future integrated transport network. We identify practical steps that enable authorities to shape future urban mobility around their vision, rather than taking a reactive approach.

Drivers of change

Long-term thinking requires an understanding of key drivers of change, taking a systems approach to understand impacts beyond existing definitions of public transport. We explore six drivers.

Under each, we have identified potential aspirations of transport authorities and considered how to support the delivery of the UN Sustainable Development Goals (SDGs).

A pathway to fully integrated public transport systems

Tomorrow's Public Transport System not only sets a path to net zero emissions, it also provides a vision for solving the impacts of over-congested transport on productivity and quality of life in our cities and their surrounding regions – a vision for an inclusive system that provides opportunities for all, while benefiting health and wellbeing by improving air quality and enabling active mobility for a greater number of journeys.

A transition to electric vehicles alone is not capable of delivering the same improvements in quality of life. Over time, mode shift away from cars will enable the creation of greener, more liveable streets and neighbourhoods with priority for public transport and active mobility and the virtuous circle will continue.

Drivers of change	Aspiration	Relevant UN SDG/s
Decarbonisation	A low-carbon public transport system that supports long term behavioural change in the transition to net zero.	 13 CLIMATE ACTION
Levelling up public transport	An integrated multi-modal public transport system based on the European model that improves regional connectivity, reduces inequality and supports inclusive growth.	 5 GENDER EQUALITY  10 REDUCED INEQUALITIES
Building back better	A public transport system that connects neighbourhoods and supports an improved public realm with streets designed for people instead of cars.	 8 DECENT WORK AND ECONOMIC GROWTH  11 SUSTAINABLE CITIES AND COMMUNITIES
Technology and innovation	A public transport system that is always innovating, and always integrating new technology solutions.	 9 INDUSTRY INNOVATION AND INFRASTRUCTURE
Customer centric design	A convenient, reliable interface offering users real time information across a range of public transport and mobility services through a single application.	 3 GOOD HEALTH AND WELLBEING
Governance and funding	Long-term vision for integration across all modes of public and shared transport to deliver maximum public value.	 10 REDUCED INEQUALITIES  16 PEACE, JUSTICE AND STRONG INSTITUTIONS

Executive Summary

Tomorrow's Public Transport System – net zero emissions, greater opportunities and neighbourhoods.

Technology to improve resilience and the experience and trust of passengers

The vision aims to improve accessibility by using the best that technology has to offer, by delivering an easy-to-understand, high-frequency core network, integrating shared transport and micro-mobility to improve the resilience of public transport, and supporting first/last mile capillary connections to mobility hubs. Technology also enables every customer to have access to a MaaS app, constantly feeding them the latest information and allowing them to provide



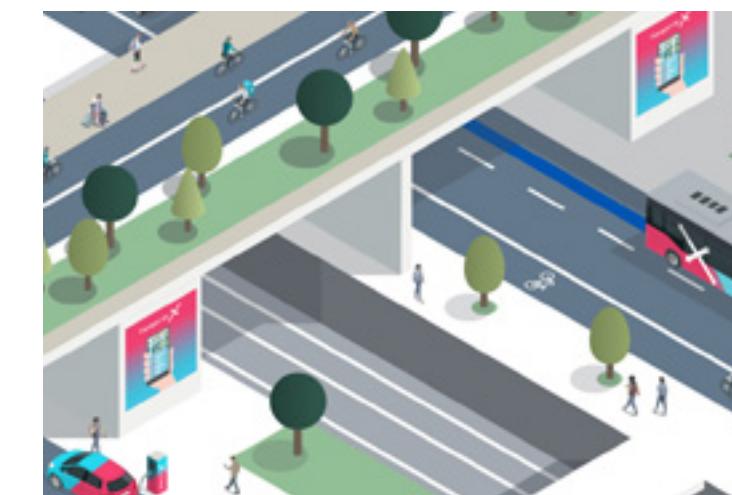
Core PT Network

- Establish core public transport network
- Consultation and co-design
- Evolve the core network over time



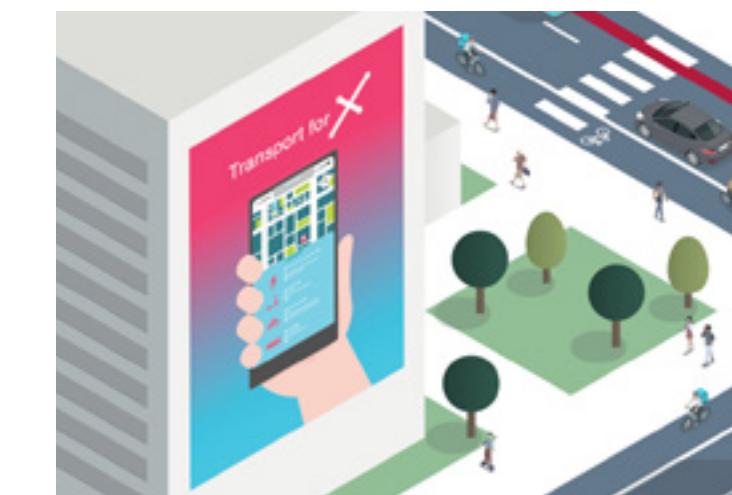
Modes and Vehicles

- Co-ordinate information, ticketing and branding
- Decarbonise the fleet
- Establish mobility hubs



Infrastructure

- Re-allocate road space
- Improve transfer between services
- Embed active mobility for first and last mile trips



Information and Ticketing

- Tap-on/tap-off account-based integrated ticketing
- Develop Mobility as a Service technology
- Grow patronage through incentives and subsidy



Marketing and Branding

- Built trust with consistent regional brand
- Two-way communication with customers
- Long-term marketing strategy



Mobility Management

- Transformative and inspiring long-term vision
- Shape new mobility around the vision
- Funding, organisational capacity and innovation

feedback on enhancing the system. This will improve the experience of passengers, and build trust in the unified brand that is the key to significant growth in passengers, in place of car journeys.

The study focuses on potential improvements to transport systems in urban areas in Great Britain, given the unique complexities and legacy of bus and rail deregulation, but will have applications for other geographies. Of course, the future vision for public transport is highly contextual, and the application of measures will vary from one authority to another, with some already in development in some regions. But we hope the ideas provide a contribution to thinking on how to best capture the opportunities and possibilities for improving public transport.

Making it happen

We explore in more detail a vision of how the system could look, through the lens of various system components. Bringing together changes across these various components could be transformational for cities.

We also identify practical steps to help shape change across each of the components, bringing interdependencies and synergies to create Tomorrow's Public Transport System.

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Introduction

Technological change and the need for urgent action on climate change presents a once-in-a-generation opportunity to re-imagine public transport.

Time for a new attitude towards public transport

Decarbonisation of transport requires an improved public system which can attract new passengers, reduce emissions and provide socially equitable access to jobs and services – the very basis of a successful economy.

However, bus usage has seen sustained decline in most UK cities over the past 10 years. Long-term trends in use of e-commerce, digital communications and flexible working have affected underlying demand for transport, while the declining cost of car ownership has reduced bus mode share.

Public transport hasn't changed much over the years. Austerity and reductions in public sector subsidy have forced operators to focus on efficiency – as they seek to manage their bottom line. This leaves little room for innovation or new technology, and the offer to passengers has remained largely the same.

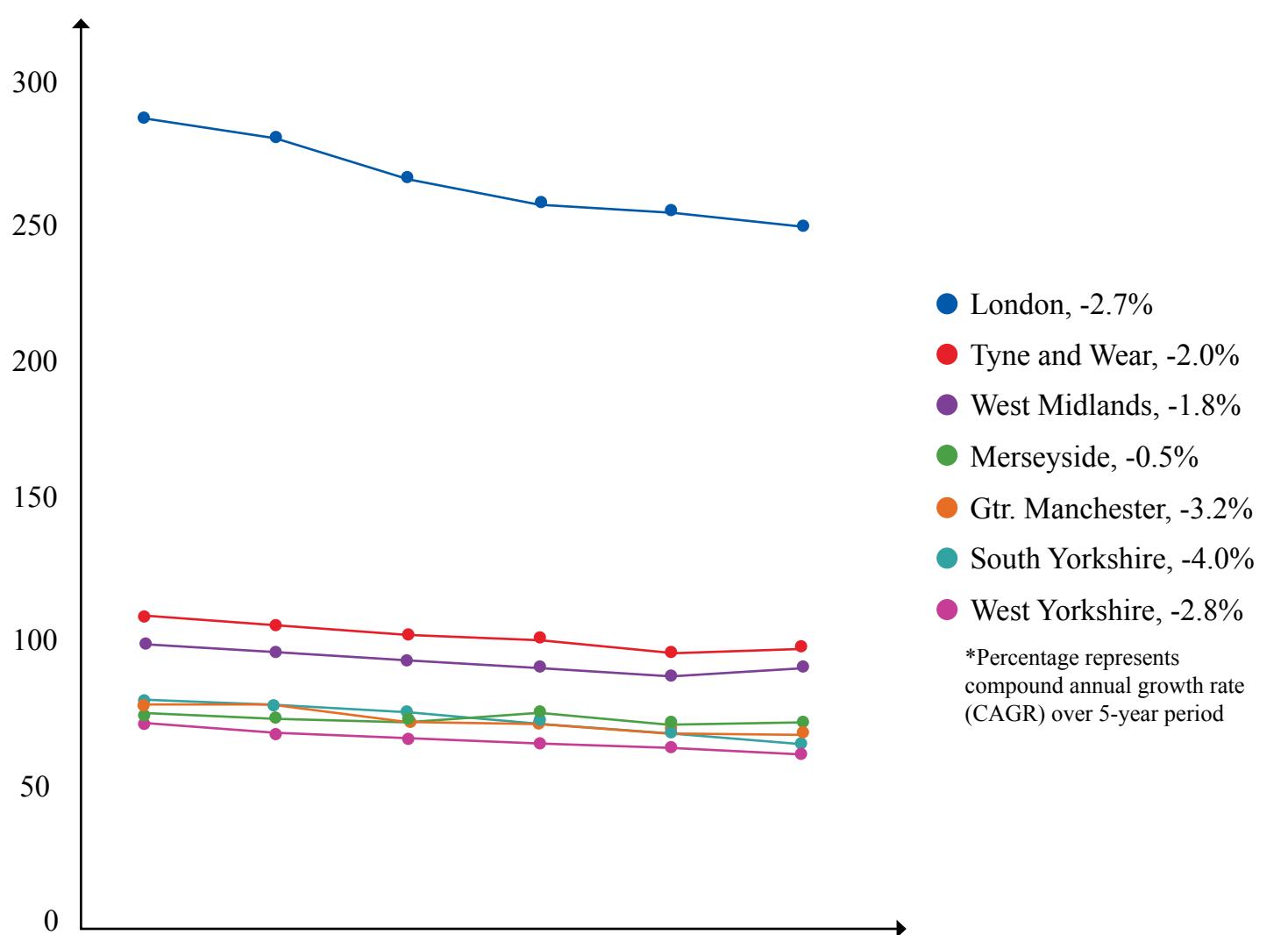
Funding and governance models since deregulation of the bus industry have become increasingly complex, and public sector interventions have tended to focus on incremental development on a route-by-route basis with limited consideration of overall network accessibility.

The result is a set of poor passenger and environmental outcomes when compared with integrated systems in most other European cities. Public transport needs levelling-up.

The COVID-19 pandemic has, of course, exacerbated these long-term trends, with emergency funding required to support the operating costs of public transport systems in the short-term.

Sustaining extensive public transport networks in cities with radically different patterns of demand requires new models of funding, and a new attitude towards the role of public transport in future.

Pre-COVID Bus Trips per Head in Selected UK City Regions



Source: DfT Bus Statistics, Table BUS0110a

Fragmentation when operators work independently

The transport system is presently experiencing disruption from a range of new mobility modes, services and business models, as ridesharing, car-sharing, micro-transit and micro-mobility expand across the globe.

Emerging mobility patterns are being shaped by a growing industry of digitally enabled, on-demand service providers. However, these new mobility operators are often subsidised by venture capital funding in the pursuit of market share, rather than solely on delivering broader community outcomes. At the same time, advances in autonomous vehicle (AV) technology promise to increase the speed of change, with pilot deployments underway in UK cities.

The current transport system, where public transport operators work independently from emerging shared mobility platforms, is not focused on good outcomes for passengers.

Public funding is being used to provide EV charging, upgrade the rail network, trial DRT services, subsidise shared bikes and to introduce electric bikes and e-scooters into the transport mix. Each of these modes is designed by separate teams, and each has a different customer-facing app and payment system.

Introduction

Present ‘zero-sum game’ brings no net change in mode shift from car

This isolated approach creates duplication and confusion, inevitably resulting in operators cannibalising each other¹. Zero-sum game describes a situation in which one mobility operator’s gain equals another’s loss, with a zero net change in mode shift from car.

Our future modal hierarchy must be based on an understanding of the full costs of transport choices, including the costs of operating and maintaining roads and parking, as well as the huge externalities associated with carbon, inequality, air pollution, noise, congestion, fatalities and the sedentary lifestyle that comes with excessive private car use.

The role of public transport must be significantly expanded to reduce car dependency and provide integrated, seamless, resilient transport which allows us to get around in a holistic system where not owning a car does not affect your ability to be included in society.

Releasing ourselves from car dependency is key to delivering on net-zero aspirations, and a reliable transport system can enable urban residents to move towards single car households as an interim step, while improving inclusivity and transport equity.

MaaS: A seamless system to connect all transport options for passengers

Mobility as a Service (MaaS) describes a system which brings various modes of transport together into a single intuitive mobile app. It seamlessly combines transport options from different providers, handling everything from travel planning to payments^{2,3}.

For the user, MaaS can offer added value through use of a single application to provide access to mobility, with a single payment channel instead of multiple ticketing and payment operations⁴. Mobility as a Service aims to reduce the fragmentation of the user experience in getting from A to B, normally via usership over ownership models.

MaaS apps launched to date – and the MaaS concept itself – have been framed by private companies. One day, there may be a commercially viable market for technology companies to sell public transport tickets, commercialise transport data or operate fleets of autonomous vehicles. However, the commercial success of such schemes is yet uncertain, and these trials often rely on significant venture capital backing.



Introduction

Many benefits – but many issues still to resolve

It is easy to see why public sector authorities may still be unconvinced of the benefits of MaaS. Commercialisation is often at odds with the public sector's aims to provide sustainable and equitable transport services.

Customer ownership and concerns over revenue allocation and settlement often mean that local transport operators prefer the status quo of passengers using their own apps instead of an integrated ticketing platform. There are also uncertainties in relation to the effort and cost required to build it, political will and capacity to deliver, and the need to tailor solutions to suit local context. These, and numerous other challenges will likely mean that, whilst pilots and limited-scope MaaS schemes will continue to appear over the short term, it could be several years before we see significant commercial use cases and scalability of MaaS.

Continued evolution of urban transport systems is key to developing a successful Maas system

Progressing towards MaaS doesn't necessarily mean searching for and designing the complex end state from a starting position. Incremental actions to improve the public transport system need to form the building blocks of a MaaS solution, making the idea more tangible for many transport authorities.

