Ease.
People Powering Payment

The World Needs
Public Transport

Mobility-as-a-Service (MaaS) & MTT:
Future-proofing global cities

let's make
payment
happen

CCV

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Technology is on our side

Since the industrial revolution, cities have been major contributors in promoting innovation, cultural progress, and economic growth. Urban environments bring people together to form more cohesive societal structures, encouraging collaboration and offering greater access to resources.

However, the proximity which once helped cities achieve their economic potential is now being plagued by traffic congestion and inefficient commutes. The constant increase in levels of urban and suburban population, and the popularity of cars, has made cities suffer from the law of diminishing returns.

Some governments and local authorities have been unable to keep pace with the growing demand for mobility, lacking a future-proof plan for sustainable growth. Tackling situations reactively is an indicator that problems are already rooted. As a result, it can be harder to make sweeping improvements.

However, technology is on our side. Mobility is being revolutionised by a combination of four things: vehicle upgrades, infrastructure modernisation, increased personal connectivity, and payment flexibility. In a nutshell, this involves the following improvements:

Vehicle upgrades
Petrol and diesel vehicles are gradually disappearing from our roads, and will be banned from new production lines in various countries over the next one or two decades. Cars are joining the Internet of Things (IoT) and becoming

fully-connected, opening up exciting new features and uses of real-time data. Public transport vehicles are following the same electric-powered and connected path, enabling more efficient operation, better scheduling, and increased reliability.

Infrastructure modernisation

Private and public transport networks are becoming better connected, more secure, and easier to navigate. User experience is at the heart of new initiatives, facilitating easier transfers with clearer information and better user flow. Mobility hubs are being developed. Not only does new infrastructure enable more intuitive travel, but it takes long-term scalability into account better than ever before. Predictive analytics forecast where growth will occur, allowing authorities to plan better for the future.

Increased personal connectivity

Almost 280 million people in Western Europe own a smartphone, and mobile internet connectivity is improving in coverage and speed every year. More and more people are connected 24/7, wherever they are. On average, people also own more connected devices than ever before. As we move deeper into the IoT age, our interactions with connected devices will become ubiquitous and automatic. Put simply, the levels of connectivity are continuing to increase, all around the world.

Payment flexibility

Cash is still highly relevant in many countries around the world, but digital payments are gaining traction in most societies. Open banking will encourage further innovation in the payments space, and open-loop payment systems have become more feasible and prevalent. Furthermore, people are accustomed to subscription-based services. Popular mindset has been changed by the convenience of entertainment services such as Spotify and Netflix, and this opens up opportunities in other industries. In addition, digital technology allows brands to intertwine value-add bonuses and loyalty schemes with payments.

"The OECD predicts that 70 percent of the world's population will live in urban areas by 2050."

What does this mean for mobility?

Technology doesn't make mobility more efficient or effective by itself. It needs smart human application. With such fast-paced technological advancements, it can be difficult to prioritise what will make an impact; where, when, and for how long. Indeed, future-proofing is essential and scalability of infrastructure and technical solutions is key for public and private mobility alike.

The advancements mentioned in the previous sections make it possible to travel in a more integrated and seamless manner. We currently see our A to B in terms of specific modes of transport, but this mindset will change as society moves towards Mobility-as-a-Service (MaaS).

Advanced vehicles will offer efficient transportation, and enhanced infrastructure will support this. Increased connectivity will enable end-to-end booking and real-time journey guidance, and payment flexibility will facilitate subscriptions and ad-hoc, contactless, Mass Transit Transactions (MTT).

Ultimately, global cities must become smart. People will always be on-the-move, so efficient mobility is fundamental to success. Flexibility is key. Retaining this travel flexibility within an efficient and reliable structure is the challenge, but technology can help us navigate these tricky waters.

In this eBook, we will look at cities that are struggling with mobility challenges, and others where super-efficient mobility has succeeded. We will investigate how MaaS and MTT integrate, and how urban transport can avoid common pitfalls as it evolves.

