VISA

Mobility as a Service

A path to frictionless
multimodal travel for all

Visa Acceptance
Solutions

Unlocking the power of Mobility as a Service

In today's urban landscape, mobility environments are anything but seamless. The increasing multitude of transportation options available – ride-hailing services, car sharing, micro-mobility schemes – have brought both convenience and complexity to city streets. This abundance of choice creates a fractured mobility ecosystem. Public and private modes of transport compete for limited road space and resources, leading to inefficiencies and frustrations for individuals trying to navigate their way through a seeming urban maze.

Increasing population density exacerbates these issues, particularly in car-dominated systems.[1] Given finite road capacity, relying solely on cars for transportation is no longer practical. However, people are hesitant to change if alternatives cannot match the convenience and familiarity of car travel. This geometry problem extends beyond individual drivers, with transit and other new mobility operators struggling to operate smoothly within congested road networks.

Herein lies the central argument for Mobility as a Service (MaaS): a concept that aims to transform urban travel into a seamless and interconnected experience for all.

At its core, MaaS is about connecting people to a wide array of mobility options and fostering collaboration among different transportation providers. By breaking down barriers and integrating services, MaaS empowers individuals, regardless of age, ability, or socioeconomic status, to move from point A to point B.

As a lead enabler with hundreds of global projects in the urban mobility space, Visa has collaborated closely with cities, mobility operators, system integrators and app providers to understand and tackle the key challenges faced by the urban mobility ecosystem. This paper delves into these challenges, highlights the transformative benefits of MaaS, and presents compelling examples of how Visa's solutions can help unlock the full potential of MaaS, paving the way to a more connected future that uplifts everyone, everywhere.

> "To unlock the power of MaaS, we need to make sure we are collaborating with the most influencing stakeholders within the market. The partnership between Visa and MaaS Alliance will help to work with private companies, public transport operators, and technology enablers to implement digital payment acceptance in the MaaS industry around the world, which is helping to enhance the travel experience for consumers."
>
> **Roelof Hellemans**
> Secretary General of the MaaS Alliance

Recipe for success

The key to success for cities is the ability to move people and goods quickly and easily – day in, day out. This hinges on the implementation of seamless Mobility as a Service solutions that effectively tackle the challenges posed by **rapid urbanization, financial barriers, changing travel and work patterns, infrastructure limitations,** and **urgent climate emergency** (see appendix).

Making significant improvements to transportation systems requires cooperation from a wide range of stakeholders, from public authorities and non-governmental organizations, to private corporations and those using the transportation systems. Visa's solutions for MaaS form an elegant and adaptable payments ecosystem that aims to build a more effective bridge between authorities, operators, and users.

> Building ecosystems of interoperability that allow competitors to cooperate is the bread and butter of international payment schemes like Visa… When it comes to validating the two credentials at the heart of every leg of every journey – who is paying and whether they can pay – it is hard to think who would be better placed to do so than the big card networks.[2]

Endava – 2023 Whitepaper: Why payments are the key to moving MaaS forward

Connecting different passenger journeys via one travel and payment method would encourage people to travel more.

Nearly half (45%) of the people surveyed would be more likely to try different forms of public transit if they could use the same payment method. Another 42% would use public transit more days than they do now.[3]

The reality of a fully functional and widespread MaaS system is yet to be fully realized. While itinerary-planning solutions have proliferated, the absence of integrated payment solutions hinders the achievement of a truly connected and frictionless travel experience. This is where payment schemes and payment technology providers play a pivotal role, helping bridge the gap between planning and payment by enabling the flow of funds unique to the needs of MaaS providers and passengers.

People want MaaS experiences.