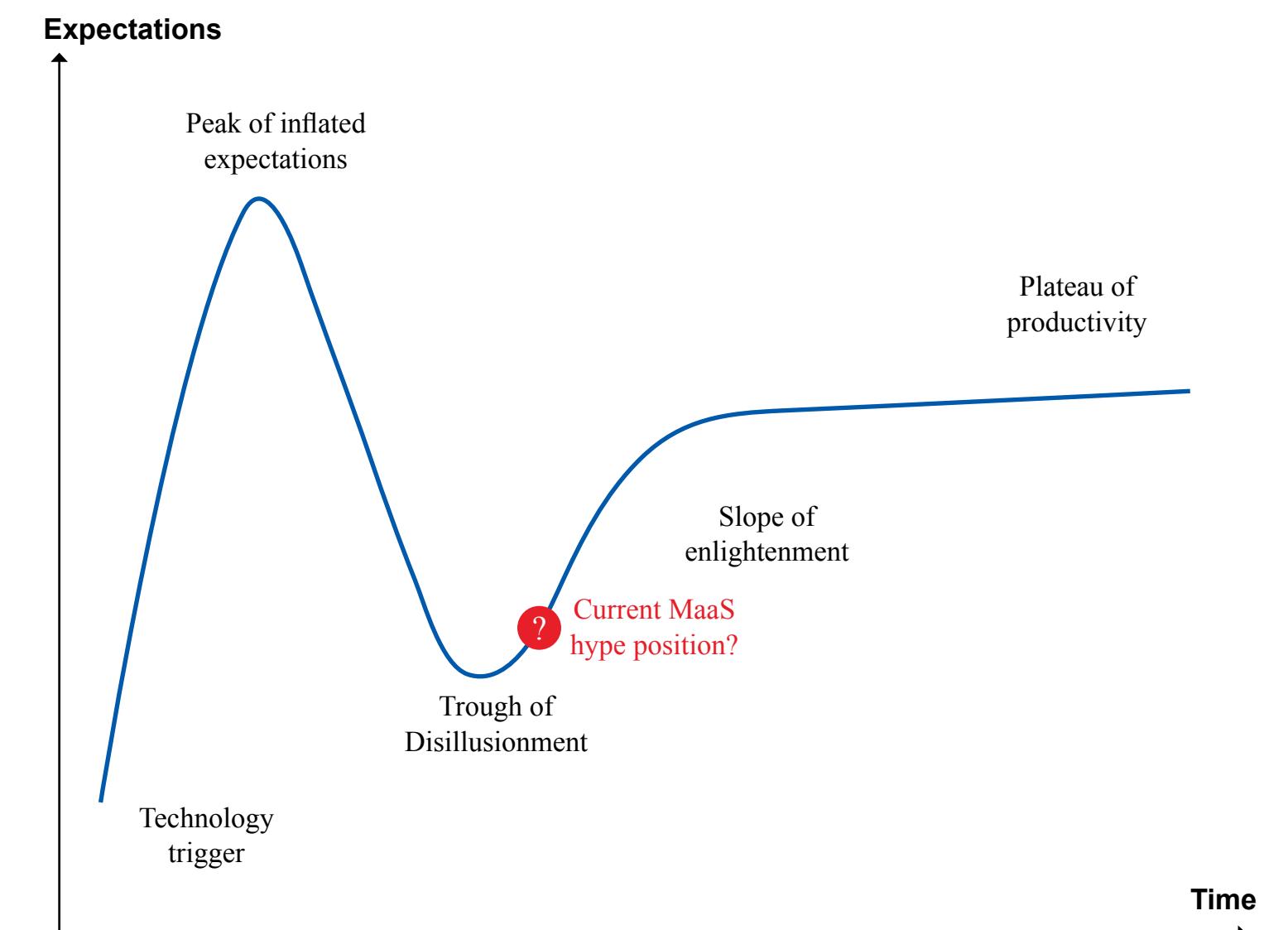
Technology can make good mobility systems even better, but it cannot compensate for poor public transport provision, so cities should start with a multi-modal offering for public transport services at the core and build outwards by adding payment integration for shared mobility and other transport modes, determined by local needs and objectives.

A shared vision for *Tomorrow's Public Transport System*

This report is aimed at helping the public sector to define its vision of a future integrated transport network, to meet local policy objectives, with high frequency public transport as the backbone to the network, and new mobility services that extend the reach and resilience of the network.

It was informed by discussion with and insights from transport authorities across the UK and seeks to provide practical steps that these organisations can take to deliver *Tomorrow's Public Transport System*, rather than taking a 'wait and see' approach.

Where is MaaS on the Hype Cycle?



Source: Gartner Smart Mobility Hype Cycle, 2020

Drivers of change

Decarbonisation

A low-carbon public transport system that is safe, inclusive, affordable and convenient to stimulate a shift away from private cars.

To limit the global temperature rise to 1.5°C we must achieve net zero carbon by 2050 at the latest. Doing so requires action on an unprecedented scale. Transport is the largest emitting sector of greenhouse gases in the UK and emissions are currently 4% higher than in 2013.

Systemic change is required

Too little progress has been made in reducing transport emissions, especially when compared with significant decreases in the energy sector over the same period. Cars and taxis are the biggest contributor, responsible for 90% of transport emissions. Action on climate change requires systemic change across planning, decision-making and funding of transport⁵.

Decarbonisation of transport has largely focused on replacing fossil-fuel-driven propulsion methods with zero-tailpipe emissions successors, with the UK Government taking steps to phase out new sales of petrol and diesel cars and vans by 2030.

Aspiration

A low-carbon public transport system that supports long-term behavioural change in the transition to net zero.

While electrification of transport will play a necessary role in reducing CO2 emissions, a coordinated effort is required to change not only the technologies being employed but the mode of transport used for personal travel, and to transport goods and services. Continued dependence on private vehicles represents a significant source of harmful particulate matter, life-cycle carbon associated with vehicle and battery production and continued sacrifice of vast amounts of public realm to the private car, preventing its use for community and social connection.

Decarbonisation requires a safe, inclusive, affordable, convenient, low-carbon public transport system that, in combination with active mobility, genuinely provides a competitive alternative to car use for local journeys to stimulate behaviour change.

Long-term view required now

We must ensure that the immediacy of the threat of the COVID-19 pandemic does not cause us to lose focus on the actions we need to take in response to the climate crisis, which will have far reaching consequences for future generations.

A long-term view on reducing car reliance and transport pricing must be taken now to make progress on pathways to net zero and should take precedence over short-term political cycles. COVID-19 recovery stimulus packages could play a critical role in kick-starting this change⁶.

**Contribution to UN SDGs**

Investment in low-carbon public transport and enabling long-term changes to sustainable travel is required to address the climate emergency.



Drivers of change

Levelling up public transport

The economic productivity and competitiveness of cities can be improved through reliable, integrated public transport networks.

There are substantial regional differences in economic performance in the UK, which the UK Government aims to address through its ‘levelling up’ agenda. Issues of inequality are linked inherently to connectivity and transport.

For disadvantaged communities on the edges of cities, often with low levels of car ownership, a lack of rail links and bus services which have been deteriorated by years of austerity, means that jobs, education, healthcare, and essential services can feel – and often are – a long way away.

Research shows that such ‘left behind’ neighbourhoods have poor public transport but are more reliant on it⁷, exacerbating economic and social disadvantage.

This issue not only affects people at a human level but impacts the economic performance of cities and regions. If people can’t reliably get to work during peak travel periods, the population of the town or city and catchment of the labour market is effectively reduced. This is particularly true of larger cities, where people often rely on buses

Aspiration

An integrated multi-modal public transport system based on the European model, that improves regional connectivity, reduces inequality and supports inclusive growth.

that get caught in congestion at peak times, thus sacrificing overall productivity. According to the Centre for Cities⁸, changing the underperformance of the largest cities outside London is key to achieving the levelling-up ambition.

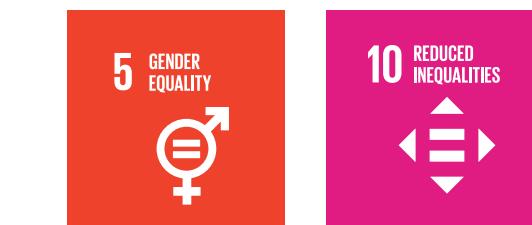
Improve entire networks, not isolated routes

Efforts to improve public transport have tended to focus on incremental development on a route-by-route basis with limited consideration of overall network accessibility that can improve the competitiveness, productivity and attractiveness for investment at the city or regional level.

The franchise model for buses in London allows Transport for London to have a ‘guiding mind’ in determining the network of services that are provided. But London is only a partial role model for other UK cities given its significantly higher population density and decline in bus ridership in recent years, matching patterns observed in the majority of UK cities.

Other countries leading the way

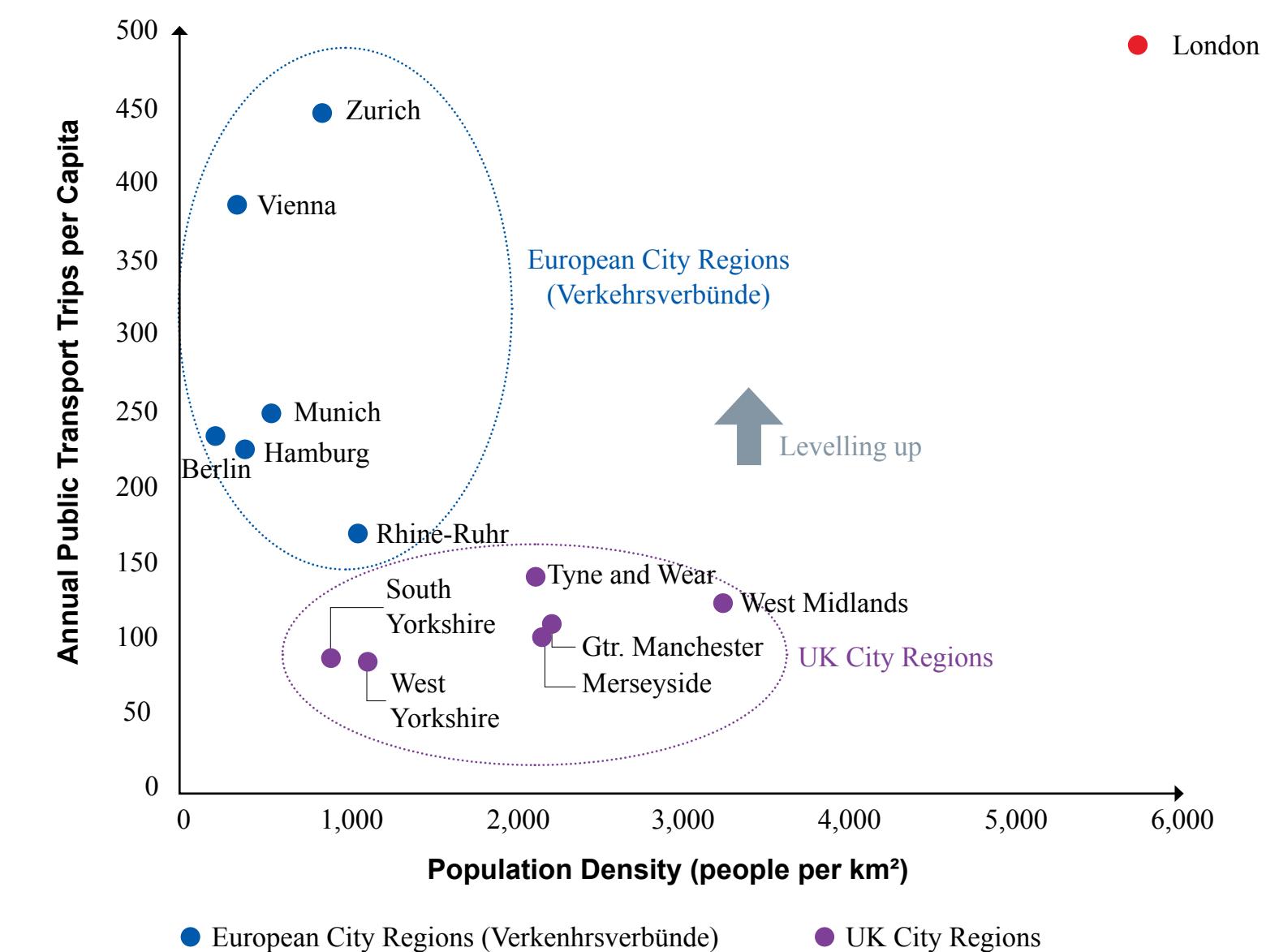
The UK fares poorly when compared to others in Europe in terms of public transport trips per capita. Germany, Austria, and Switzerland have successfully implemented regional public transport associations, called Verkehrsverbünde (VVs), which coordinate public transport planning, services, fare structures, ticketing, marketing, and customer information throughout entire metropolitan areas, despite having comparatively lower densities of development than in the UK. By improving PT throughout metropolitan areas, VVs provide an attractive alternative to the private car, helping to explain why the car mode share of trips has fallen since 1990 in all of the VVs identified⁹.



Contribution to UN SDGs

Improving public transport can address divides between demographic and geographically distinct communities. Public transport use is highly gendered across England, with a third more women using the bus than men. Improving public transport addresses such hidden inequalities and provides better accessibility for all, including those with disabilities⁹.

Annual public transport trips and population density of UK city regions compared with European Verkehrsverbünde in Germany, Austria, and Switzerland.



Source: Adapted from original comparison by Transport for Quality of Life^{10,11,12}

Drivers of change

Building back better

COVID-19 accelerates our opportunity to re-structure neighbourhoods and cities around people – making them better places to live and work.

The COVID-19 pandemic has considerably impacted public transport with messages to work from home and to avoid travel by bus and train. It has intensified long-term trends in e-commerce, digital connectivity and growth of active travel, with new modes of transport such as electric bikes and scooters, which result in lower demand for public transport.

Some of the fall in ridership is expected to recover post-vaccination roll-out, but it is likely a proportion of commuters will continue to work from home, either permanently, or as part of a hybrid working pattern.

Aspiration

A public transport system that connects neighbourhoods and supports an improved public realm with streets designed for people instead of cars.

Sustaining extensive public transport networks in cities with radically different patterns of demand requires new models of funding and a new attitude towards the role of public transport in the future.

There are also long-term implications to consider for our neighbourhoods and city centres. Social distancing has exposed the inherent imbalance in allocation of road space for cars in our towns and cities. COVID-19 has brought about the moment of a generation to relocalise society, reduce unnecessary movement and repurpose streets for commerce, community and social connection, instead of sacrificing vast amounts of public realm for the parking of private cars.

An opportunity to make cities more accessible and welcoming

An improved public transport system can support development of low traffic, fifteen-minute neighbourhoods. Mobility hubs can be introduced to increase the reach of the public transport network and encourage active mobility for first/last mile trips. Seizing the opportunity to transform our cities around changes in travel behaviour will support local jobs and neighbourhood renewal, and make them better places to live and visit.

**Contribution to UN SDGs**

By reducing car trips and improving air quality, places become more attractive to dwell and socialise, with the possibility for squares and pavement cafés, providing social value for communities and making places more attractive for investment.



Drivers of change

Technology and innovation

New technology and data can create a combined transport system truly focused on delivering better services for passengers

New technology is disrupting transport

We are experiencing disruption from new mobility modes, services and business models, as ridesharing, carsharing, micro-transit and micromobility expand across the globe. Emerging mobility patterns are being shaped by a growing industry of technology-enabled, on-demand service providers.

These new mobility operators are often subsidised by venture capital funding in the pursuit of market share, rather than solely on delivering broader city authority outcomes.

At the same time, advances in autonomous vehicle (AV) technology promise to increase the speed of change with pilot deployments already underway in UK cities.

Aspiration

A public transport system always innovating, and integrating new technology solutions.

Disconnect between data and planning

Improvements to public transport have been gradual by comparison and focused on incremental changes. Mass transit is still being designed as it was in the 1990s, but technology, data and customer expectations have changed and there is a disconnect between how we plan and manage transport, and the availability of new data.