KEY TAKEAWAY

Many large cities face traffic congestion and inefficient commutes. The use of technology can change this, so urban mobility systems becomes future-proof. In particular, mobility is now shaped by vehicle upgrades, infrastructure modernization, increased persona activity and payment flexibility. These advancements lead to the rise of concepts of Mobility-as-a-Service and Mass Transit Transactions.
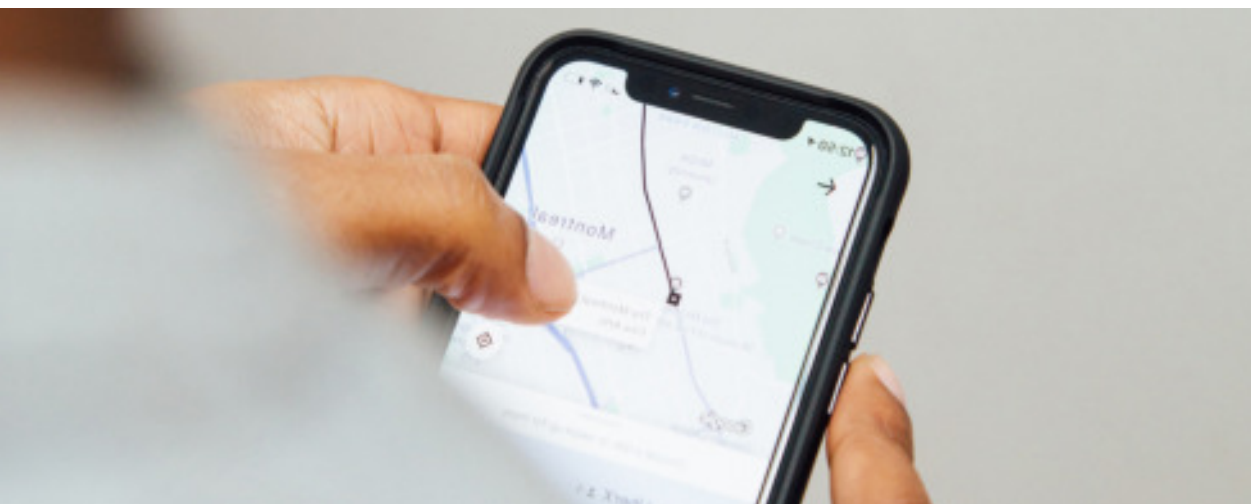
New York:
Struggles and solutions

An exceptionally challenging case is the bustling USA city of New York, which faces potential losses of up to $100 billion over five years, due to congestion and commuter delays.

The city's rail and subway system – which is its mobility backbone - is facing significant delays due to old infrastructure and overcrowding. Likewise, the streets are mainly dedicated to cars and drivers, offering few opportunities for alternatives such as cycling. This is despite the number of daily bicycle trips actually increasing over time. Average bus speeds have reduced, and limited mass transit access in various neighbourhoods has been proven to increase private car usage.

However, it is still a city with 8.6 million inhabitants that relies heavily on its mass transit options. In the Manhattan area, very few residents own a car. Most people walk, take the subway,

or take a bus. Even so, the average travel speed on the street decreased from 9.1 miles per hour in 2010 to 7.2 miles per hour in 2016. The city is facing difficulties with mobility, and has launched a number of initiatives to improve infrastructure and make public transport services more usable.

With New York authorities not delivering significant mobility improvements fast enough, residents take matters into their own hands by finding alternative ways to commute, such as subscription to private car-sharing services. It is now one of the leading cities in the USA for car-sharing.

Furthermore, having recognised the clear mobility issues in New York, ride-hailing services such as Uber have seen massive success. According to Business of Apps, the numbers are huge:

"Uber became the most popular form of private hire transport in terms of rides per day in September 2017. Since then, bar a couple of minor dips, it's been in front – and continuing to pull away. As of August 2018, 436,000 Uber rides took place per day, compared to 275,000 taxi rides, and 122,000 Lyft rides."

Uber went a step further in 2017 by partnering with the MaaS Alliance - highlighting their intent to provide a sustainable alternative to private cars. A quote from Marius Macku, Uber's previous Senior Associate in Public Policy & Government Relations, shows how Uber sees its role in facilitating MaaS:

"We know that Uber is just one part of the solution. Public transportation will always be the backbone of cities — the only way to move thousands of people at a time — and policymakers are rightly also focussed on encouraging active modes of travel. Ridesharing and other mobility services — from bike sharing to car sharing to public transport — must work together to usher in fundamental changes to urban mobility in our cities…

Through research, data-analysis, and mapping, we've already discovered how Uber can serve as an important complement to traditional transit services in many of our cities. For example, in Brussels, London and Paris about 30% of Uber's trips start or end within 200 meters of the tube or metro stations. By picking up where public transportation drops off, Uber is helping give people the benefits of car ownership without the hassle or expense."