Nearly two thirds of people surveyed in a recent research report said they would try MaaS if available to them – nearly 2 in 3 (64%) would be likely to use Mobility as a Service if it were an option – in fact, 25% already do.[4]
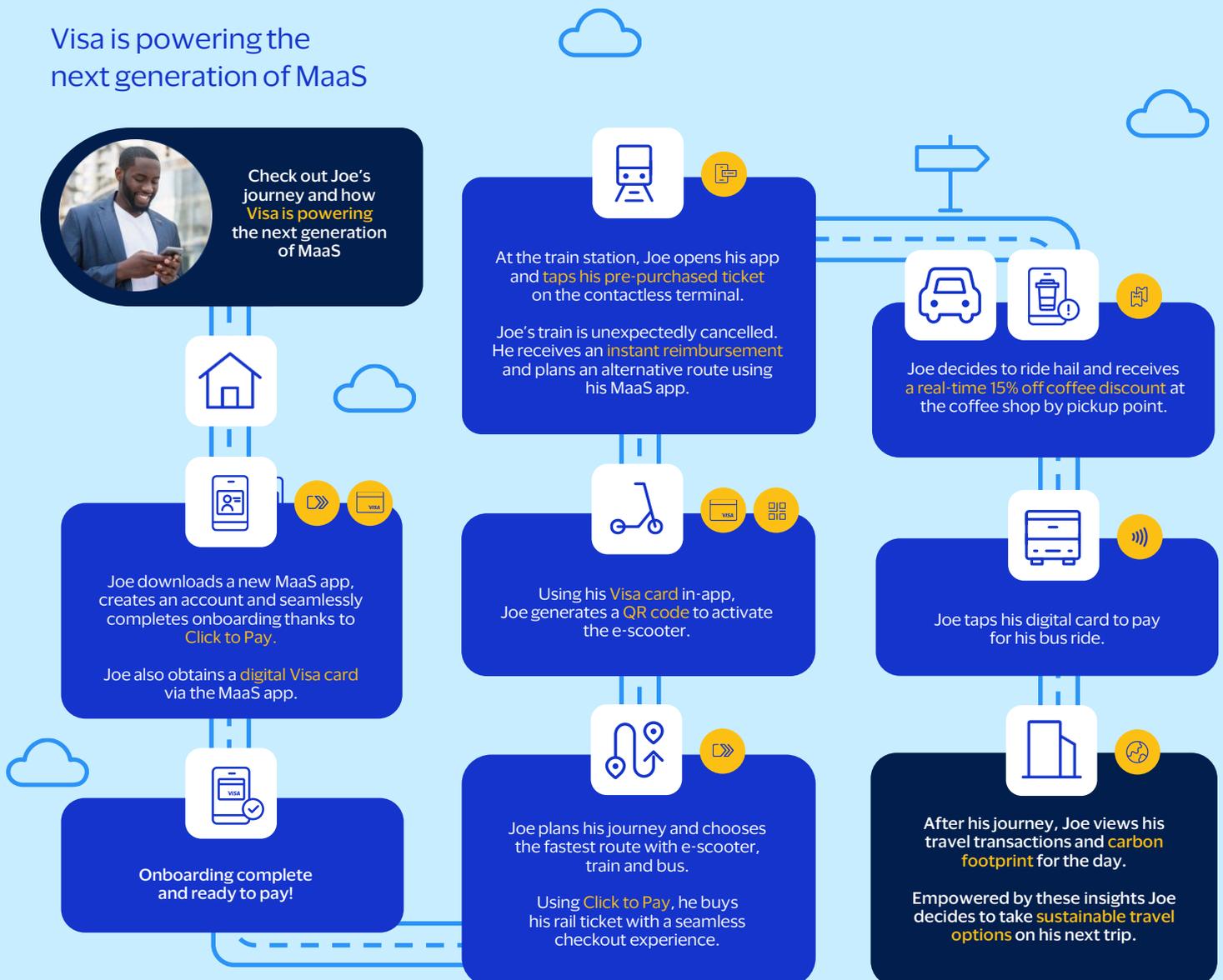
Visa in MaaS

Visa is the world's largest payment network, with over 4.2 billion cards and more than 14.3 trillion dollars in annual volume transacted in 200+ countries.[5] Built on a network that can handle 5,300-plus transactions per second – over 5.8 billion a year – sits Visa Acceptance Platform[6]: the underlying technology for Visa Acceptance Solutions that aggregates all the payment services in a fully customizable and modular fashion for any sector and for any business. Our corporate mission is to connect the world through our innovative and highly secure network, so that individuals, businesses, and economies may thrive.

In urban mobility, Visa is committed to helping cities create efficient, inclusive, and sustainable door-to-door transportation experiences enabled by simple, convenient, and secure digital payment solutions. Paving the way to a next generation of MaaS, Visa Acceptance Solutions embolden our MaaS partners and clients, addressing the unique pain-points experienced by the ecosystem and improving the overall customer experience.

Visa is powering the next generation of MaaS

Check out Joe's journey and how Visa is powering the next generation of MaaS

Joe downloads a new MaaS app, creates an account and seamlessly completes onboarding thanks to Click to Pay.

Joe also obtains a digital Visa card via the MaaS app.

Onboarding complete and ready to pay!

At the train station, Joe opens his app and taps his pre-purchased ticket on the contactless terminal.

Joe's train is unexpectedly cancelled. He receives an instant reimbursement and plans an alternative route using his MaaS app.

Using his Visa card in-app, Joe generates a QR code to activate the e-scooter.

Joe plans his journey and chooses the fastest route with e-scooter, train and bus.

Using Click to Pay, he buys his rail ticket with a seamless checkout experience.

Joe decides to ride hail and receives a real-time 15% off coffee discount at the coffee shop by pickup point.

Joe taps his digital card to pay for his bus ride.

After his journey, Joe views his travel transactions and carbon footprint for the day.

Empowered by these insights Joe decides to take sustainable travel options on his next trip.

Our solutions for Mobility as a Service can be categorized into three main areas:
Acceptance Solutions, Issuing Solutions, and Additional Visa Solutions.