**Contribution to UN SDGs**

Innovation can play a key role in improving public transport from a passenger perspective, while infrastructure improves reliability of the network.

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Drivers of change

Technology and innovation

A need for public transport innovation

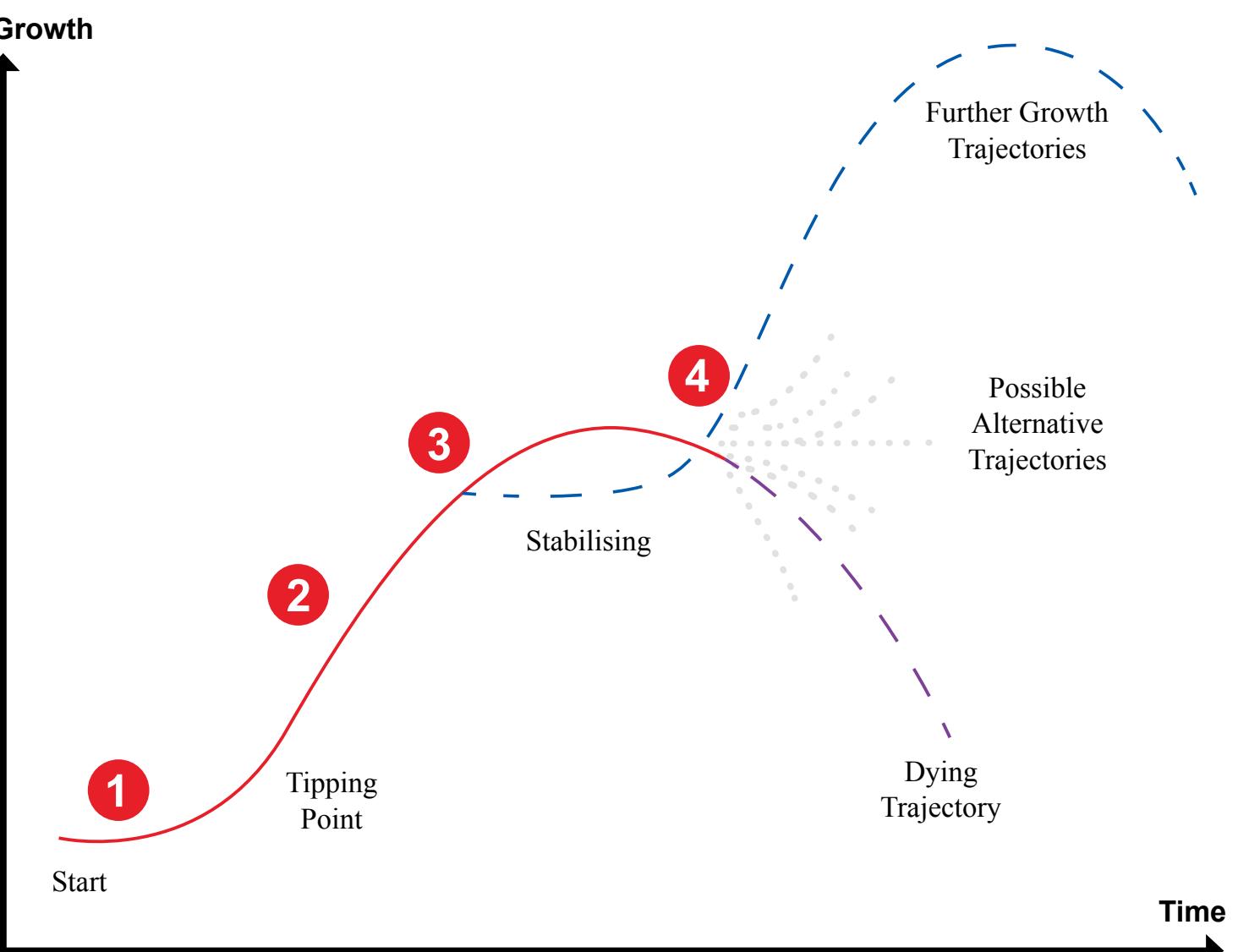
While not typically applied to the public transport industry, the sigmoid curve framework (opposite) can be used to explain the dilemma for public transport businesses. It is suggested that traditional models of public transport operations are at an inflection point, somewhere in stage 3 of the cycle.

Innovation is required to transition public transport to a new period of growth. However, the organisational structures of mature public transport companies are often not effective for innovation and developing new technologies. This is the very focus of emerging competitors – disruptive mobility start-ups. Governments have a key role to play in promoting and supporting innovation in public transport.

The current system, where public transport operators work independently from emerging shared mobility platforms, is not focused on good outcomes for passengers. Transport authorities need to better understand the impacts of new technologies and shape them to be equitable, inclusive, meet broad objectives and ensure efficient spending of subsidies.

The S-curve framework is used in the management of a technology to define the following stages in the cycle of growth and development over time:

Public transport's innovation dilemma



Stage 1: Learning and experimentation

Growth is slow at first, led by a few early adopters of the product or service.

Stage 2: Rapid growth

After a tipping point, growth accelerates rapidly as it is adopted by many.

Stage 3: Maturation

A more stable, slow-growth period as fewer individuals adopt the product or service. If there isn't a new alternative, this stage can last for many years and requires formally-trained managers who are focused on efficiency. At this point, organisations have an opportunity to renew and innovate their product or service, but organisational structures of firms operating in established, mature markets are often not effective for innovation and disruptive technologies as they are focused instead on meeting the needs of existing customers and on efficiencies to maintain profit margins.

Stage 4: Transition

The death of an old technology, accompanied by the adoption of a new one. Evidence shows that the longevity of companies is decreasing as the pace of technological advances increases¹³.

Drivers of change

Customer-centric design

Having one place to make informed, real-time decisions about all aspects of a trip can help public transport truly rival the private car.

New mobility operators such as Uber have disrupted not just transport service provision, but the convenience, speed, and level of service with which customers can plan, book, pay for, and undertake trips. It is a great example of how tomorrow's public transport system must be designed around the experience of the customer, rather than convenience for operators.

Until now, concerns over revenue allocation and customer ownership have often meant that transport operators prefer the status quo of passengers using a diverse range of information sources, tickets, and mobile applications instead of integrated platforms, each with different customer facing apps and payment systems.

Aspiration

Improving the customer experience by providing a single, convenient, reliable interface offering users real time information across a range of public transport and mobility services.

One system – everything covered

Integrating information and ticketing for various transport modes under one system allows a customer to make use of various modes in the most optimal way. This will require thinking beyond traditional information and payment offerings currently available and an understanding of all components of end-to-end customer journeys.

By doing so, a customer-centric value proposition can be developed to give users a high-quality experience across a range of mobility services, through a single application and promote access over ownership. By offering products which improve the quality of the transport experience operators can draw in more customers, collect, and analyse more data, allowing them to incrementally improve convenience and win further customers¹⁴.

Such an arrangement would mean tomorrow's public transport system could unlock passengers from personal car ownership by offering a compelling and convenient alternative at a much lower cost.



Contribution to UN SDGs

Mode shift from car to public transport enables users to build active mobility into daily routines, reducing rates of obesity, diabetes and other lifestyle-related health conditions, as well as reducing air pollutants.

End-to-end customer journeys are made up of various components, and increasingly different modes of travel



Drivers of change

Governance and funding



Barriers to Mobility as a Service (MaaS) adoption

Mobility as a Service (MaaS) describes a system which brings various modes of transport together into a single intuitive mobile app, seamlessly combining transport options from different providers, handling everything from travel planning to payments^{2,3}.

For the user it can offer added value through use of a single application to provide access to mobility, with a single payment channel instead of multiple ticketing and payment operations⁴. Its aim is to reduce fragmentation of user experience in getting from A to B, normally via usership over ownership models (i.e. providing access to transport services without the need to own a vehicle).

Schemes pioneered in UK

Transport for the West Midlands (TfWM) and Whim are pioneering UK-based MaaS in the West Midlands, offering customers a choice of either pay-per-ride or monthly subscription to services provided by Gett taxis, National Express buses, Midland Metro trams, as well as local train services, city bikes, rental cars and car club vehicles. Elsewhere, various trial schemes are either taking place or in development, such as in Scotland or as planned in the WECA Future Mobility Zone (FMZ). Private sector start-ups are also developing trials of MaaS.

One day, there may well be a commercially viable market for technology companies to sell public transport tickets, commercialise transport data or operate fleets of autonomous vehicles. Citymapper, for example, has developed a multi-modal subscription model in London and trialled the provision of its own data-driven bus and shuttle services. However, the commercial success of such schemes is yet uncertain, and these trials often rely on significant venture capital backing.

It is easy to see why public sector authorities may still be unconvinced of the benefits of MaaS. Commercialisation is often at odds with the public sector's aims to provide sustainable and equitable transport services. There are also uncertainties in relation to the effort and cost required to build it, political will and capacity to deliver, and the need to tailor solutions to suit local context. These, and numerous other challenges will likely mean that, whilst pilots and limited-scope MaaS schemes will continue to appear over the short term, it could be several years before we see significant commercial use cases and scalability of MaaS.

It's about evolution, not revolution

Technology can make good mobility systems even better, but cannot compensate for poor public transport provision, therefore, MaaS should be seen as an evolution of the transport system, rather than an off-the-shelf technology product. Incremental actions to improve the public transport system can form the building blocks of a MaaS solution, making the idea more tangible for many transport authorities.

Drivers of change

Governance and funding

A long-term vision and transitional funding is needed to help regions create unified, convenient and efficient public transport networks. Decision making over transport policy in the UK is increasingly being devolved to regional and city levels. It is therefore cities, rather than national government, that will lead change and innovation in our transport systems.

Enhancing devolution will be critical for levelling up and driving faster delivery of UK-wide net zero targets. With their own budgets and responsibilities, city authorities will have more freedom to determine who operates in their cities, and under what terms.

The separation between public and private transport will become less clear as we move towards an integrated service economy. For example, first and last mile partnerships between ride-sharing services and public transport operators could create more seamless journeys.

Aspiration

Governance and regulatory arrangements established to develop and deliver a long-term vision for integration across all modes of public and shared transport to deliver maximum public value.

Social equity a key consideration

How data is shared to enable real-time information, unlock new services and create more efficient infrastructure and services will be key.

As the blurring of public and private transport gathers pace, questions around the issue of social or public good and who is the guardian will become more pressing and politically charged. For example, the profit motive of private companies to provide public transport could be an issue if their focus is only on the most profitable routes. This could undermine the economic sustainability of public transport systems, and the equity of the transport system for passengers.

The objectives of cities (such as reducing environmental impact, increasing safety, and supporting economic growth), as well as the objectives of commercial organisations and consumers need to be simultaneously maintained.

Public and private entities will need to find ways of working together to ensure that transport stays competitive, while ensuring equity, privacy, and safety³ for travellers.

As we emerge from the pandemic, change is already underway. The Bus Back Better strategy outlines the UK Government's requirement for bus services in England to be delivered under an enhanced partnership or franchising, as set out in the Bus Services Act 2017, to access new discretionary funding.

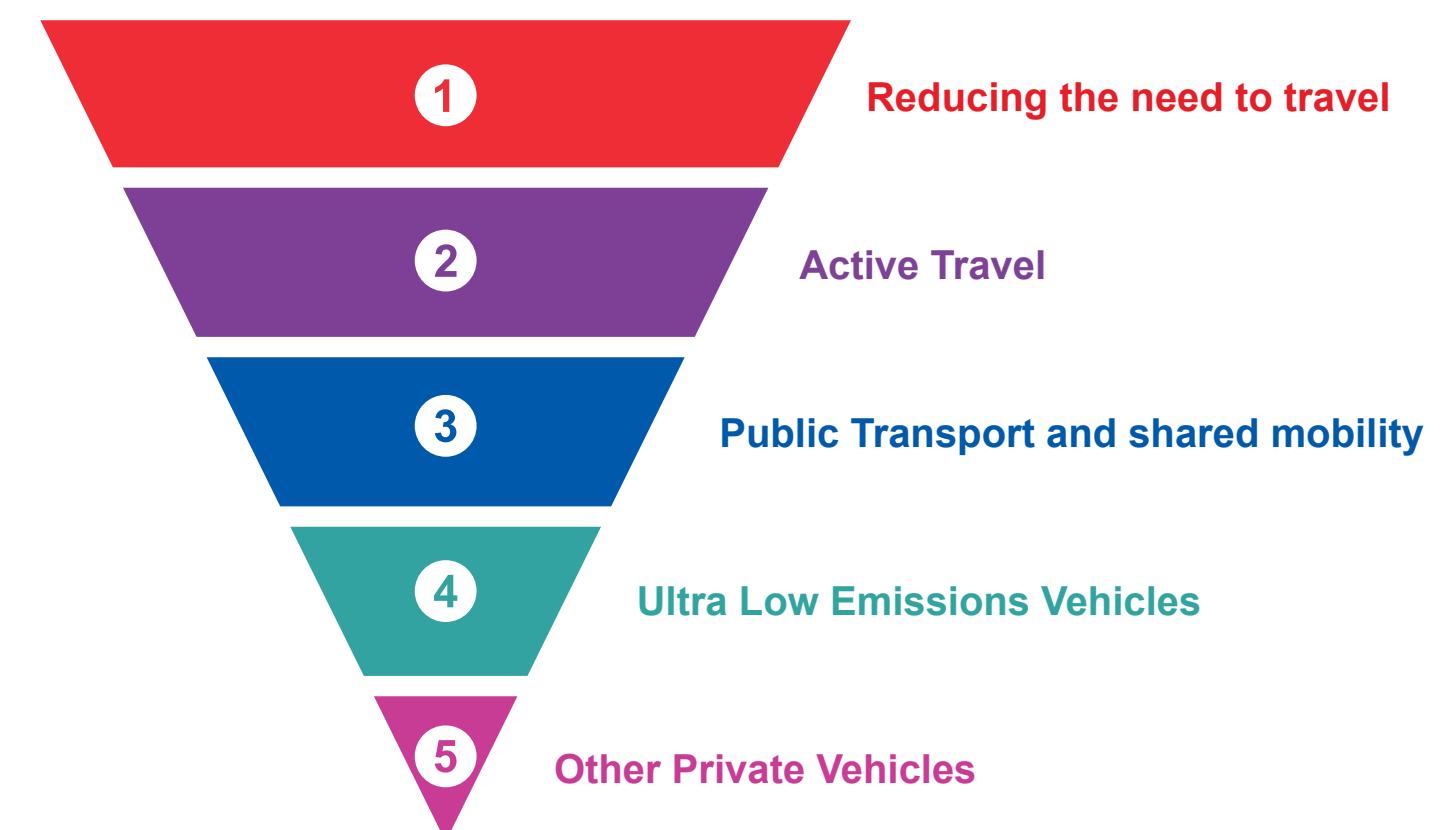


Contribution to UN SDGs

Improved governance arrangements and long-term funding for public transport can ensure equitable access to mobility, where not owning a car does not affect your ability to be included in society. Strong institutions, political buy-in, regulatory arrangements and sustainable funding models are key to engendering the change required.

Sustainable Transport Hierarchy

A sustainable transport hierarchy can help guide decision making by considering measures that first focus on the role of place in reducing trips, before prioritising sustainable modes. Welsh Government has identified a similar framework within Llwybr Newydd | New Wales Transport Strategy¹⁷, which sets a target of 30% of the workforce to work remotely and 45% of journeys to be made by public transport, walking and cycling by 2040.