In 2018, Uber and Masabi announced that they're joining forces, order for users to purchase public transit tickets from the Uber mobile application. This allows travellers to seamlessly transfer from Uber's ride-sharing services to public transport when multimodal mobility is required.

What we see in New York and other major global cities is a clear appetite for better mobility. When we look at the everyday pain points of modern urban society, getting around is commonly described as stressful, unreliable, unclear, and expensive. With the right approach, this is a winnable battle.

If governments and public authorities don't get involved quickly, private companies will pick up the slack with innovation. Ultimately, consumers are demanding seamless and reliable transport services. It's the job of mobility industry stakeholders to make this happen.

THAT'S A FACT

In New York, the average travel speed on the street decreased from 9.1 miles per hour to 7.2 miles per hour. Besides this, the city faces potential losses of up to $ 100 billion over five years due to congestion and commuter delays.
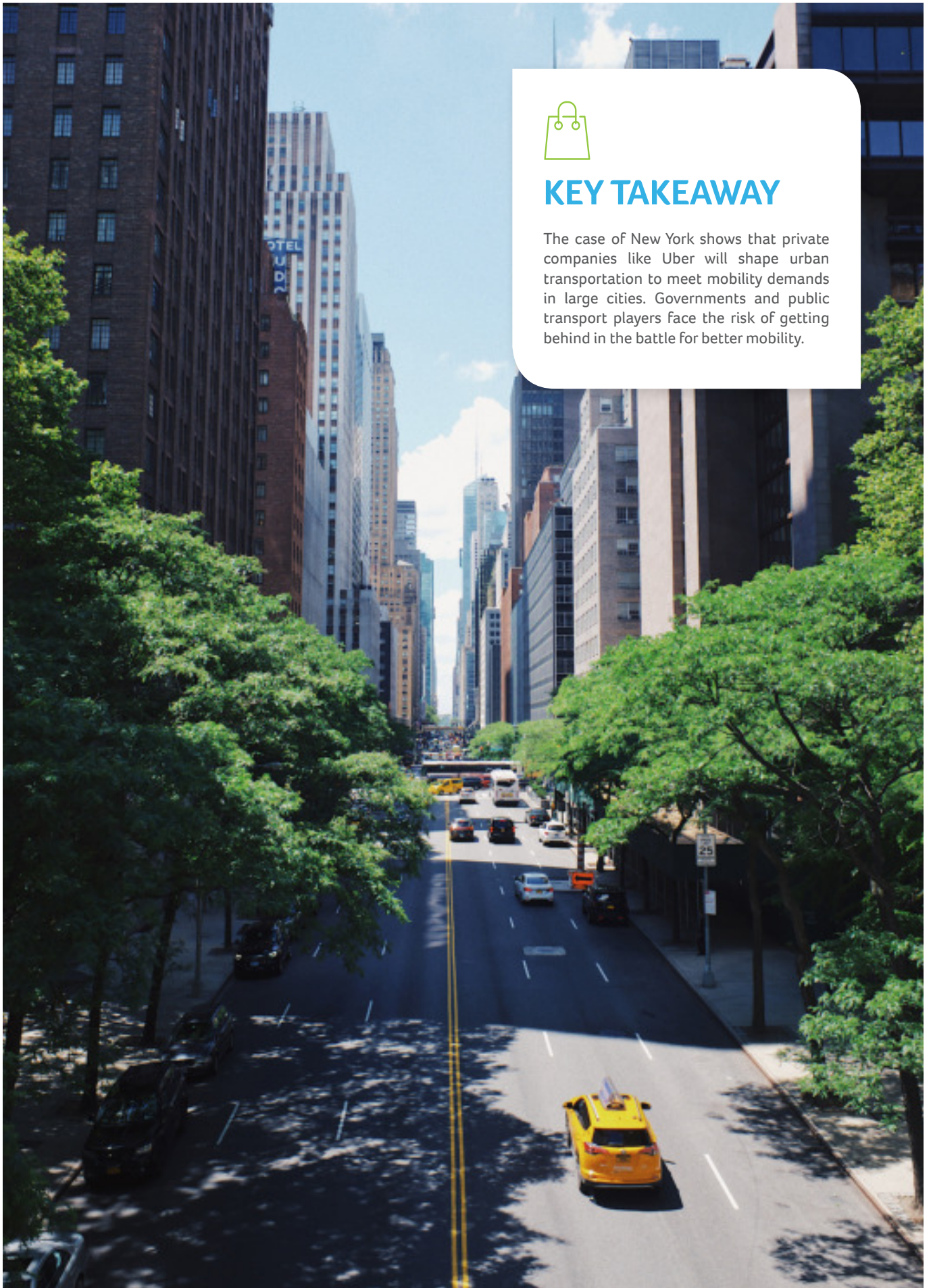
KEY TAKEAWAY

The case of New York shows that private companies like Uber will shape urban transportation to meet mobility demands in large cities. Governments and public transport players face the risk of getting behind in the battle for better mobility.