Figure 1: Putting customer experience at the heart of our solutions
Please see Annex on page 24 for more information.
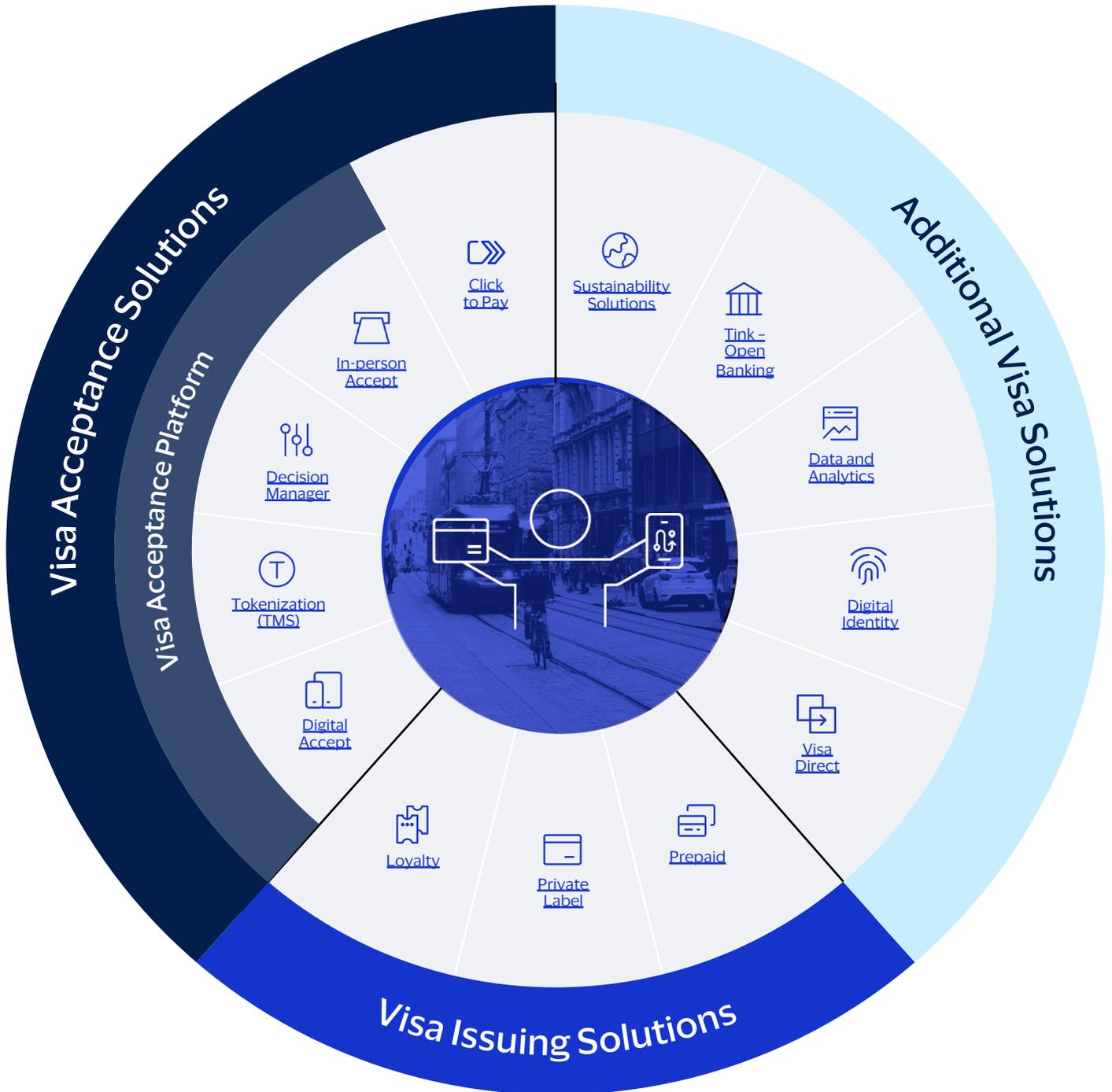
Visa Acceptance Solutions for MaaS

Key to the evolution and liberation of MaaS, Visa Acceptance Solutions sets the foundations that empower the MaaS ecosystem to deliver MaaS solutions that are:

Faster
Quicker time to market, in full compliance with scheme requirements

Further
Seamless tap and app acceptance, with higher approval rates

Smarter
Secure and optimized customer experiences

Partner ecosystem

ISV | technology partners | solution integrators

Modular Payment Services

| Digital Accept | In-person Accept | Payment Processing | Transaction Management & Optimization | Fraud Management | Risk Management | Post Transaction Management |

Visa Acceptance Platform

Integration | Onboarding | Billing I Reporting | Management | Dev Tools

To learn more about Visa Acceptance Solutions and to contact us, please visit www.visaacceptance.com.

Visa Acceptance Solutions for MaaS

Visa Acceptance Platform

Visa Acceptance Platform provides mobility operators and MaaS providers with a single point of connection to help seamlessly manage all payments, digital and physical, across different transportation networks, with access to over 250+ acquirers globally.

Resolving key MaaS challenges
1. **Fragmented ecosystem with onerous payment integrations**
2. **Compliance with industry regulations**

This open platform offers global, scalable, on-demand access to a complete ecosystem of integrated, modular payment services, including payment processing, in-app and in-person acceptance, tokenization, and fraud management, as well as to a broad ecosystem of independent software vendors, technology partners, acquirers and fintechs. With Visa Acceptance Platform, mobility operators and MaaS providers can access a connectivity hub of acquirer, payment technology provider and independent software vendor integrations to build innovative, scalable, and secure payment experiences in MaaS.

In addition to the consolidation and delivery of MaaS and other turnkey solutions, Visa Acceptance Platform supports over 460,000 businesses and enables global growth and reach through over 250+ acquirers and processors, for worldwide payment acceptance. In urban mobility alone, Visa Acceptance Platform has hundreds of systems around the globe and processes over half a billion transactions a year, with a host of live transit technology partners across the digital and physical space.

A connectivity hub powering MaaS solutions

Urban mobility ecosystem

- Mass Transit
- Parking/ Tolls
- Ride hailing
- First & Last Mile

- Tap-to-Ride
- App-to-Ride

Mobility as a Service

- Mobility Operators
- MaaS Providers
- Transit Authorities
- System and App Integrators

Visa Acceptance Platform

modular, integrated payment services

Integration | Onboarding | Billing | Management | Dev Tools

- Global networks
- Domestic schemes, wallets
- Alternative payments

Global payment service providers

- Acquirers
- Payment Technology Providers
- Fintechs
- Networks

Market-leading, globally relevant, omnichannel acceptance componentry

Open, composable, modular and API-driven

Delivered with Visa-grade resilience, security, maintenance, and scale

Visa Acceptance Solutions for MaaS

Digital Accept
(a Visa Acceptance Platform solution)

This solution enables mobility providers to securely accept e-commerce or in-app payments and helps create more seamless payment experiences across channels and devices with world-class security and the minimal PCI-DSS compliance burden possible.