Drivers of change

Governance and funding

Transport authorities should adopt a broader definition of public transport that encompasses emerging means of shared and active travel to supplement the core public transport offering.

The DfT has also set out principles for the future of mobility, and is consulting¹⁵ on the Public Transport Ticketing Scheme Block Exemption, which could extend arrangements for area-based multi-operator and multi-modal ticketing, to form the basis of better integration of bus, rail, and tram networks.

This will enable them to act as the ‘guiding mind’ to oversee the long-term vision and operation of all public transport operations to ensure the system works as a unified network, making travelling more convenient and efficient and contributing to modal shift and reduced private car ownership.



City, metro and national governments in the UK must act now to rethink funding and finance models to pay for future transport infrastructure developments.
[Read More: Rethinking transport funding and finance](#)

Substantial transitional funding required

Funding and governance models since deregulation of public transport have become increasingly complex with COVID-19 accelerating existing challenges with bus and rail operating models.

Public transport will require substantial transition funding for some time to come. Without it, there are risks of a negative cycle of route closures and further decline in use which would impact cities’ economic performance.

In order to build back better, a long-term solution to the challenge of funding public transport and financing the required investment to enable decarbonisation is needed, rather than relying on ad-hoc fragmented funding streams, especially given falling fuel duty and road taxes in the switch to electric vehicles and the need for equitable transport outcomes. Our future modal hierarchy must be based on an understanding of the full costs of transport choices, including the costs of operating and maintaining roads and parking, as well as externalities associated with carbon, inequality, air pollution, noise, congestion, fatalities and the sedentary lifestyle that comes with dominance of private cars. City, metro and national governments in the UK must act now to rethink funding and finance models to pay for future transport services and infrastructure developments¹⁶.



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Drivers of change

Governance and funding

Bus Back Better, National Bus Strategy for England

“As we build back from the pandemic, better buses will be one of our major acts of levelling-up.”

Boris Johnson, Bus Back Better¹⁸

The UK Government published a National Bus Strategy for England in March 2021, at a critical time for the industry. The strategy aims to reform the way local bus services are planned and delivered, requiring Local Transport Authorities (LTAs) to form enhanced partnerships with bus operators, backed by £3 billion investment.

The strategy paves the way for buses to continue to form a key component of tomorrow’s public transport system, and recognises the need for a network that feels like a network, with easy-to-understand services, comprehensive information at the touch of a phone, and price capping across bus operators, rail and tram. It also outlines how the Future of Transport Regulatory Review¹⁹ will consider how legislation that separately covers buses, taxis, private hire vehicles and light rail may be brought together to reflect the blurring boundaries between these forms of travel, and how new forms of service, such as AVs, could be provided to passengers by removing obstacles to innovation and allowing greater flexibility.

Key dates

- June 2021 LTAs need to commit to establishing Enhanced Partnerships under the Bus Services Act or begin the statutory process of franchising services.
- October 2021 LTAs will need to publish a local bus service improvement plan.
- April 2022 To access new discretionary funding, LTAs will need either to have an enhanced partnership in place, or be following the statutory process to decide whether to implement franchising.

Key elements of the Bus Back Better strategy



Drivers of change

Governance and funding



DfT Future of Mobility: Urban Strategy Moving Britain Ahead²⁰

The Government has outlined nine principles which underpin, as far as possible, its approach to innovation in urban mobility:

1. New modes of transport and new mobility services must be safe and secure by design.
2. The benefits of innovation in mobility must be available to all parts of the UK and all segments of society.
3. Walking, cycling and active travel must remain the best options for short urban journeys.
4. Mass transit must remain fundamental to an efficient transport system.
5. New mobility services must lead the transition to zero emissions.
6. Mobility innovation must help to reduce congestion through more efficient use of limited road space, for example through sharing rides, increasing occupancy or consolidating freight.
7. The marketplace for mobility must be open to stimulate innovation and give the best deal to consumers.
8. New mobility services must be designed to operate as part of an integrated transport system combining public, private and multiple modes for transport users.
9. Data from new mobility services must be shared where appropriate to improve choice and the operation of the transport system.

Decarbonising Transport: A Better, Greener Britain²¹

The DfT's transport decarbonisation plan sets out the path to net zero transport in the UK, and the Government's approach to delivering it. The plan includes several commitments around accelerating modal shift to public transport supported by shared mobility, including support for shared mobility services, MaaS, e-scooter trials and improved data sharing.

“Shared mobility services can decarbonise and decongest our transport network, offer an alternative to traditional mass transit, and provide new forms of transport for the first and last mile connecting to public transport.”

To reduce motor traffic in urban areas and increase the share of trips taken by public transport, the document sets out the following strategic priorities:

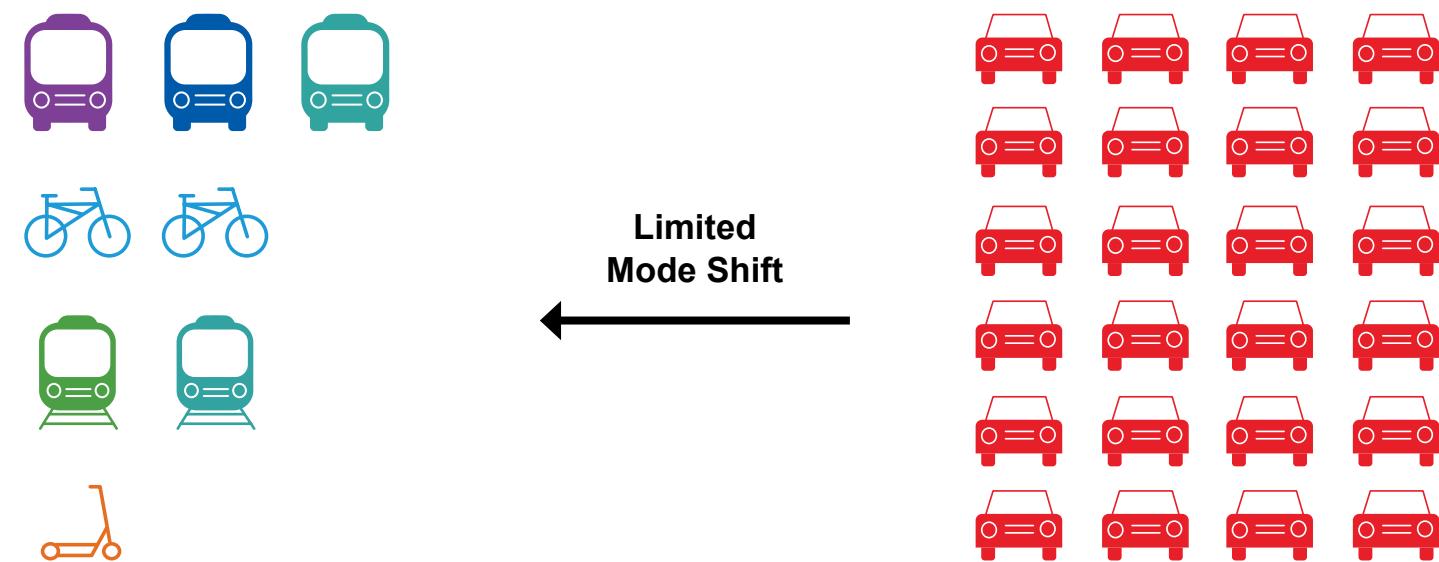
- Public transport and active travel will be the natural first choice for our daily activities.
- We will have a cohesive, widely available, net zero public transport network designed for the passenger.
- We will use our cars differently and less often, with new technology helping reduce our carbon footprint.

Drivers of change

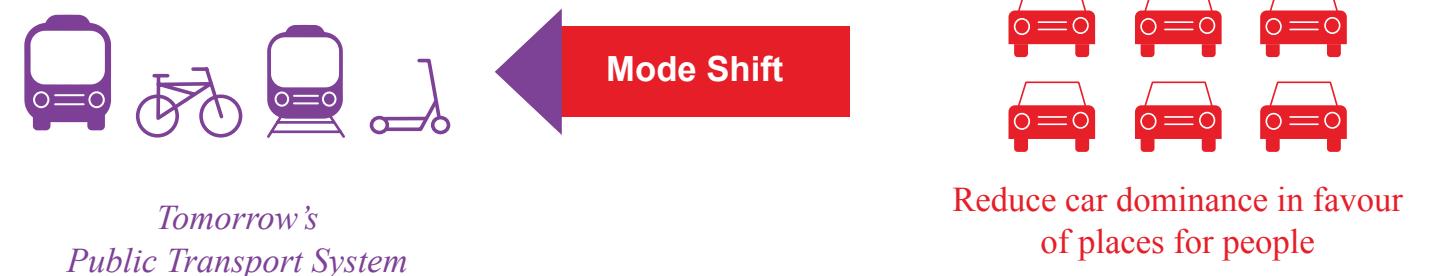
Summary

High frequency public transport should act as the backbone of a comprehensive public mobility ecosystem, integrating with rapidly emerging forms of shared mobility to improve the experience of passengers.

Existing Zero Sum Game



Future PT System: Greater than the sum of its parts



The current system where public transport operators work independently from emerging shared mobility platforms is not focused on good outcomes for passengers. This siloed approach creates duplication and unnecessary confusion, inevitably resulting in operators cannibalising each other in a zero-sum game. One mobility operator's gain equals another's loss, with a limited net change in car trips.

A reliable integrated transport system that is greater than the sum of its parts and focuses on seamless journeys and convenience for passengers is key to releasing ourselves from car dependency, delivering on net-zero aspirations and re-designing city streets as inclusive spaces for people.

Local and regional transport authorities, government and public transport operators will all continue to play a crucial role in the success and delivery of services and integration of new mobility. They must redouble collaboration efforts to manage recovery and support the long journey to return patronage to pre-COVID-19 levels and beyond.

Aspirations for Tomorrow's Public Transport System

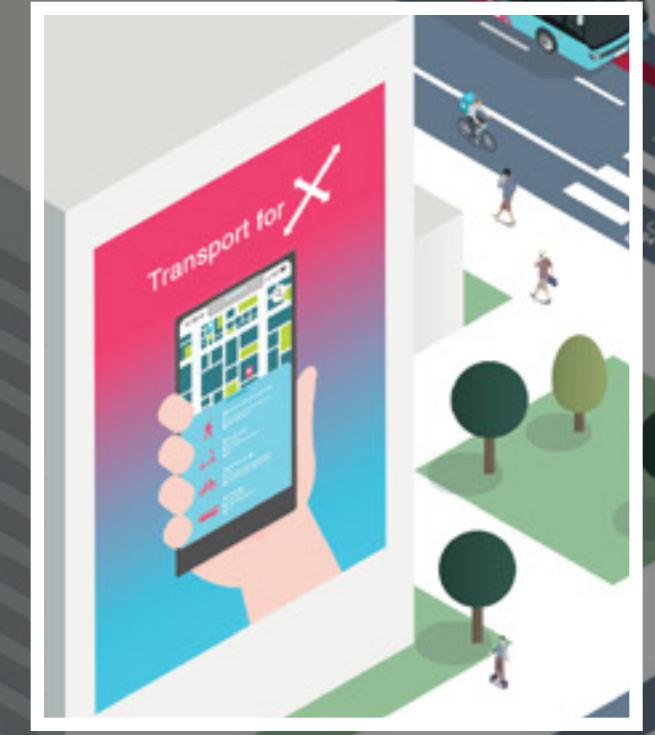
- A low-carbon public transport system that supports long-term behaviour change in the transition to net-zero.
- An integrated multi-modal public transport system based on the European model, that improves regional connectivity, reduces inequality and supports inclusive growth.
- A public transport system that connects neighbourhoods and supports an improved public realm and streets designed for people instead of cars.

- A public transport system that grasps the opportunities to innovate, and integrate new mobility
- Improving the customer experience by providing a convenient, reliable interface offering users real time information across a range of public transport and mobility services through a single application.
- Governance and regulatory arrangements developed to deliver a long-term vision for integration across all modes of public and shared transport to deliver maximum public value.

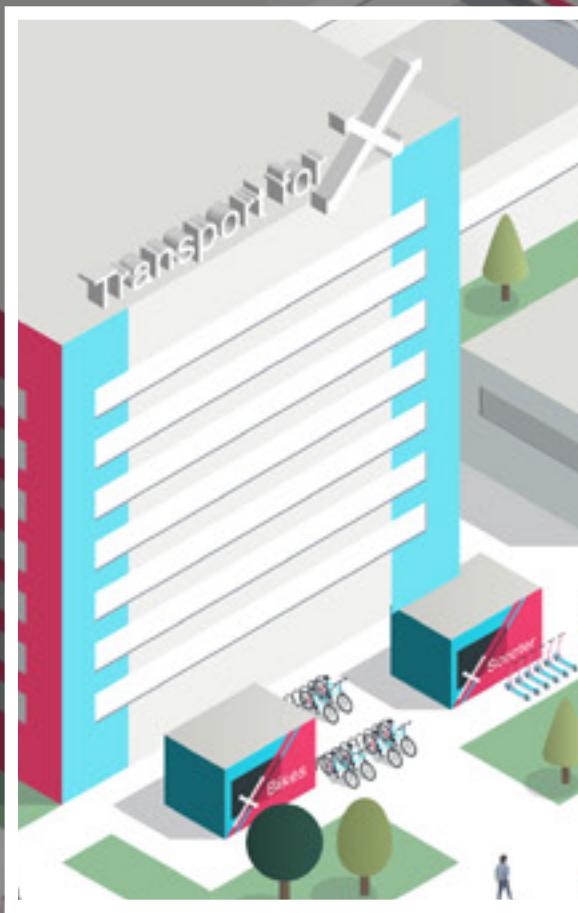
Improving transportation requires investment in the short-term to unlock a virtuous circle of additional revenue, further innovation and focus on passenger outcomes, leading to further additional patronage. This will mean that investments made in the short term will more than pay off in the long run, especially when the negative externalities of car dominance (carbon, inequality, air pollution, noise, congestion, fatalities and sedentary lifestyles) are included in the equation.

Whether it's improving the economic productivity of city-regions; reducing reliance on cars in favour of healthier alternatives and better places; addressing the climate crisis and other UN Sustainable Development Goals; or making the most of opportunities brought about by technology to improve the experience of customers, in some respects, the case for long-term investment in *Tomorrow's Public Transport System* has never been better.