Mobility-as-a-service (MaaS)

There are nuanced definitions of MaaS. The most popular definition is to provide a single platform for booking and managing multiple modes of transport to create an end-to-end trip. These may include public transportation, ride-sharing, car-sharing, bike-sharing, taxi, car rentals, or a combination of all the above. Another key element for MaaS is providing users with a single digital payment method; only one transaction necessary for an end-to-end trip rather than paying for individual modes of transportation.

The city of Helsinki in Finland has deployed a MaaS-based transport strategy, and it has gained significant traction. The main platform is called Whim, and it currently has 60,000 active users per month. This enables travellers to choose between three mobility options: a full-access subscription, a basic membership with reductions on taxis and car sharing, and a pay-as you go model. Helsinki offered a great environment for the implementation of MaaS due to multiple reasons:

» Finnish law requires transport providers to make ticketing functionality available to third-parties
» Great public transport operations with 99.7% reliability and 89% overall satisfaction
» Consistently-upgraded public infrastructure
» Public transport providers offer free access to data and paperless ticketing is in place

Following the success Whim saw in its home market, it has spread its operations to Birmingham, UK and Antwerp, Belgium. We have to keep in mind that platforms like these are in their infancy, but the concept has been proven in multiple regions. There will be challenges in scaling this across different societies with different consumer habits, varying levels of digital adoption, and mixed travelling patterns.

There are clear benefits to the customer. Firstly, the payment amount is clear and the payment method is secure and digitalised. The application automatically calculates the price you pay based on your subscription level, or offers a pay-as-you-go option. The route is planned and displayed in detail, whilst offering flexibility for changes of circumstance or delays. Real-time data feeds keep the whole process accurate and reliable. The objective is to provide carefree travel. This is the overarching result of MaaS.

Challenges for MaaS

There are huge challenges associated with the MaaS subscription model. The main overriding obstacle is to draw the disparate parties together to collaborate under one banner. As we outlined in a CCV blog article, the clear problems can been understood as follows :

Systems

Ticketing and scheduling systems have been established using various technologies and various languages. Somehow, the legacy systems for buses, trains, trams, metro, and taxis need to talk to each other in a standardised format.

Security

Where there is innovation, there is vulnerability. MaaS stakeholders must ensure bulletproof cybersecurity in the face of hackers, and be able to accurately identify travellers and their tokens at each stage of their journey. Protection of customer data is paramount, and fraud must be actively targeted.

Business models

Different operators have different business models, pricing structures, and value-add offers. Some may have built a brand reputation on a set of values. Some players may have been in direct competition with others for decades. It's difficult to move into the collaborative mindset under these conditions.

Suppliers and partnerships

With such a huge shift in technology, existing suppliers and partnerships will be put under pressure. This isn't easy to manage, particularly if long-term contracts are in place or relationships are well-established.

Data compatibility

The compatibility of different data sets is a challenge, but this is essential to giving the end-user a consistent experience across operators.

Fare distribution

How do the mobility operators receive their share? Taxis generally charge according to distance travelled and the duration of the journey, while buses have fixed prices per area. Combining multiple modes of transportation requires precise calculations and the price estimations are only as good as the computation algorithm is. How much would the price differ when booked through the application rather than buying tickets straight from the operator? How are delays managed from a price perspective?

With the widespread appetite for MaaS, a new way of thinking must emerge. A culture of collaboration, trust, and non-competitiveness is needed to build the shared platforms that travellers need. The payments industry must ensure that stakeholders get their share quickly, accurately, and consistently. MaaS implementation requires the involvement of trusted third-party authorities who drive the innovation and mediate between key players. In a competitive environment, it's important to create win-win scenarios for everybody. This will require tough diplomacy, and expertise in technology for payments, scheduling, and more. MaaS is a mindset change. Industry stakeholders must adopt a truly customer-centric approach, and travellers must think about mobility in a holistic way.

THAT'S A FACT

Mobility challenges lead to the introduction of concepts like Mobility-as-a-Service, as seen in Helsinki where 60.000 people using its main transport platform.