Resolving key MaaS challenges

1. **Fragmented, tedious, and complex digital user experiences**
2. **Transit rules, EMV® certifications, and operational complexities**

With checkout templates for 50+ countries and 25+ languages, and international payment acceptance in 160+ countries and 50+ currencies, mobility providers can easily accept credit and debit cards, digital wallets, top-ups, instalment payments, subscriptions, and more.

Visa Acceptance Platform, JustPark & Judopay.

With JustPark, Judopay, and Visa Acceptance Platform, parking is no longer a high-friction purchase.

• Using Apple Pay or Google Pay, customers can register and pay in less than 30 seconds.

• JustPark can focus on the customer experience – because Judopay is taking care of the payments in-app while Visa Acceptance Platform manages the back end.

• JustPark is processing 10 times the number of transactions it was 18 months ago.

Through Judopay's partnership with Visa Acceptance Platform, it has enabled payment tokens like Apple Pay and Google Pay and serves JustPark as a dynamic partner that can offer new technology as it becomes available.[7]

VISA & JustPark & judo®

Digital Accept offers comprehensive integration solutions to meet the evolving needs of mobility providers. Whether it's self-service integration methods, streamlined third-party platform integration plug-ins that accelerate go-to-market, or turnkey applications for hassle-free digital payment acceptance with no integration necessary, Digital Accept caters to your specific solution and go-to-market requirements.

App-based payments, also known as "App-to-Ride", are a key component in laying the foundations for the future of MaaS and unlocking its full potential. Some MaaS solutions will store a Visa credential on file for pay-as-you-go consumption of mobility services, whereas others may utilize a subscription model, or sell a travel pass in advance.

> "Digital Accept has been instrumental in enhancing our MaaS offering, enabling a seamless user experience for passengers making in-app purchases, and supporting our continued global growth across multiple countries, as well as providing access to a broad range of alternative payment methods so that our passengers from all over the world have a smooth checkout experience.

Josh Nicklin
Chief Sales Officer, Masabi

(T)

Token Management Services
(a Visa Acceptance Platform solution)

Tokens play a crucial role in the realm of next-generation mobility services, providing a secure and efficient way to handle sensitive customer information.

Payment tokens replace card numbers and personal details with unique cryptograms, ensuring the protection of valuable data such as payment card information, while also complying with PCI requirements. With Token Management Service, mobility providers can securely vault customer data in Visa's state-of-the-art data centers, eliminating the need to build and maintain their own data storage systems and reducing the scope of PCI compliance requirements.

Token Management Service helps simplify the complexity of distinct payments, customer data, and network tokens into a unified proprietary super token that centralizes and orchestrates management of all tokens, while helping minimize fraud and optimizing authorization rates. The solution works across global payment types, including tap and app-based flows, making it simple and cost-effective for mobility and technology providers to handle sensitive information, while also providing valuable insights into customer payments and anonymized travel data through a comprehensive 360-degree view.

For instance, mobility operators offering their services via a MaaS platform could gain shared visibility and insights of the end-to-end passenger journey, instead of being limited to just their own transport service. By leveraging Token Management Services, they can access a holistic view of their customers' experiences, allowing them to make data-driven decisions that enhance the overall travel experience and optimize their services.

Resolving key MaaS challenges

1. **PCI-DSS compliance**
2. **Fraud and payment data security**

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Businesses who have customers in Europe will be able to use Real Time Account Updater to ensure they are getting the highest authorization rates while also creating a seamless experience for their customers.

Kamran Zaki
COO, Adyen

"

Visa & Bolt.

Bolt, a European leading mobility super-app, unlocked additional revenue by tapping into Visa Token Service to transform its UX, boost authorization rates, reduce fraud, and lower operational costs.

Additional revenue optimizations accompany this solution as customer payment details are now automatically and securely kept up to date. This means Bolt and their customers no longer experience an interrupted service when payment details expire.

Watch the **video** or read the **article** to find out more.

VISA & Bolt

Visa Acceptance Solutions for MaaS

Tap token is a capability of Token Management Services, and enables technology providers to offer EMV® Contactless Travel, also known as Tap-to-Ride, without the cost and effort of sourcing, building, or maintaining their own secure storage system. This infrastructure-as-a-service solution eliminates the need for mobility operators to handle sensitive payment data within their back-office environment.

This cutting-edge solution is already revolutionizing the way leading technology companies worldwide approach Tap-to-Ride contactless travel, helping cut time to market and enabling a more seamless integration of app-based payment flows, in full support of MaaS. For instance, thanks to tap token, Bangkok Metro can now offer EMV® open-loop contactless travel, without having to worry about security, compliance, and risk management.

> Working with Visa Acceptance Solutions, who understand the unique challenges of mass transit ticketing and payment acceptance, enabled us to roll out the next generation of urban mobility payments in a way that's flexible, scalable, and secure. The solution meets riders' expectations while helping protect our reputation and revenues.