Tomorrow's Public Transport System



Information
and ticketing



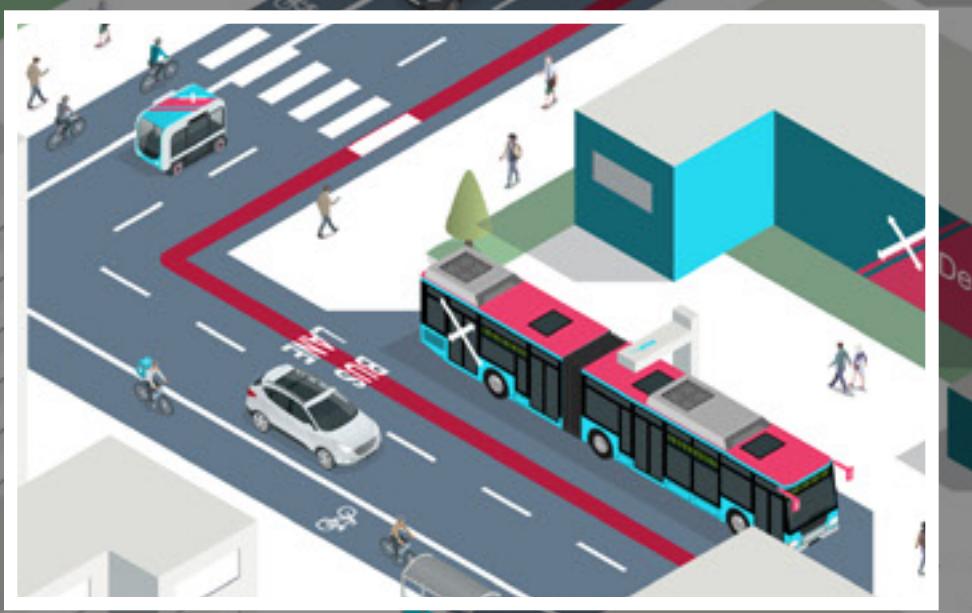
Marketing and
branding



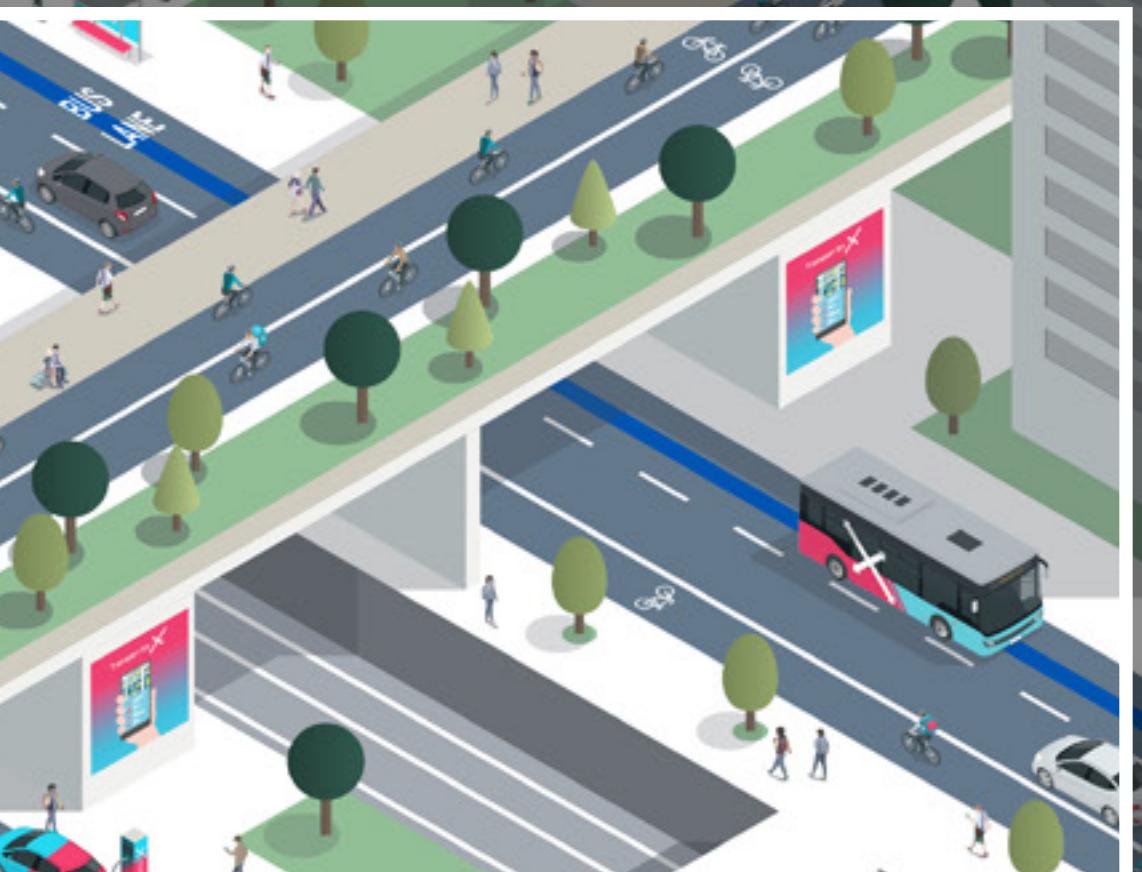
Core public
transport network



Mobility management



Transport modes
and vehicles



Infrastructure

Future of public transport

Core public transport network

Establishing an easy-to-understand network of high-frequency bus services, which complement rail, is key for *Tomorrow's Public Transport System*.

Current regulatory arrangements for public transport, particularly bus services, has created a complex network with large number of individual services, often with different ticketing and liveries, and a non-intuitive numbering system.

This impacts on the ability of passengers (and potential passengers) to understand how to travel on the network. Combined with poor co-ordination and provision for transfer between services, this means that passengers are often limited to destinations on single routes, rather than benefiting from the accessibility of a city-wide network.

In addition, bus services are changed often due to operators needing to amend services and as a result of short-term tenders for subsidised services. This lack of stability impedes the trustworthiness and attractiveness of public transport as a reliable and long-term alternative to private car use.

Core network of services

Bus services in *Tomorrow's Public Transport System* should be arranged as a single, unified network of services, planned by a single guiding mind, as part of a wider public transport network. The following principles could be used to inform the design of core networks:

- **Easy to understand** – A network of high-frequency core routes forming a coherent network shape, rather than over-provision on a few busy corridors. Showing all routes on the same map, with consistent numbering and common branding to improve passenger understanding and make services more accessible and inclusive for those without access to supporting technology.
- **Turn-up-and-go frequencies** – For core routes, with consistent operating hours and evening/weekend services to improve the convenience and flexibility of the network without knowledge of timetables.
- **Transfers** – Improved by well-designed infrastructure, where bus lines coincide. This improves the interchange experience for passengers, and reduces the perceived difficulty of changing service, opening up the range of possible journeys.
- **Direct, fast, reliable services** – Consistent route lines enhanced by bus priority on key corridors, making services more reliable for passengers.

The core network should provide a long-term 'backbone' of reliable and resilient services around which passengers can make plans. Frequencies could be monitored, and dialled up or down to respond to demand changes and short term/seasonal disruption, as opposed to services being fundamentally changed leading to confusion for passengers.



Future of public transport

Core public transport network

Making it happen

The National Bus Strategy ('Bus Back Better') sets out the changes required to improve bus networks in England and provides a framework for delivering required changes using either Enhanced Partnerships or the franchising of bus services.

The strategy paves the way for buses to form a key component of *Tomorrow's Public Transport System* and recognises the need for a network that feels like a network, with easy-to-understand services, comprehensive information at the touch of a phone, and price capping across bus operators, rail and tram.

As such, key actions outlined in the strategy are included in the practical steps, providing a short-term catalyst for transport authorities to deliver the network of services that form the backbone of *Tomorrow's Public Transport System*.

Establish core public transport network by delivering Bus Services Improvement Plan (BSIP), Enhanced Partnership and/or franchising as set out in the National Bus Strategy.

Undertake regular consultation and co-design of the core network, to ensure it meets the needs of passengers, and flexes to support new transit-oriented land uses.

Evolve the core network over time, improving priority infrastructure and considering conversion to fixed public transport modes as patronage increases.



Re-planning services to create a high frequency, cross-town network and a central interchange point makes it easier for passengers to understand the network, and where to transfer between services.

Future of public transport

Transport modes and vehicles

Embracing innovation in vehicle technology and making transport modes look and feel part of the same system helps to enable seamless passenger journeys.

Seamless multi-modal journeys

To persuade users to move away from private vehicles, public transport systems must offer a similar level of freedom as car ownership.

Public transport itself might not be able to offer door-to-door journeys, but when combined with active and micromobility modes it can rival the car, providing multi-modal transport in a seamless journey.

A new understanding of travel as seamless, multi-modal and continuous will replace traditional notions of moving from A to B. Passengers of *Tomorrow's Public Transport System* are likely to be mode-agnostic – choosing whichever mode gets them to their destination via the fastest, most efficient or most direct route, depending on their preference. Successful transport systems will operate as a network of 'civic' transport modes, combining public and private providers.

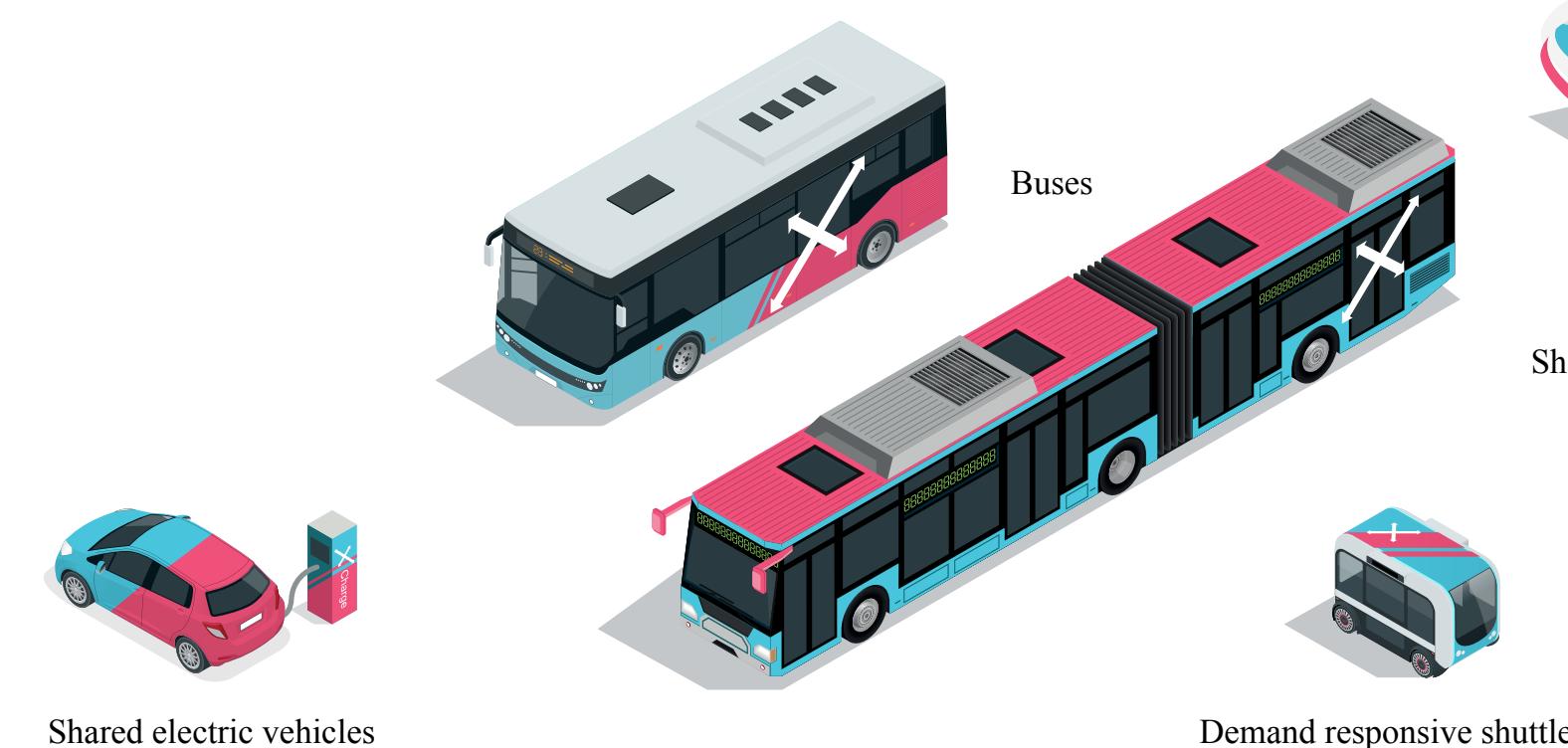
Public transport feeder services

Demand Responsive Transport (DRT) has been implemented in many guises over recent decades as a solution to travel in suburbs and lower density areas not suited to public transport. By removing the cost of a driver, AVs can strengthen the case for DRT. It is important to take advantage of what AVs can offer, but to mitigate against their negative impacts on limited road space and equity constraints. The technology could therefore be put to best use by deploying AVs as demand-responsive or pre-determined feeder routes to the core network, rather than as competing services.

Faster, better, zero-emission vehicles

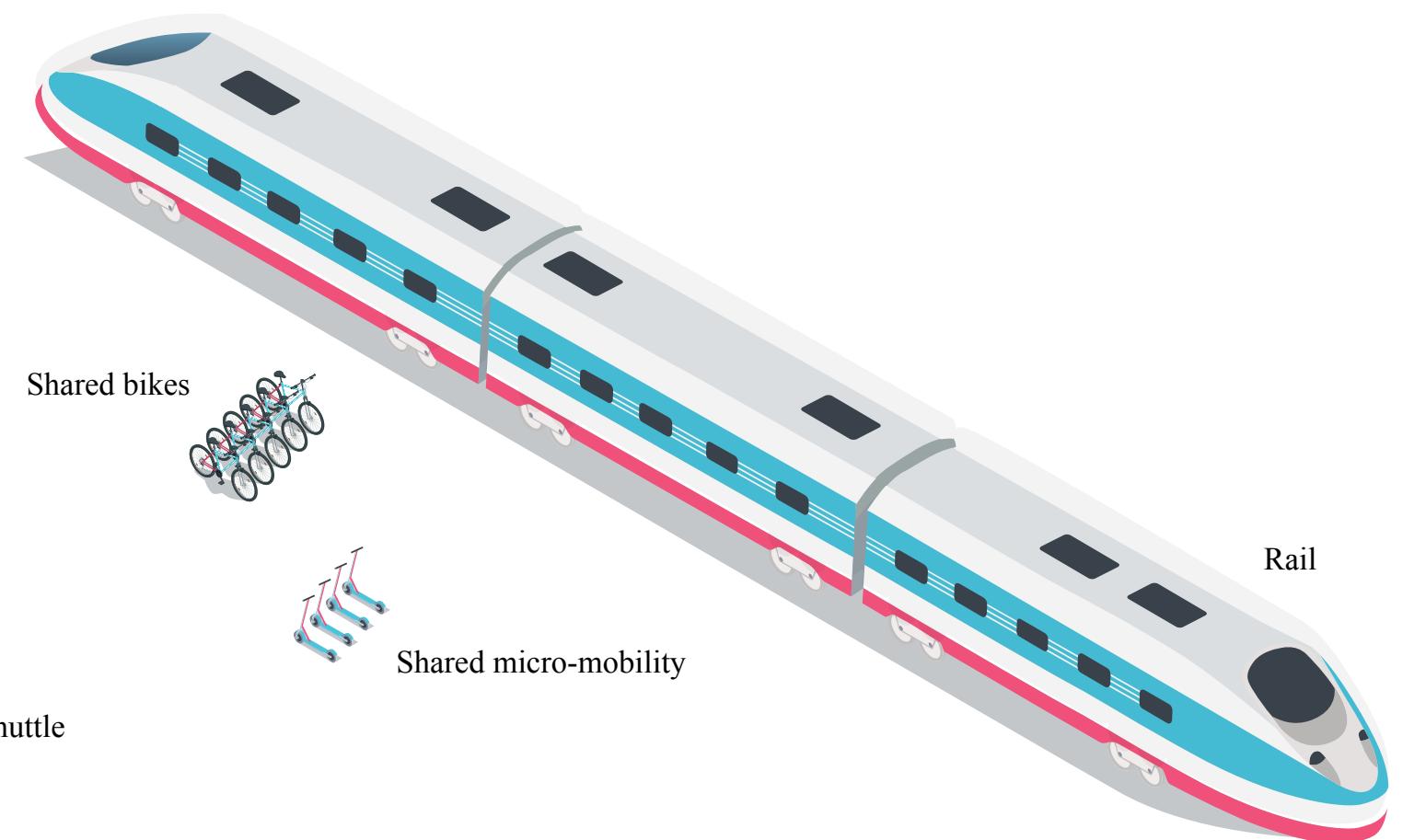
Accelerating investment in the adoption of zero-emission vehicles is necessary to meet net-zero targets and improve local air quality in our towns and cities. Investment in new vehicles should include for shorter dwell times at stops, using multiple doors and automated ticketing to provide a passenger experience on a par with best practice in European cities. Emerging low-emission vehicle technologies (such as those being considered for Coventry Very Light Rail, Cambridge Autonomous Metro, or trackless trams operating in Zhuzhou, China) should be considered, with more space on board for personally owned bikes, and micro-mobility to improve the quality of public transport and integration of transport modes from the passenger perspective.