The role of payments in better mobility

We're currently seeing the deployment of multiple payment methods across various mobility modes. It's a fractured landscape. Payment methods include tokenised digital accounts, subscriptions, contactless cards, chip-and-pin, smart wearables, mobile websites and apps, digital smartphone wallets, and of course… cash. It costs money to travel, so payments must be central to improving mobility.

Let's examine the most popular payment methods currently in operation for mobility.

Closed-loop schemes

These are generally dedicated payment cards such as the Oyster Card in London, or NS Card in the Netherlands. Customers can easily top these travel cards up by using cash, card, or smartphone wallet at terminals or tills. They can also be topped-up online via the customer account. These cards allow for quick access to the transport system, and they're lightweight and secure.

Closed-loop cards can also offer promotions and discounts based on customer-specific factors, perhaps for students and pensioners. However, they are usually void of value in any other open environment, therefore adding a responsibility to the user to have the scheme card on-hand for successful access to mobility. They also add yet another card to the client's wallet. This is not a problem by itself, but when handling multiple closed-loop cards for transport, retail, and more - it does become inconvenient.

Account-based schemes

This system relies on customer access to a website or mobile app to register and verify their personal details and payment methods. The nature of these platforms allows for multi-functionality, such as bookings in advance, access to packages and discounts, as well as pay-as-you-go models.

Bank cards can simply become a connected identifier, enabling the customer to quickly access the transport network without having

to interact with the digital platform. When it comes to convenience, the account-based payment solution is not always ideal. It requires time investment in setting up the application and booking the services, as well as relying on connectivity to the internet. Furthermore, infrequent travellers and tourists may not wish to register with this type of system.

Ad-hoc payments

Put simply, ad-hoc payments are a requirement for any transport operator, in order to allow everybody to access services spontaneously – regardless of their preferred payment method. Until recently, ad-hoc payments were the only option available, with travellers queuing for a till or terminal, or paying an attendant whilst on the train, tram, or bus. The system has evolved to be faster and more inclusive, with self-service ticket machines accepting cash, card, and smartphone payments.

Technology enables the ad-hoc model to be taken a step further. Open-loop payment methods allow travellers to tap a contactless card or smartphone wallet on terminals at the gates to enter in less than a second, and tap after arriving at their destination – validating their end-to-end journey and seamlessly paying for the service. When open-loop can be operated alongside the subscription-based MaaS model, this creates a winning combination. But it's not easy to achieve in any global city.

The challenges and opportunities of open-loop

Open-loop payment systems promise huge potential by enabling mass-scaled transactions for public transport. They are a key component in optimising Mass Transit Transactions (MTT), which can greatly increase the passenger throughput at security gates, increase efficiency, and reduce the burden on staff.

Transport for London (TfL) implemented the open-loop system in 2012. Since then, the usage has grown steadily, reaching four million active customers as of 2017. With this system, queues have been reduced and tourists have been further encouraged to use public transport – as they have a much easier experience using international contactless cards as opposed to learning how an Oyster Card operates.

The open-loop system also provides a cost-saving opportunity, as lower number of issued Oyster Cards and less people managing the orders saves a significant amount of resources.

A challenge in adopting an open-loop payment system at the station gates is that in order to accommodate such a high number of travellers whilst offering a seamless experience, the transaction would need to take place in less than half a second; restricting TfL from using traditional payment verification processes. With no Payment Card Industry Standard existing for the transportation industry, a new model had to be developed - paving the way for future integrations worldwide.

Another consideration revolved around instances when payment issues arise. As any supported payment operator can be used at the gates, who would need to be contacted in case of an error – the bank, or TfL? Indeed, TfL chose to take responsibility for most issues and become the contact point for customers.

An article on the Australian Payments Network features an interview with TfL's Head of Customer Payments, Mike Tuckett:

"There was a large group of commuters on TfL that we call 'wallet tappers' - someone that taps their whole wallet on the reader. Because "wallet tappers" carry more than one contactless card in their wallet, this can result in someone unintentionally "tapping on" with an Oyster card and "tapping off" with a credit card that they didn't want to use. We felt that this presented a significant reputational risk to our scheme. We solved this mainly using a marketing campaign to educate the public all about 'card clash', but we also developed an algorithm to infer where it has occurred and reverse the transactions."