Somprasong Suttayamully, PhD
Director of Fare Media Department, Mass Rapid Transit Authority of Thailand

Visa Acceptance Solutions for MaaS
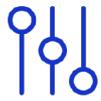
Decision Manager
(a Visa Acceptance Platform solution)

Paramount to the success of MaaS, Decision Manager combines industry-leading machine learning and a robust fraud network ensuring reliable passenger authentication and fraud prevention to minimize costs and maximize authorization conversion rates.

Resolving key MaaS challenges

1. **Passenger authentication and fraud management**
2. **Operating costs, fraud losses and authorization conversion rates**

114 billion global transactions
actively inform our machine learning & artificial intelligence, providing payments intelligence for better decision-making.[8]

Powered by advanced self-adapting artificial intelligence, Decision Manager enables real-time assessment of active behaviors and automated identification of good, bad, and never-seen-before customers – unlocking a world of benefits for MaaS providers and mobility operators selling products ranging from daily tickets to higher-value annual passes:

- **Customize your fraud prevention strategy** using AI insights to filter and reject high-risk transactions, even before they are sent for authorization, preventing additional costs from unnecessary authorizations or chargebacks.

- **Shift liability** back to the issuer on fraud-related chargebacks.

- **Lift authorization rates** by filtering out more bad transactions and sending only high-quality transactions for authorization.

- **Protect passengers** by delivering enhanced fraud prevention through every step of the transaction process.

Maximize approval rates, minimize fraud
Merchants on the Visa Acceptance Platform experienced a 2.97% higher approval rate and fraud rates fall by 70bps.[9]

The impact of Decision Manager in combatting fraud and optimizing conversion rates for mobility operators is consistent globally. Take for instance a recent success story in the Italian market, where a prominent train operator successfully reduced declined rates from 2% to 0.1%, reducing fraudulent transactions to under 0.05%.
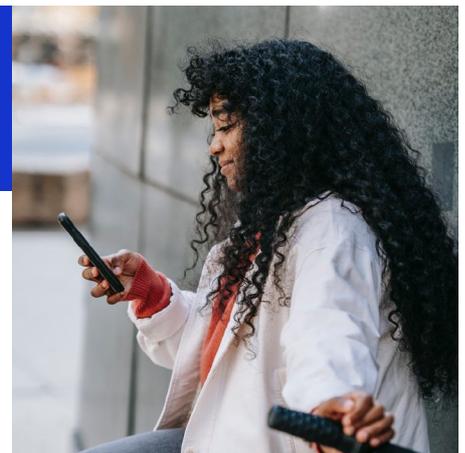
In-Person Accept
(a Visa Acceptance Platform solution)

As well as in-app payments, the future of MaaS will likely include Tap-to-Ride solutions. For instance, by seamlessly linking a card used for travel to a personalized passenger profile, you can enable full transparency of travel fares, application of relevant discounts or concessions, and integration with adjacent mobility services that are not currently well-served by Tap-to-Ride (e.g. car-sharing, congestion charging, and bike-sharing).

In-Person Accept empowers mobility providers to seamlessly process Tap-to-Ride contactless transactions from major payment schemes through a single integration, avoiding the hassle and operational cost associated with one-off integrations.

This solution is a complete toolkit with a modular set of components and services that enables technology partners and acquirers to seamlessly connect to the Visa Acceptance Platform and process card present payments on a variety of acceptance devices, including innovative solutions like Tap to Phone. Mobility providers can access a network of payment technology providers to power unified commerce experiences that meet the evolving needs of the urban mobility ecosystem. The solution accelerates time-to-market with simplified card present certifications and streamlines end-of-day processing, including authorizations, management of shared liability, and resubmissions, ensuring world-class approval rates and full compliance with supported scheme rules.

Resolving key MaaS challenges

1. **Fragmented technology ecosystem and in-person sales channels**
2. **Transit rules, EMV® certifications, and operational complexities**

Expanding global presence of In-Person Accept in urban mobility

Live

In progress

Click to Pay

Click to Pay eliminates the need for consumers to manually enter their card details to pay, bringing the convenience of face-to-face touchless payments to e-commerce checkout experiences.

Resolving key MaaS challenges

1. **Conversion rates and user abandonment**
2. **Customer onboarding and fragmented checkout experiences**

Early pilot results show an increased average conversion speed of +20 seconds and an uplift of authentication rate of +4% versus manual card entry payments.

MaaS users can easily onboard with Click to Pay, which dynamically looks up their registered cards and presents them for payment without passwords or lengthy forms. Early pilot results show an increased average conversion speed of +20 seconds and an uplift of authentication rate of +4% versus manual card entry payments. This, combined with the usage of token technology, addresses the main interest points consumers have highlighted are fundamental when paying online[10]: security and convenience, alongside seller's focal objective of increasing sales.