Any plan has to work in conjunction with the supply chain, to ensure the demands of the market and the skills and capabilities of manufacturers are aligned, to enable manufacturers to invest and scale up in the way that is required.



Case Study: Bad Birnbach

Bad Birnbach Germany Ioki (Deutsche Bahn subsidiary for innovative mobility) driverless shuttle buses connect the train station with the town centre, around two kilometres away²².



Future of public transport

Transport modes and vehicles

Flexible, data-enabled micro-mobility

Effective use of data can help to better manage transport options in real-time and improve the efficiency of transport networks. Modular technology such as replaceable batteries can also improve resilience and efficiency of micro-mobility services.

Making it happen

Co-ordinate information, ticketing and branding across all vehicle modes, including micro-mobility for first/last mile, as part of a holistic offering to passengers.

Low emission vehicles: Work with the supply chain to develop a route map for decarbonising the UK public transport fleet by 2030, embracing innovation to improve the quality of journeys for passengers.

Establish mobility hubs to bring transport modes together, and provide hubs for feeder services and interchange between transport modes.



Public transport services with off-board ticketing, multiple door boarding/alighting, and fewer stops than conventional bus services can improve predictability and reliability of the core network, making services more attractive for passengers.

Future of public transport

Infrastructure

Transport infrastructure should make it safe, convenient and desirable to switch from car trips, allowing urban streets to be repurposed.

Decisions around infrastructure investment in the coming years must influence positive changes to movement patterns, creating liveable neighbourhoods and embedding active mobility and public transport. A targeted reduction in private car trips and ownership will improve local air quality and, act as a catalyst for tackling climate change.

Faster, reliable, joined-up services

Improving reliability is crucial to the operation and attractiveness of public transportation services and arresting the spiral of decline for buses. Bus priority should be established on all core corridors enabling faster, more reliable journeys. High-quality roadside infrastructure at bus stops and mobility hubs, as well as a public realm that supports and encourages active transport is also required to build consumer trust in public transport as a viable and attractive alternative to car use.

Transfers between services can be improved by well designed infrastructure where lines coincide. This improves the interchange experience for passengers, and reduces the perceived difficulty of changing service.

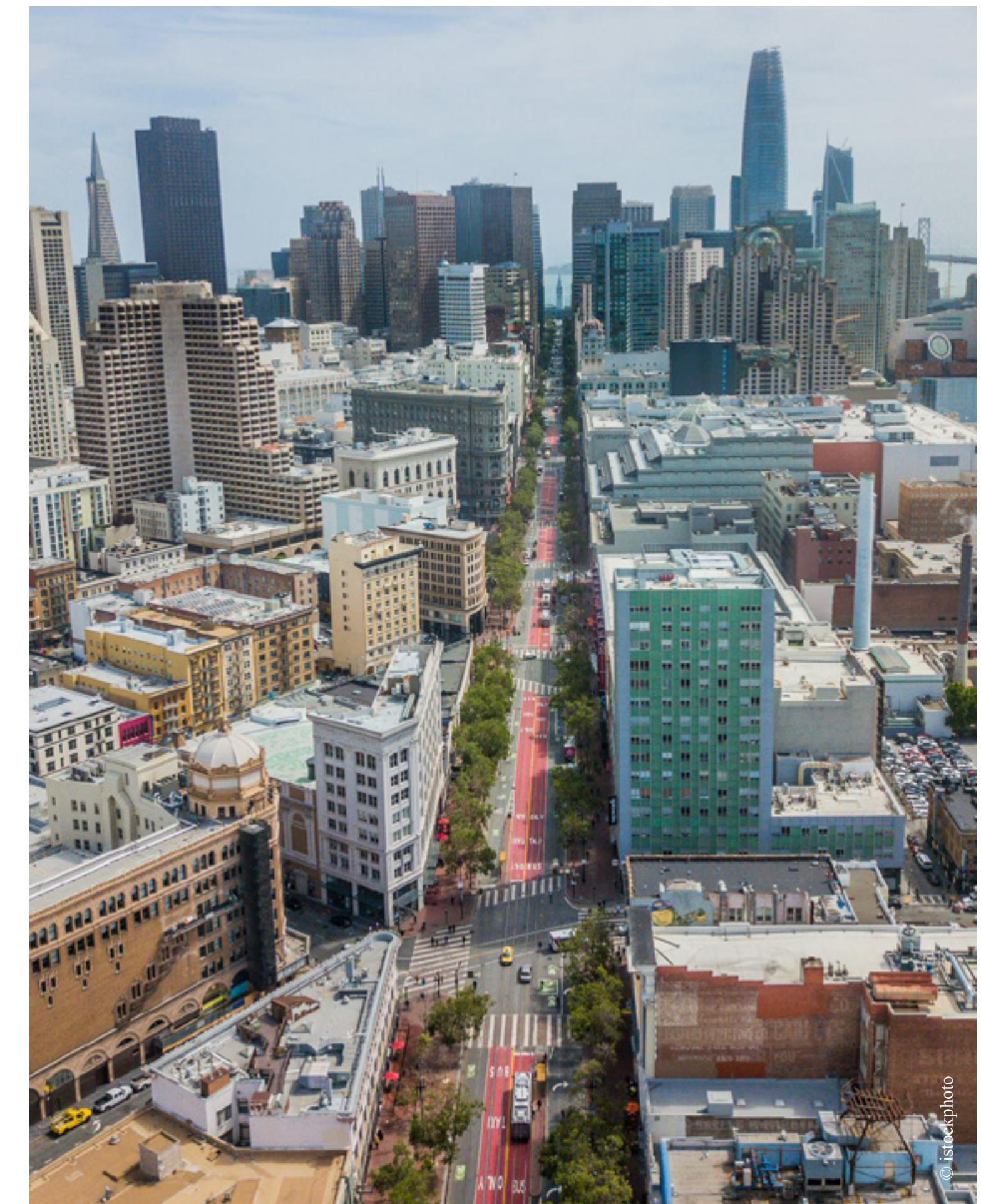
Supporting liveable neighbourhoods

The COVID-19 pandemic has brought about an appetite for more liveable, people-oriented neighbourhoods. The 15-minute neighbourhood concept could be utilised by establishing mobility hubs at the heart of low car neighbourhoods. As well as provision for first and last mile connections to public transport and encouraging multi-modal trips, such facilities are increasingly becoming much more than just transport nodes. Efficient use of space around public transport nodes enables users to connect and engage with local facilities which contribute to making vibrant, high quality city neighbourhoods that attract a diverse range of people.

Core public transport infrastructure should be supported by transformational urban public realm projects that encourage safe, low speed use and reflect the place function of urban streets. Such projects should capitalise on mode shift to more sustainable modes, by re-allocating road space from cars, creating a positive feedback loop and reflecting the modal hierarchy necessary to decarbonise.

Adaptive reuse

Strategies to tactically make best use of existing infrastructure, such as the retrofitting of multi-storey car parks or installation of parklets to create resilient green spaces and deliver electric charging infrastructure for example will become increasingly important in future, as will designing flexibility and adaptability into new infrastructure, given the increasing rate of technological change. Mobility hubs, docking stations and charging infrastructure should be designed to be universally used by multiple operators rather than proprietary solutions.



Future of public transport

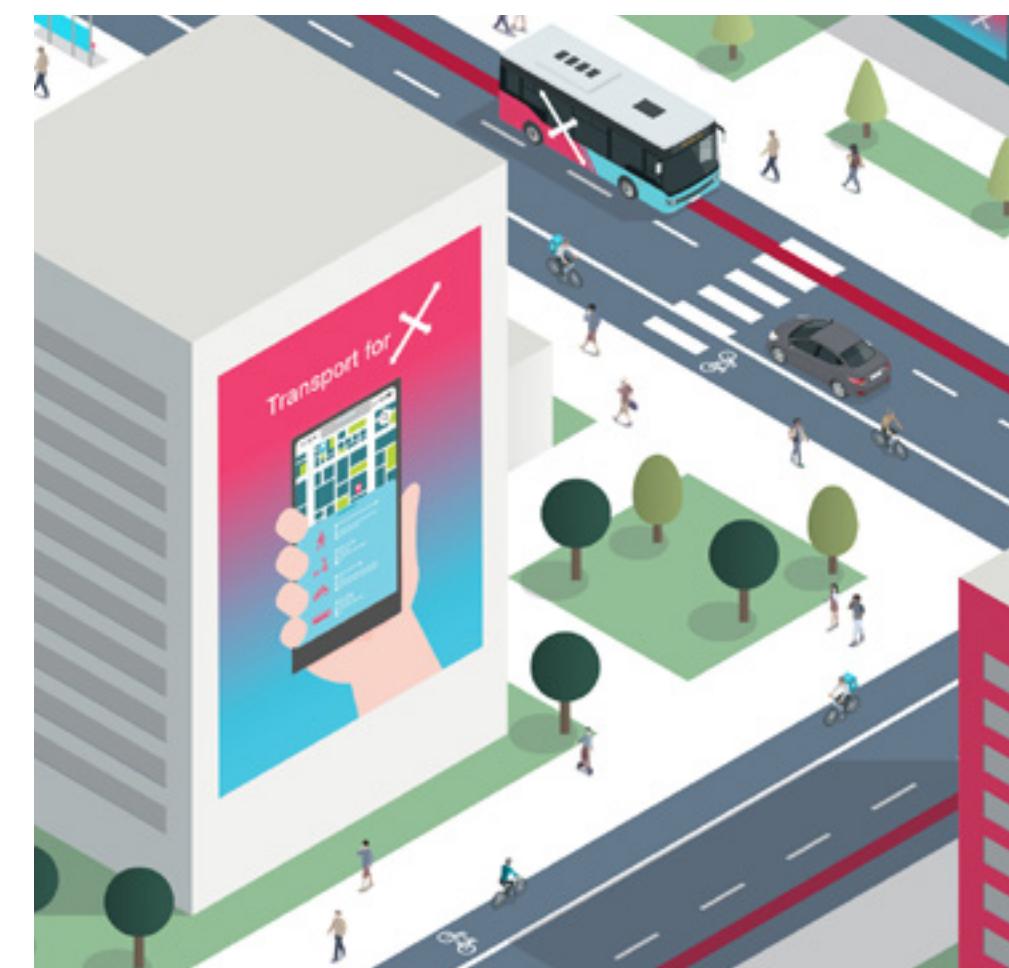
Infrastructure

'Deep Integration' of mobility and community facilities can create seamless daily journeys:



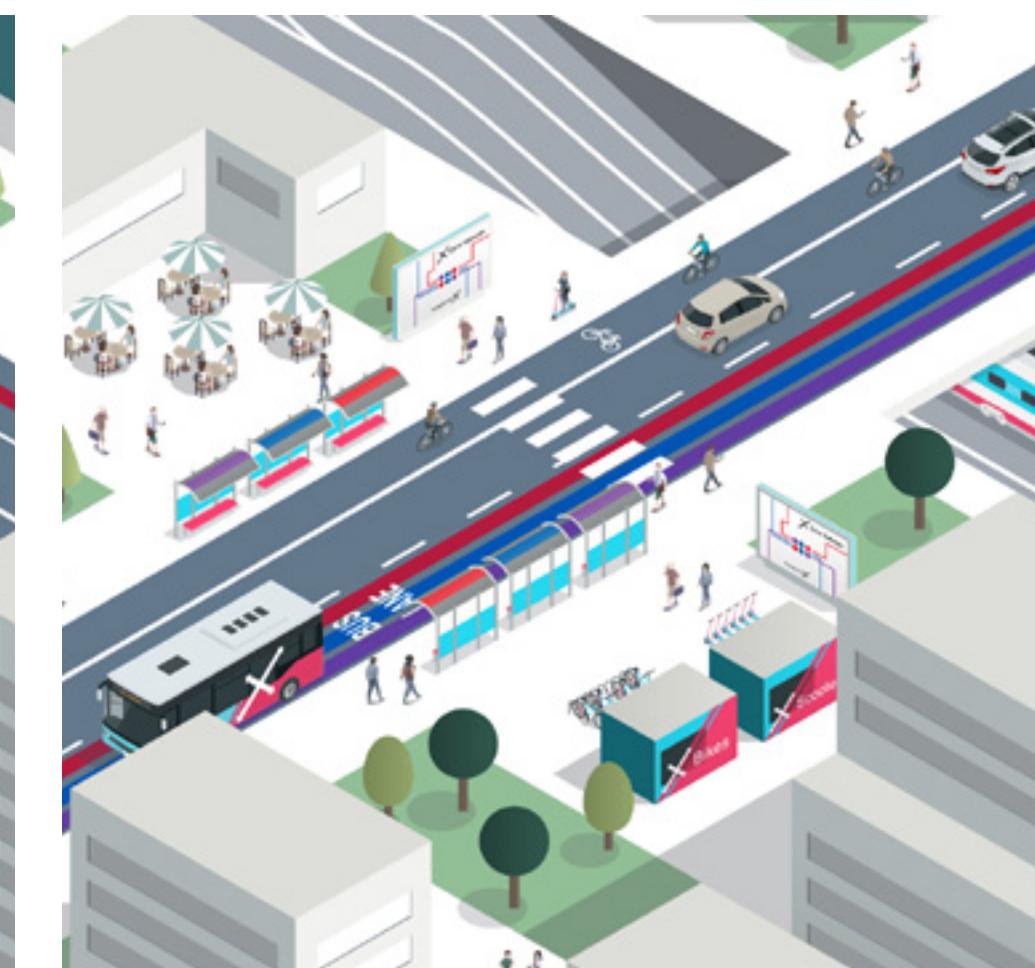
Mobility hubs

Establishing mobility hubs at the heart of communities to improve movement choices and interchange between transport modes.



MaaS app

Integration of journey planning, real-time information and ticketing via Mobility as a Service application.



Living interchange

Improving the mobility experience by connecting seamlessly with neighbourhood services and facilities.

Making it happen

Improve consumer trust in public transport by re-allocating road space to deliver priority for public transport and active mobility that enables faster, more attractive journeys and improves reliability.

Improve the ability to transfer between services by designing interchange infrastructure where lines coincide, opening up the range of potential journeys.

Develop urban realm transformation projects around mobility hubs to embed active mobility for first and last mile trips, and place multi-modal connectivity at the heart of 15-minute neighbourhoods.

Future of public transport

Information and ticketing

Emerging technology can provide a better passenger experience, competing with the convenience of private car ownership and saving users time, money, and mental energy.

Fragmented governance of public transport in the UK leaves passengers with the choice of various ticket options, each of which have different fares and are compatible with different services or at times of the week. Whilst the Oyster card paved the way for an integrated ticketing service in London, and since expanded to use contactless bank payments, this is a unique case in the UK.