In the back-end, there are also complexities. The system must correctly aggregate tariffs over the course of the day and apply custom rules to ensure that the traveller has the best deal. This must be consistently accurate to maintain trust among customers. Furthermore, human behaviour can be unpredictable, and mistakes often happen. Memory can be hazy, leading to wrongful complaints and refund claims, so customer support must have deep knowledge to troubleshoot these issues on the fly.

We must also remember the unbanked (or underbanked) travellers who currently buy physical tickets or top-up their closed-loop scheme card at unmanned ticket machines and manned ticket desks. In this context, cash payments are also still in play. Whilst transport infrastructure can progress quickly through innovation, operators have a responsibility to help vulnerable people get around. In some cases, this technology is accelerating too fast for those who lack access to digital services; whether it be contactless bank cards, NFC-enabled smartphones, or online subscription services.

THAT'S A FACT

Transport for London (TfL) implemented a open-loop payment system in 2012 and its usage has grown to 4 million active customers as of 2017.

Interview: Open-loop payments

The expert opinion

James Timperley is a consultant for transport and payments at Timperley Partners, based in Wellington, New Zealand. He has worked with FirstGroup and Transport for London (TfL).

What are the opportunities of open-loop payments?

By moving away from a proprietary scheme or standard, there is a benefit for the transport body; as they are making use of a system that is already in the hands of the public. The most common use case is the use of contactless payment cards, allowing the PT provider to use a card provided to the customer by their bank. This eliminates some costs of the bespoke proprietary solution. The example in London is the ability to reduce the need for production, distribution, and management of Oyster Cards vs the use of contactless cards - managed and provided to customers via their own banks. There is potential for significant cost savings, whilst improving the customer experience as you digitise the payment mechanism.

The other benefit that generally comes with open-loop payments is that the ticketing solution becomes account-based. This can be both anonymous or personalised, but means the possibility for greater customer engagement and an improved customer experience. This sits alongside the benefit for the PT provider of having better trip data to adapt existing services and then provide these services more efficiently.

What are the challenges of open-loop payments?

There are two significant hurdles that I see. Firstly, it is a costly challenge to replace old infrastructure with new infrastructure that can accept open-loop payments. You need readers that can accept these payment forms and you need back office systems that are able to process them. There is a cost associated with changing to these systems, which is exacerbated by the incremental movement of customers to these payment mechanisms. This means you must continue to support the legacy solutions whilst you make the change - meaning your cost savings do not kick in immediately.

Secondly, moving to an account-based system has the potential to change the way in which fares are set or calculated by PT providers. For example, you may move towards a PAYG model which will require different customer and operator behaviour - i.e. no longer buying single tickets or period passes and therefore need to introduce tap in/tap out or other mechanisms to calculate fares. This creates commercial risk, and also introduces new challenges from an operating perspective, i.e. potential to impact boarding times. This will also impact existing commercial agreements in areas where you may have a competitive services running. When a single authority has control and decision making abilities across a city or area, it has the potential to make the implementation easier by removing some of the commercial negotiations.

"The example in London shows there is potential for significant cost savings, whilst improving the customer experience as you digitise the payment mechanism."

Summary: Final takeaways

Large global cities are at the forefront of mobility innovation. The pressure to reduce congestion and improve the commute for residents is only growing, and the demand for a better way to move is stronger than ever. The shift from small-scale proprietary systems to a more standardised and universal approach will help create a seamless transport experience around the world; for tourists and locals alike.

The promise of MaaS and the ability to handle a heavy load of Mass Transit Transactions has the potential to revert busy car-filled city streets, and enable customers to achieve superior ease of movement without owning a private vehicle. Besides the integrated multi-modal travel, MaaS also tackles a pain point in customer experience by adopting a single payment method in the background. If they choose to subscribe to such a mobility service, no longer do customers need to juggle between cash, closed-loop travel schemes, smartphone wallets and contactless bank cards to get from A to B.

It is not a straightforward task to settle on a future-proof mobility strategy. In the short-term, multiple stakeholders will have differing opinions on the path forward. Commercial motivations are difficult to navigate, and the fast pace of technological change will evolve the landscape yet further. This is an exciting period for the mobility and payment industries.

The choices we make now will set the standards for the future. Collaboration is key. If you want to go fast, go alone. If you want to go far, go together!

READY TO KNOW MORE?

Are you ready to explore your opportunities in public transport?

Please contact our support team at **supportme@ccv.eu** or **+31 88 228 9965** and we will organise a workshop or roundtable to clarify your business challenge and uncover solutions to fit your needs.

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