Click to Pay helps facilitate easy and consistent checkout experiences for both one-time and recurring payments, covering both subscription and pay-as-you-go mobility products, reducing drop-out and barriers to entry for new users to adopt MaaS travel behaviors.
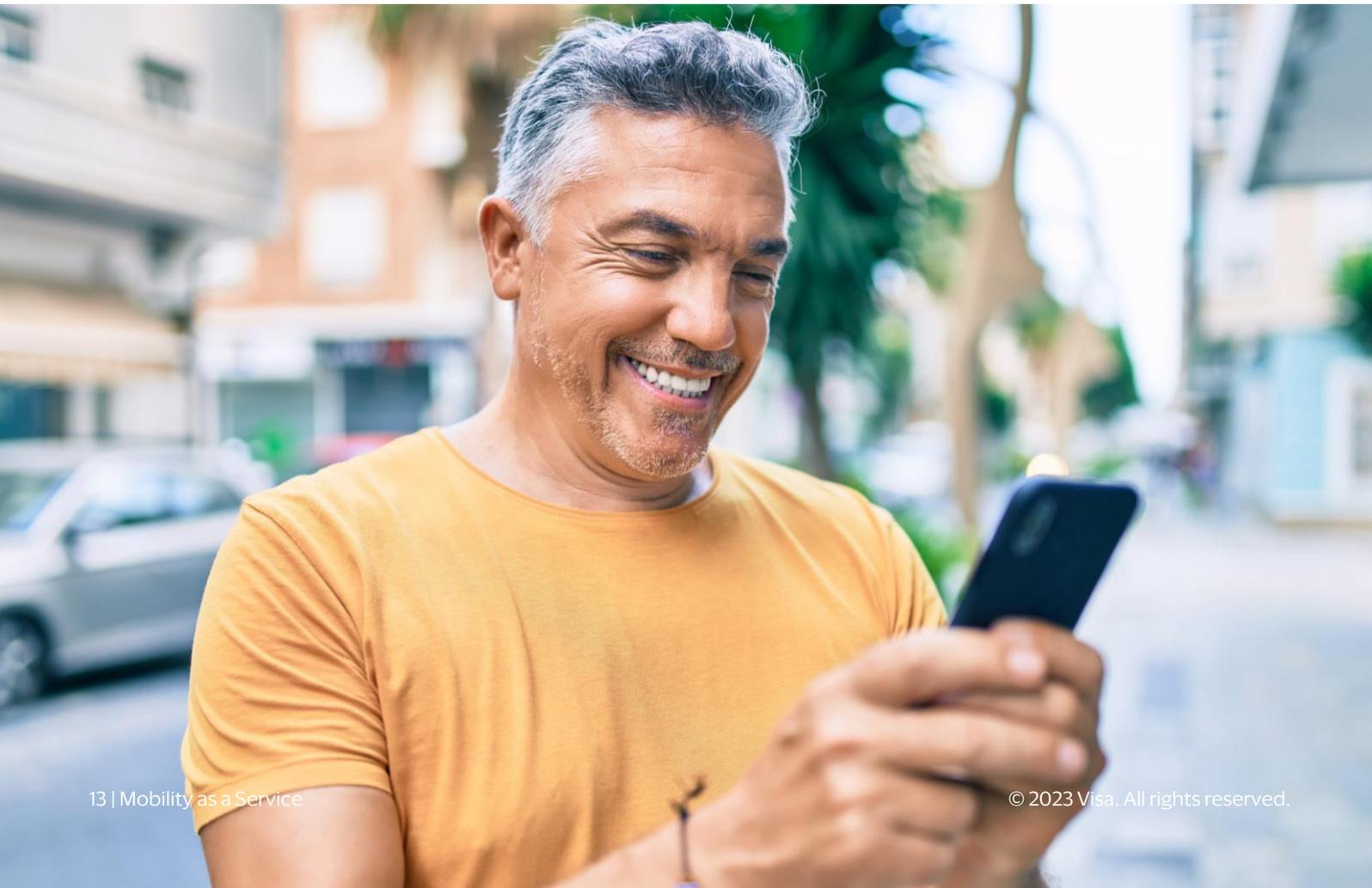
Visa Issuing Solutions for MaaS

Visa's Issuing Solutions for MaaS empower residents, visitors, and enterprise customers to redefine their travel experience, offering a more seamless and hassle-free journey. By leveraging Visa's issuing solutions, MaaS providers can go beyond traditional EMV®-based credentials, like prepaid and debit cards, and embrace alternative options such as QR codes, biometrics, and location-based tickets. This flexibility enables a wider range of payment methods, enhancing convenience and accessibility for all users. From corporate travel programs to products for tourists exploring new cities, to products aimed at those without access to traditional bank cards, Visa's issuing solutions pave the way for innovative and inclusive mobility experiences.

Pay-in-Advance (PIA)

Visa Prepaid and Visa Private Label solutions seamlessly complement your MaaS journey, catering to all user and journey types. MaaS providers and mobility operators can include riders without traditional credit or debit cards by providing their first digital payment credential, usable for payments inside and outside transit networks. Whether you are an unbanked rider or an employee managing corporate travel, PIA helps simplify and lower payment barriers, ensuring that no rider is left behind.

Imagine a passenger that does not have, or prefers not to use, an existing bank card for travel. Mobility providers can easily integrate instant prepaid or private label issuance inside a MaaS platform to get them moving right away, putting the card holder in full control.
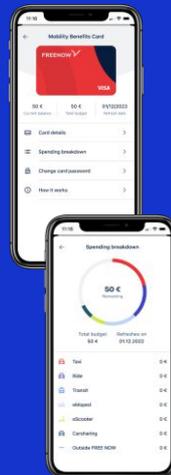
Resolving key MaaS challenges
1. **Financial inclusion for un/underbanked**
2. **Concessionary travel**

Prepaid cards for transit are the second most preferred form of payment, after contactless debit or credit.[11]
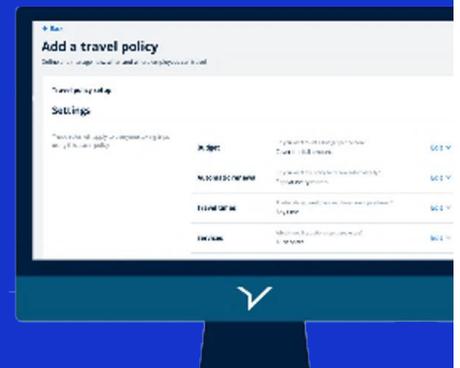
Visa & FREENOW.