As operator of all underground rail and franchised bus services, TfL does not have the same barriers to implementing multi-modal ticketing products as other city regions. While some joint ticketing arrangements are in place – where operators have been able to agree on an equitable division of revenue – there is room for improvement, including the need to add daily fare caps.

Systematic approach to information and payment integration

Continued devolution and emerging legislation means that city regions are becoming well placed to drive payment integration across the mobility ecosystem. It is vital that transport authorities take steps to ensure that new mobility services can be integrated with public transport ticketing and that travellers can access information required to make seamless journeys across all modes.

Approaching this systematically, cities should start with a multi-modal offering for public transport services at the core and build outwards by adding payment integration for shared mobility and other transport modes, determined by local needs and objectives. By identifying affordable fares and contractual or policy requirements for shared mobility services, transport authorities can become the go-to source for mobility information and payment transactions, growing overall revenue by providing an attractive alternative to car ownership.

Should public sector lead on MaaS?

Smartphone penetration and the use of real-time data will further improve the experience of passengers of *Tomorrow's Public Transport System*. MaaS describes the integration of information and ticketing across multiple modes of travel into a mobility ecosystem delivered via a single, digital customer interface.

Conclusions from the iMOVE MaaS trial in Sydney²⁵ suggest that users see little value in MaaS without the (monetary) incentive of price capping or bundled services in a subscription model. Hence it is at Level 3 that MaaS products become scalable, and reduce car usage. This adds weight to the argument that the public sector should take a lead on MaaS development, at least initially, to manage ongoing public transport subsidy and explore funding mechanisms for MaaS such as via road user charging.

Gamification of behaviours around environmental impact or individual health could provide a further incentive, such as Glasgow's 'Better Points' initiative where users earn reward points for using green transport modes, which can be spent in local stores²⁶.

MaaS Topology, Adapted from ^{23,24}

Effective implementation of MaaS provides a better passenger experience, competing with the convenience of private car ownership by saving users time, money, and mental energy.

Level 4: Incentives Planning + payment + fares + incentives

- 4 The final step of MaaS would involve a subscription service which also provides messages and incentives to promote smart and sustainable transport choices.

Level 3: Subscription Journey planning + payment + capped fares of subscription



Level 2: Payment Journey planning + payment



Level 1: Journey planning Multi-modal route and price information



Level 0: Individual Mobility Services and Data

- 0 This step underpins all further progression. Data about the network is required for MaaS apps, and data collected can be fed back to improve the system.

Less thinking required

Reducing Cognitive User Effort

More thinking required

Future of public transport

Information and ticketing

Making it happen

Develop tap-on/tap-off account-based integrated ticketing system with capped fares for core urban public transport services to enable passengers to use the network as a single, unified network.

Develop trials of Mobility as a Service technology, adding shared mobility payment, journey planning information and bundled services via subscription model to integrated ticketing offering.

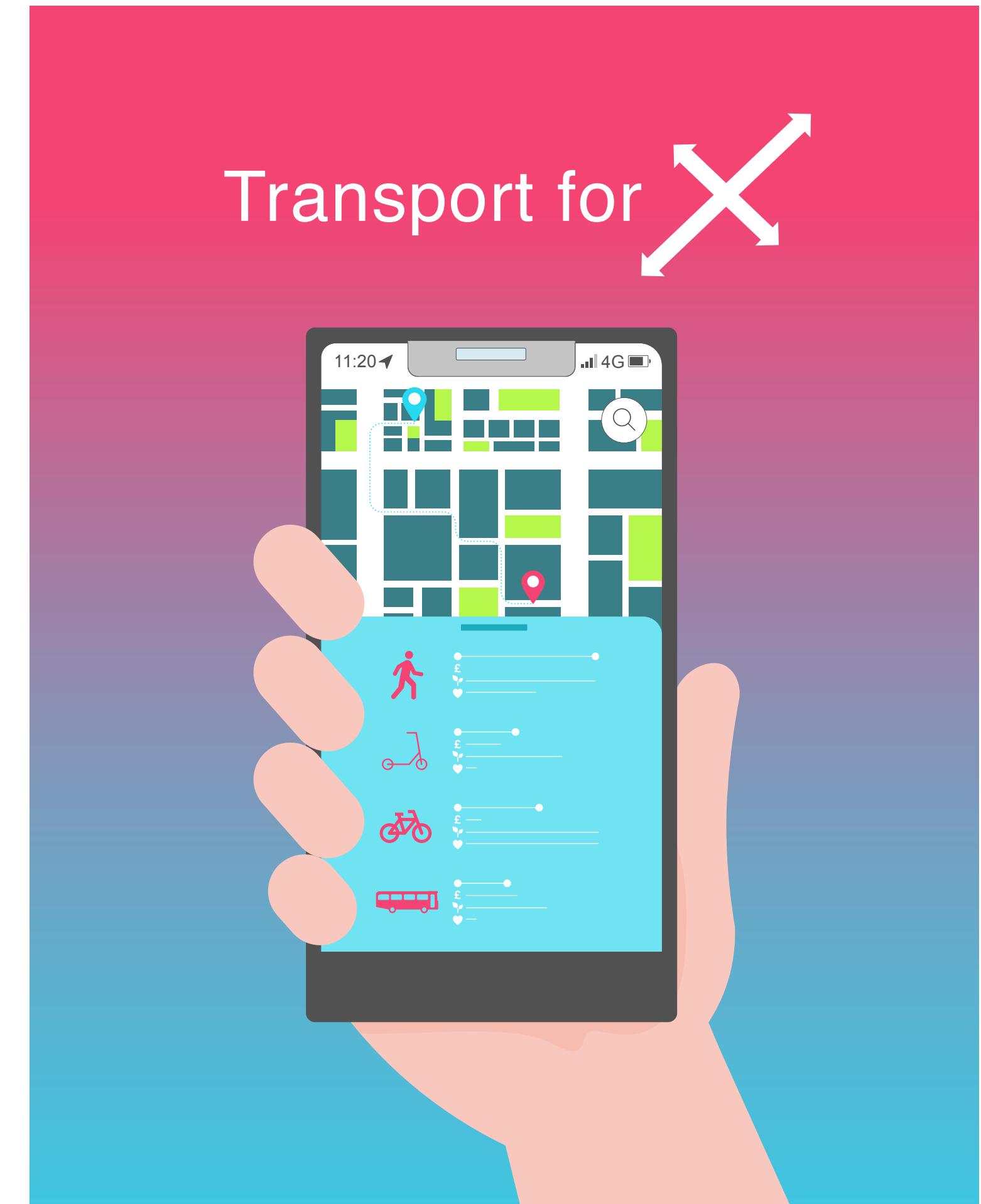
Explore potential to incentivise use of *Tomorrow's Public Transport System* by providing incentives such as additional subsidy from alternative sources such as Road User Charging.

Who leads the evolution of mobility systems?

There is a question whether the evolution of our mobility systems should be led by the market or by policy and regulation. Cities must manage this balance to enable change, at the same time as influencing operators within their region. There are many related issues, including how to regulate without restricting innovation and competition, how to prevent a regulatory framework that protects vested interests rather than the user, and the role of taxation in directing innovation and its uptake. The role of the city will be to maximise opportunities to improve outcomes and align with priorities, while guarding against unintended consequences.

Each transport authority must consider its aims, organisational capability, local policies and aspirations in more detail before defining its role in the MaaS ecosystem. Some potential broad governance arrangements for integrating new mobility and public transport within a MaaS framework are outlined. Clearly, future governance arrangements will be dictated by government regulation and market conditions.

MaaS could result in a significant expansion of the role of transport authorities in the UK, who are likely to be best placed to ensure that public transport forms the high-capacity backbone of MaaS. This will be necessary to ensure most trips can be made efficiently, and a base level of accessibility can be offered to all users, while other modes might serve less populated areas and more complex passenger needs.



Future of public transport

Information and ticketing

Public control can steer towards societal good

Private actors in MaaS might have conflicting goals. For instance, aiming to maximise revenue by selling as many and as expensive trips as possible. Public control is therefore needed to steer the development towards societal good and put in place incentives and mechanisms to balance the most beneficial transport modes that deliver public good.

Public funding may also be needed to catalyse the development and diffusion of sustainable MaaS business models. Transport authorities could also have an important role in governing fair allocation revenue. Equally, protocols around data security and sharing need to be governed effectively to ensure trust in the system and good outcomes for users. These are complex questions requiring careful consideration and consultation.

However, it is not strictly necessary that transport authorities internally adopt the new roles, as the public sector could also lead MaaS developments by procuring development and operation of MaaS integrator and MaaS operator services from private actors (i.e. according to the current division of roles as purchaser and service providers). Furthermore, the public sector could also set up new MaaS organisations, over which they have direct or indirect control.



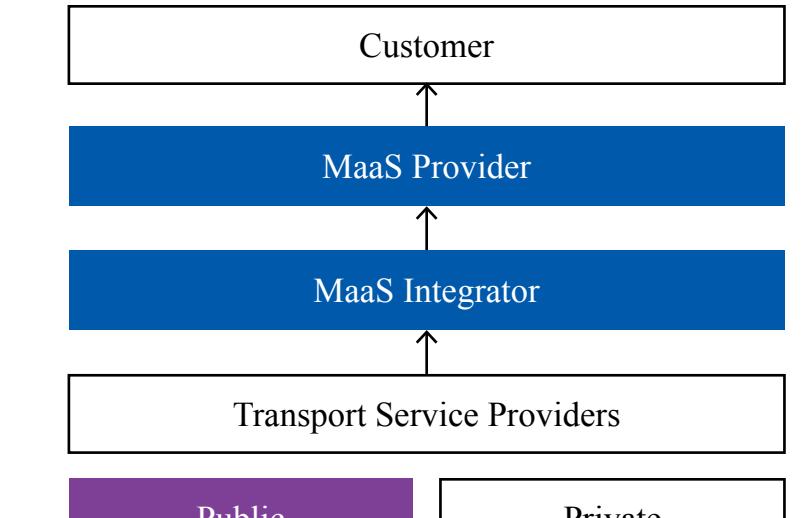
As the world of transport and mobility evolves, government must be cognisant of their role to protect public value, while ensuring they can efficiently support progress and innovation.
[Read More: MaaS Governance and Orchestration.](#)

MaaS Governance Models

Two potential new roles are expected to emerge to enable service types and provision of multi-modal MaaS: MaaS integrators that assemble the offerings (data) of several transport providers, and MaaS providers that package and deliver these offerings (MaaS) to end-users. The scenarios below explore three models for governance of MaaS²⁷.



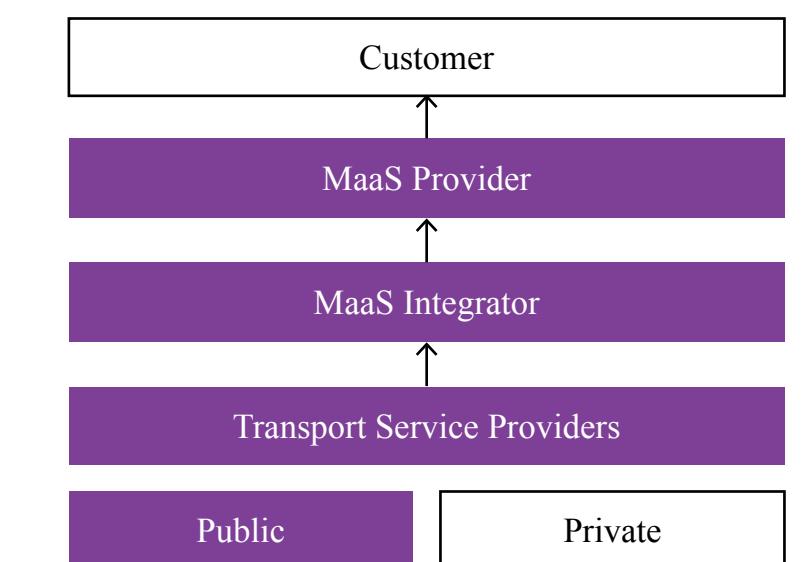
Scenario 1: Market-Led MaaS



Examples:

- UbiGo, Sweden
- Whim/MaaS Global, Finland & Birmingham
- Citymapper, London

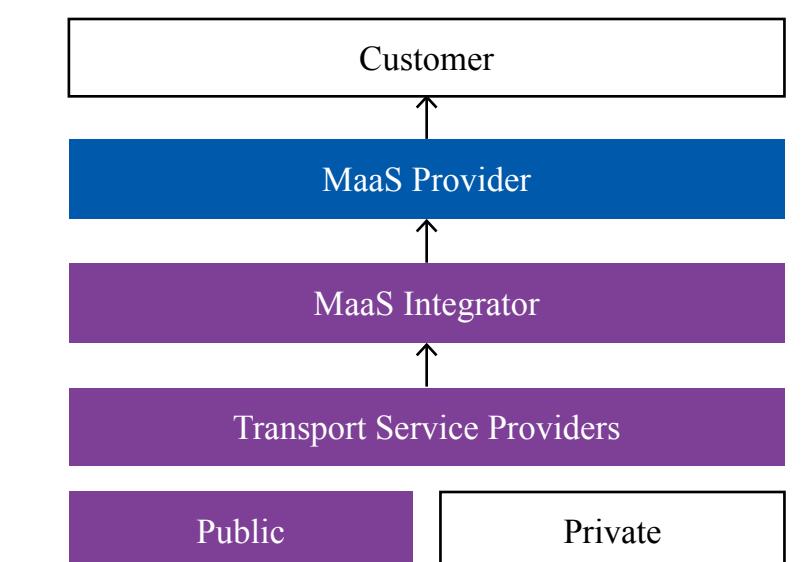
Scenario 2: Public MaaS



Examples:

- Jelbi, Berlin

Scenario 1: Market-Led MaaS



Examples:

- Île-de-France Mobilités, Paris

Private Sector Role

Government Role

Future of public transport

Marketing and branding

Building a consistent brand around trust, efficiency, safety and low-carbon mobility is key to attracting and retaining public transport passengers

The current fragmented, confusing system

The current multitude of brands operating across a fragmented public transport system causes confusion for passengers, and undermines trust in combining multiple modes of public and shared transport. For core public transport services, response to the gradual ending of lockdowns has been a message of ‘Back on the Bus’ or similar, to reverse the Government’s message of avoiding public transport.

However, this does not constitute building back better. Consideration of a step change in passenger experience across all components of the public transport system, and building a unified system that passengers can trust, is required to have a marked impact on the mode shift required to address the climate emergency.

Creating a clearly branded, complete transport system

A comprehensive approach is required in which the various components of *Tomorrow’s Public Transport System* are branded and managed consistently. This requires a guiding mind to link values and service delivery to customer needs and then relate this to customers through clear and consistent imagery and communication through naming, design, advertising and promotions with the marketplace.

Successful branding is not based solely on communication measures. It defines the company in the mind of the customer and be experienced it in every personal contact and carried across all components of the

system – corporate identity, design of vehicles, communication with staff, mobile applications, tickets, uniforms etc. Over a long period of time, access to a reliable service which is effectively branded builds trust in the mind of the customer, and a promise of seamless access across the mobility ecosystem for all users.

Developing direct customer relations

Mobile applications can strengthen the brand and add further trust amongst passengers as a platform for two-way communication. Users of *Tomorrow’s Public Transport System* could be asked to rate their journeys on a regular or ad-hoc basis, with data and insights being used to improve the customer experience. A direct relationship with customers through an app, or via marketing emails allows the ability to create tailored promotions, offers and information about new services.