FREENOW and Visa partnered to deliver a multi-country MaaS app dedicated to corporate travel. This innovative solution offers employees an in-app "Mobility Budget" for a seamless travel experience across all mobility providers, both public and private.

Users can also instantly obtain a digital Visa Prepaid card in-app, driving even more convenience and travel options, and employers can incentivize sustainable travel choices as part of their corporate mobility budgets.

Loyalty

Combining the power of MaaS with Visa Loyalty solutions to offer card-linked offers, rewards, redemption, and loyalty program opportunities can increase customer engagement and perceived value of the overall travel experience. Imagine a frequent traveler receiving personalized rewards and discounts based on their travel patterns, encouraging them to choose a particular provider for their transportation needs.

Loyalty products can be used to both reward the traveler for regular behavior and manage network demand for increased operational efficiency. For instance, in the case of disruption, by offering rewards to incentivize a different travel route, thereby helping balance passenger load and minimize disruptions.

Beyond transit, mobility providers can also gain a richer view of the customer journey and their behaviors. For example, a passenger commuting every day may regularly stop for breakfast or coffee near the station. By leveraging this data, mobility providers can form mutually beneficial partnerships with local businesses to offer targeted promotions and rewards that enhance the overall travel experience.

Resolving key MaaS challenges
1. **User adoption and ridership volumes**
2. **Operational inefficiencies and network demand**

nextbike, Germany's biggest bike rental, partnered with Visa to offer in-app rental credits, deals, and rewards across Germany, which boosted contactless transactions by 49% during the campaign.
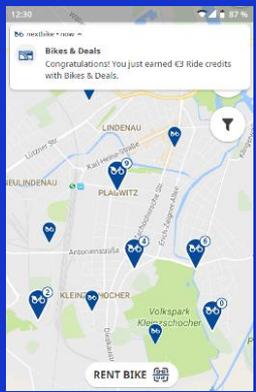
Additional Visa Solutions for MaaS

Visa Direct

Mobility passengers around the world experience the frustration of trip cancellation, followed by a time-consuming and complex refund process that takes days or even weeks to receive a payment.

With Visa Direct, the refund experience becomes effortless and immediate. As a real-time payment capability, Visa Direct empowers MaaS providers and mobility operators the ability to originate refunds, rebates or goodwill payments to passengers and colleagues in 190+ countries.

Resolving key MaaS challenges
1. **Complex travel refund processes**
2. **Gig workforce attraction and retention**

> **For MaaS providers working with gig economy platforms, Visa Direct is also a powerful solution that can facilitate seamless, real-time worker payouts, enhancing their ability to attract and retain talented workers.**

To learn more about Visa Direct and contact us, please visit Visa Direct.

Visa & Lyft.

Lyft has integrated Visa Direct's real-time "push" payment capability to enable their independent ride-hailing drivers to access their earned wages through their eligible debit cards and accounts.

1. Driver selects Express Pay for real-time payout of earnings
2. Driver completes simple one-time setup
    *   Enters debit card information
    *   Enters verification code
3. Driver confirms transfer to eligible debit card
4. Driver receives confirmation that payment has been sent

VISA & **lyft**
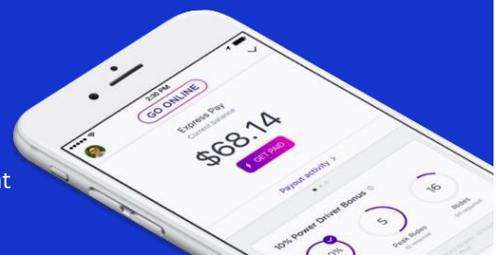
Additional Visa Solutions for MaaS

Tink – Open Banking

Urban mobility is constantly evolving, with customers increasingly expecting a seamless and convenient mobility experience.

With Tink, customer onboarding for those choosing to pay via open banking is faster and more efficient, reducing manual processes by instantly and securely verifying consumer or business accounts.

Tink enables high-performing account-to-account payment experiences that let MaaS users pay for a journey or top-up an account – no lengthy forms, no manual entry – creating more seamless and integrated travel for customers.

For instance, in the B2B space, Tink disrupts and standardizes payments to simplify payment experiences across urban mobility beyond invoices and bank transfers for MaaS providers.

To learn more about Tink and to contact us, please visit Tink.com

Resolving key MaaS challenges
1. **Customer onboarding and user abandonment**
2. **Complex and fragmented payment experiences**

Digital ID*

Concessionary travel makes up a substantial proportion of ridership on urban mobility systems, and mobility providers must cater for passengers of all types, including minors, students, the unemployed, pensioners and veterans who may be entitled to discount or concession.

Visa Digital Identity solutions allow MaaS providers and reliant parties to authenticate riders and manage their entitlements, helping speed up operations and increase conversion rates while reducing fraud.

For instance, by linking the user's existing payment card to their identity, personalized discounts or concessionary fares can be applied at the end of each travel day across any mobility products purchased, streamlining the process for the customer and MaaS provider.

*Product is not yet available commercially and is subject to change by Visa.

Resolving key MaaS challenges
1. **Concessionary travel**
2. **Passenger authentication and fraud management**

Additional Visa Solutions for MaaS

Data & Analytics

Digital payments allow cities and mobility providers to capture journey data and associate them to the same 'account,' revealing previously hidden insights into your passenger base, including ridership trends to better understand how residents and visitors navigate around cities over time.