Billions of pounds are spent by the car industry each year, portraying a message of strength, freedom and individual choice. When new models of cars are released, the brand is recognisable, building trust in the eyes of potential customers. The public transport system has different strengths to convey: efficiency, safety, inclusivity, and low-carbon mobility. The public transport sector can also tap into new audiences. There is a sustained decline in car use among young adults²⁸, and this generation are responsive to brands they trust. Bus and rail travel have strong financial and environmental incentives that are often not well communicated. Again, a long-term view is required. Sustained investment in marketing and branding to attract and retain customers over several years means that less subsidy will be required in future.



Future of public transport

Marketing and branding

Case Study: Transport for Wales

As a new organisation, TfW is investing in a long-term strategy to create an iconic, consistent, recognisable brand for its multi-modal transport network of which the people of Wales can be proud. The brand is linked closely to the organisation's mission, values, and communication strategy, recognising that the TfW brand reflects the decisions the organisation makes and the service that is delivered for customers. The brand is built through good design and consistent application across all areas of activity to ensure clarity and consistency for services and communications to avoid any unnecessary confusion^{29,30}.

Making it happen

Develop a consistent regional brand for all public transport services and focus on long-term brand value creation and building trust of passengers.

Develop two-way communication through mobile application and use data insights to improve the customer experience, create tailored offers and information about new services.

Invest in a long-term marketing strategy around the relative strengths of public transport to attract and retain customers and reduce future subsidy requirements.



“Sustained investment in marketing and branding to attract and retain customers over several years means that less subsidy will be required in future.”

Future of public transport

Mobility management

The public sector's role should evolve to manage *Tomorrow's Public Transport System*, maximising the value to customers and delivering sustainability goals.

Given the fundamental changes occurring within transport since the COVID-19 pandemic, the role of digitally enabled public and shared transport in reducing car dependency and delivering net-zero aspirations, evolution of transport governance is inevitable.

A guiding mind is required to ensure that emerging shared mobility services complement core public transport services, providing a better overall offer to passengers, whilst also serving social goals such as equity and sustainability. It is envisaged that 'Mobility Management' can be achieved by undertaking the broad activities outlined.

Establish a long-term vision

Transport authorities should establish and communicate a transformative and inspiring long-term vision for public transport that is centred on the customer, and addresses sustainability goals. The vision should encompass strengthening core public transport services, new mobility services, and reduced dominance of private cars.

The diversity of cities and regions makes it unlikely that a single vision is universally applicable. Buy-in from the people who will be using the network is imperative. Key to this will be listening to groups who don't currently travel by public transport to understand the barriers which prevent them from doing so.

The vision should be supported by measurable impact targets and be aligned with plans from non-transport policy sectors such as land-use, regional growth, and public health.

Shape new mobility around the vision

The vision should form the basis of overseeing all public transport operations and future plans to ensure that the mobility system works as a unified network. Cities should influence, rather than be influenced by new mobility. Operators should be seen as guests in cities and need to buy in to the vision and associated sustainability agenda and be directed by the city – where they can park/dock/charge, if there are communities which need to be served, whether it is affordable for disadvantaged groups and whether it complements existing public transport provision.

For their part, cities, regional and local transport authorities should facilitate the availability of new mobility by providing physical infrastructure (e.g. mobility hubs) and information platforms and applications that consumers can turn to for trip planning, comparison of the duration and cost of alternatives, arranging for services, and convenient means of payment.



Future of public transport

Mobility management

Establish long term funding, organisational capacity and innovation

Tomorrow's Public Transport System will continue to require significant levels of (cross) subsidy unless scalability can deliver enough customers to obtain a profit margin. To ensure a sustainable range of mobility options, successful cities will develop new income models and revenue streams that discourage private car usage and move a large percentage of that demand towards lower impact travel modes, such as road user charging or re-allocation of roadspace. Effective mobility management will require a broadening of organisational capability and skills somewhat beyond today's capabilities in transportation governance, especially after years of austerity and deregulation.

Successful cities will pursue open data policies to encourage innovation, enable real-time information, unlock new services and create more efficient infrastructure – ultimately for the benefit of transport users.

Innovative policies could be developed to widen use of the system, through corporate partnerships to replace company cars, mode-agnostic mobility contracts or mobility credits for low income households and jobseekers.

Enhancing devolution will be critical for enabling effective mobility management. With their own budgets and responsibilities, city authorities will have more freedom to determine who operates in their cities and under what terms.

Making it happen

Establish and communicate a transformative and inspiring long-term vision for public transport that is centred on the customer, and addresses sustainability goals.

Shape new mobility around the vision, and influence, rather than be influenced by new mobility.

Establish long term funding, organisational capacity and innovation required for effective mobility management.



Future of public transport

Mobility management

Case Study: Jelbi MaaS Platform, Berlin

Jelbi is a Mobility as a Service (MaaS) platform developed and currently being trialled by the state owned Berlin public transport company (Berliner Verkehrsbetriebe, BVG), which manages the city's U-Bahn underground railway, tram and bus networks. The name is a play on the German word for 'yellow' – the colour of BVG's livery.

The vision for connecting the whole shared mobility offer in Berlin into a single marketplace sits at the heart of BVG's smart mobility strategy #Berlinsteigtum, aimed at providing an attractive alternative to private car usage. Jelbi was set up in Spring 2019 as an arms-length start-up type research & development (R&D) organisation, outside of the constraints of BVG management processes. The organisational structure gives Jelbi the agility to deliver the project at speed, and focus on customer experience.

The platform is powered by Trafi, a private company which provides MaaS software for cities, and integrates all public transport and shared mobility options into an app for Berliners to find, plan, book, and pay for all their trips. It covers all rider's needs including journey planning, real-time information, vehicle location & availability, payment and multi-modal comparison of journey time and cost.



The trial is being used to test customer response, explore potential business models and consider platform and data arrangements. The project is supported by private operators of shared mobility, with each partner covering their own costs. Users register once with a unified payment method, with the app generating separate invoices for each service provider. As Jelbi is primarily an R&D exercise in scaling the technology, no commission is taken from mobility providers.

The platform is the largest mobility platform for public and shared transport integrating around 30,000 vehicles across seven modes of transport. On average (pre-COVID), customers booked 2.3 rides per week.

Transport Mode	No.Vehicles	Partner Service Providers
Buses and trains	4,000	VBB Bus, Tram, U-Bahn and Ferry Services
Rental bikes	4,850	Nextbike
E-scooters	10,200	Tier, Voi
Carsharing vehicles	2,100	Miles
Taxis	6,500	Taxi Berlin
E-mopeds	2,100	Emmy, Tier
Ridesharing shuttles	40	BVG BerlKönig Demand Responsive Transport



Future of public transport

Mobility management

BVG are planning to further develop the offering by making mobility subscriptions available to companies and residents of residential districts with the aim of replacing company cars and private car ownership with public transport and shared mobility bundles.

The public-led governance arrangements behind Jelbi means access to public transport services have been included from the outset. BVG are able to draw on experience of providing integrated public transport, a large customer base and strong brand to build trust with private sector stakeholders. Crucially, this allows BVG to own the anonymised data derived from Jelbi users, and keep a direct relationship with the customer as opposed this data being owned by third party software providers through alternative MaaS governance arrangements, which could impact future public transport revenue streams. Close collaboration with Trafi has made use of a mature technology stack, allowing Jelbi to be launched within six months.

Incorporating public transport as the backbone of MaaS is more difficult under alternative governance arrangements, such as private-led MaaS models typical in Sweden and Finland, which have involved complex commercial negotiations with public transport operators. The Jelbi case study provides a good framework for integrating new forms of shared mobility with PT, which could be considered as part of evolving to *Tomorrow's Public Transport System*^{31,32,33}.



Jelbi Mobility Hub, Waterkant Low Car District, Berlin

Bus, train and shared mobility services such as car sharing, bike sharing or scooters are co-located and seamlessly linked via the Jelbi app³⁴.

In summary

A unified, efficient public transport system to drive major social, environmental and economic benefits.

As we embark on Building Back Better from the COVID-19 pandemic urgent action is needed to address a lack of progress in reducing transport emission and head towards net-zero – presenting a unique opportunity for urban mobility to deliver true long-term social, environmental and economic benefits.

Public transport has a major role to play, but it must evolve from existing systems where operators act in isolation and make little or no positive impact in influencing a behaviour shift away from use of the private car.

By developing a truly integrated transport network which addresses the current climate emergency, is attractive to passengers, responsive to changing technology, and meets local policy objectives, the behaviour shift can be made.

The key is to develop a safe, inclusive, affordable, convenient, low-carbon public transport system which, in combination with active mobility, genuinely provides a competitive alternative to car use for local journeys.

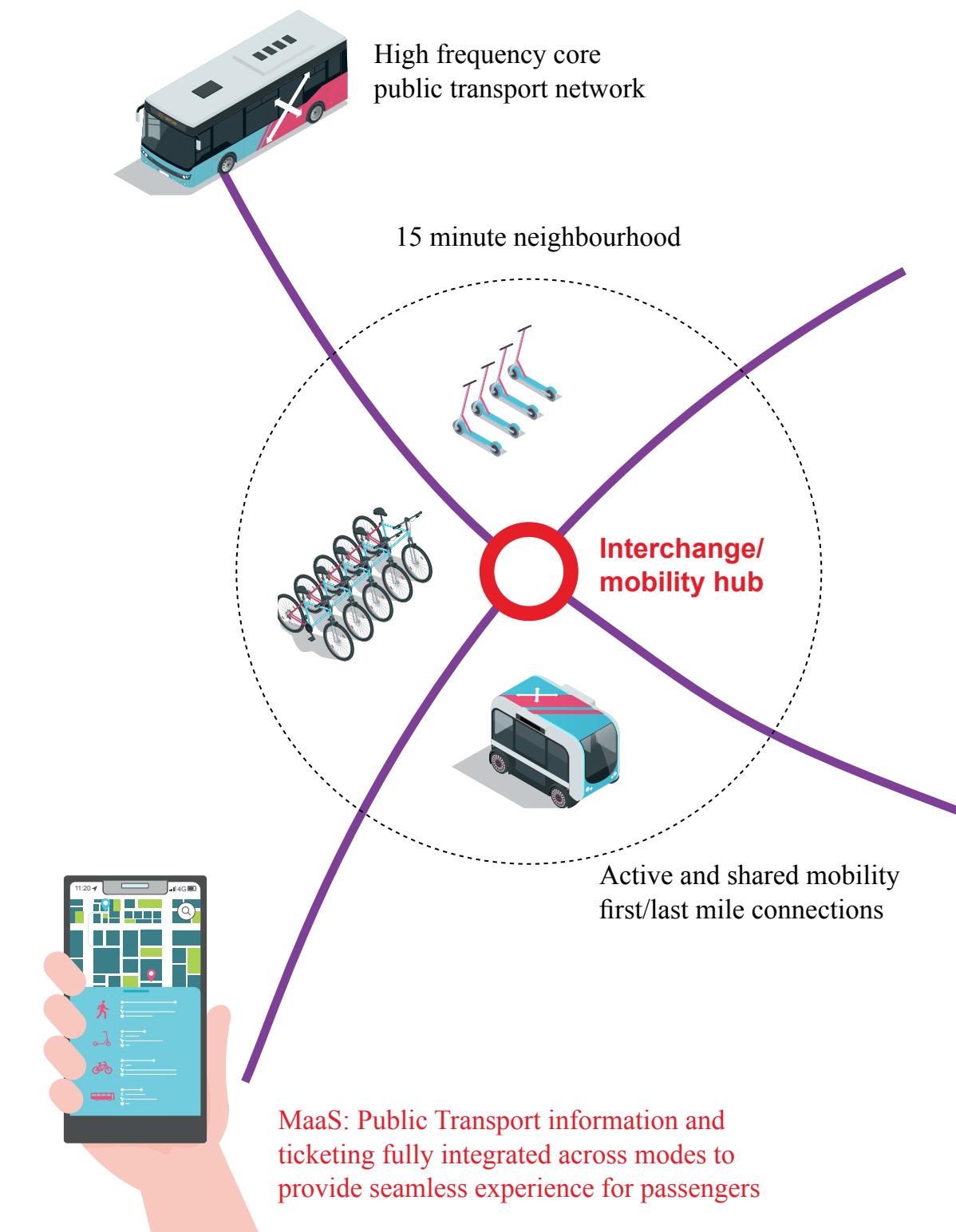
Making a positive impact on UK's environment, people and communities

The initial stages must be driven by the public sector, establishing incentives and mechanisms to ensure the most beneficial transport modes that deliver public good are focussed upon. Congestion can be cut and journey times improved, reducing the scale of new road building, with land in towns and cities, repurposed for urban realm improvements and places for people.

A unified core network of high frequency, low-emission vehicles on dedicated infrastructure should form the backbone of any future integrated network, supported with shared mobility services and a digital approach to allow customers to seamlessly plan, pay for and access information via their smartphones as they travel on all forms of public transport.

The potential for an effective, multi-modal, integrated public transport system goes beyond getting people from A to B. Our vision is of a system that makes a meaningful contribution to eight of the UN's Sustainable Development Goals, positively impacting the UK's environment, people and communities.

Building on our discussions with transport authorities from across the UK, and by considering best practice through the lens of various system components, we have set out practical steps that can be taken to prepare pro-active regulation and policy interventions. This can develop infrastructure to support the delivery of *Tomorrow's Public Transport System*.



Making it happen

Core PT Network

- Establish Core Public Transport Network by delivering Bus Services Improvement Plan (BSIP), Enhanced Partnership and/or Franchising as set out in the National Bus Strategy.
- Undertake regular consultation and co-design of the core network, to ensure it meets the needs of passengers, and flexes to support new transit oriented land uses.
- Evolve the core network over time, improving priority infrastructure and consider conversion to fixed public transport modes as patronage increases.

Modes and Vehicles

- Co-ordinate information, ticketing and branding across all vehicle modes, including micro-mobility for first/last mile, as part of a holistic offering to passengers.
- Low emission vehicles: Work with the supply chain to develop a route map for decarbonising the UK public transport fleet by 2030, embracing innovation to improve the quality of journeys for passengers.
- Establish mobility hubs to bring transport modes together, and provide hubs for feeder services and interchange between transport modes.

Infrastructure

- Improve consumer trust in public transport by re-allocating road space to deliver priority for public transport and active mobility that enables faster, more attractive journeys and improves reliability.
- Improve the ability to transfer between services by designing interchange infrastructure where lines coincide, opening up the range of potential journeys.
- Develop urban realm transformation projects around mobility hubs to embed active mobility for first and last mile trips, and place multi-modal connectivity at the heart of 15-minute neighbourhoods.

Information and Ticketing

- Develop tap-on/tap-off account based integrated ticketing system with capped fares for core urban public transport services to enable passengers to use the network as a single, unified network.
- Develop trials of Mobility as a Service technology, adding shared mobility payment, journey planning information and bundled services via subscription model to integrated ticketing offering.
- Explore potential to incentivise use of *Tomorrow's Public Transport System* by providing incentives such as additional subsidy from alternative sources such as Road User Charging.

Marketing and Branding

- Develop a consistent regional brand for all public transport services and focus on long-term brand value creation and building trust of passengers.
- Develop two-way communication through mobile application and use data insights to improve the customer experience, create tailored offers and information about new services.
- Invest in a long-term marketing strategy around the relative strengths of public transport to attract and retain customers and reduce future subsidy requirements.

Mobility Management

- Establish and communicate a transformative and inspiring long-term vision for public transport that is centred on the customer, and addresses sustainability goals.
- Shape new mobility around the vision, and influence, rather than be influenced by new mobility.
- Establish long term funding, organisational capacity and innovation required for effective mobility management.

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