Visa Data & Analytics solutions can be used to optimize existing services and introduce targeted new services to better meet demand, replace costly customer behavior surveys, and improve the accuracy of revenue apportionment calculations.

For instance, MaaS data flows can help improve data interoperability across travel modes to better understand travel patterns and behaviors, enabling mobility providers to optimize services, reduce congestion and improve operational efficiency.

If you are looking to unlock the potential of your data, contact us.

Resolving key MaaS challenges
1. **City and transportation network optimization and revenue allocation**
2. **Evolving passenger needs, trends, and demands**

Sustainability Solutions

Helping individuals and businesses better understand the environmental impact of their travel – and showing them ways to improve it – is a first and important step in enabling real change.

Visa's sustainability solutions focus on identifying and reducing the carbon footprint of transactions, promoting sustainable behaviors, and supporting the transition to net positive economy.

Visa partners with Ecolytiq to offer APIs that enable real-time analysis of payment data, allowing MaaS users to understand their environmental impact and make more sustainable choices.[12] By traveling on public transit, users have already taken a major step to reduce their carbon footprint, but additional insights could be invaluable to people who want to do more. With Lune's APIs, passengers are also empowered with carbon offsetting tools.[13]

Resolving key MaaS challenges
1. **Environmental impact neutralisation**
2. **Sustainable travel options and passenger demands**

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Payment data is the largest accessible data source available on the planet to calculate consumer footprints to create transparency on an individual level.[14]

Ulrich Pietsch
Ecolytiq founder and CEO

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Visa Solutions for MaaS:
A world of benefits

Solution	Problems	Features	Benefits
Digital Accept	Fragmented, tedious, and complicated user experiences.	Comprehensive integration solutions across self-service, streamlined third-party platform plug-ins, and turnkey applications.	One service supporting a variety of integration and user experience flows.
	Mobility providers struggle to amend their solutions for different regional markets.	Checkout templates for 50+ countries and 25+ languages.	One single integration point enabling mobility providers expansion globally.
	Difficult to accept local alternative payment methods for international app providers/solutions.	International payment acceptance in 160+ countries and 50+ currencies.	One single integration point enabling mobility providers expansion globally.
TMS	Onerous PCI-DSS Compliance.	TMS' tap token solution can allow mobility and back-office providers to support contactless EMV® acceptance for travel without maintaining a PCI-sensitive data storage system.	Reducing ongoing PCI DSS compliance and maintenance costs and effort.
	Payments fraud and data security risks.	Providing a super token view that provides enhanced visibility.	Enhanced visibility into passenger behavior can minimize fraud and improve authorization rates.
	Disparate card present and card not present user experiences.	Providing a super token view that centralizes and orchestrates the management of all tokens.	Mobility providers can see a 360-degree view of passengers' journey history.
Decision Manager	Fraud losses driving up the cost of ticketing.	Customizable fraud prevention using AI insights and customizable rules to filter and reject high-risk transactions before they are sent for authorization.	Reduced fraud before authorization will lift authorization rates, saving the mobility provider money.
	Authenticating passengers at point of ticketing purchase.	Real-time assessment of active behaviors and automated identification of good, bad, and never-seen-before customers.	Protect passengers by delivering enhanced fraud prevention through every step of the transaction process.
	Low authorization rates.	Filter out bad transactions and send only high-quality transactions for authorization.	Shift liability back to the issuer on fraud-related chargebacks.
In-Person Accept	Fragmented technology ecosystem and in-person sales channels.	One single integration point granting access to a host of pre-integrated transit back office and hardware providers.	Mobility providers can access a network of payment technology providers to power unified commerce experiences.
	Onerous acquirer integration timeframes.	One single integration point granting access to hundreds of acquirers around the world.	Mobility providers can support a variety of payment flows across the 160+ acquirers available via Visa Acceptance Platform.
	Acquirer inability to support transit-specific Card Scheme frameworks.	Global transit compliance with Visa, Mastercard, American Express, Discover, and other regional schemes transit transaction frameworks.	One single integration point enabling mobility operators to accept Tap-to-Ride transactions globally.
Click to Pay	MaaS user abandonment.	Dynamically looks up registered cards and presents them for payment without passwords or lengthy forms.	Eliminates the need for users to manually enter their card details to pay.
	Low MaaS conversion rates.	Dynamically looks up registered cards and presents them for payment without passwords or lengthy forms.	Early pilot results show an increased average conversion speed of +20 seconds, meaning a passenger is more likely to travel faster, with a smoother user experience.
	Fragmented customer onboarding and checkout experiences.	Provides checkout experiences for both one-off and recurring payments.	Provides a smoother user experience for new MaaS adopters.
Pay-In-Advance	Struggle to include un- and under-banked populations.	Supports provision of a digital or physical EMV® card for people without existing bank accounts or credit history.	Enables unified MaaS experiences using payment credentials inclusive of all demographic groups.
	Concessionary travel support.	Ability to issue a card or credential denoting a qualifying concessionary product.	Commutes the benefits concessionary pass holders (e.g. students) have in traditional mobility environment to MaaS experience.
	Incentivize employees to travel sustainably.	Supports physical or digital mobility budget cards for employers to give to employees.	Enables B2B MaaS user experiences .

Visa Solutions for MaaS:
A world of benefits

Solution	Problems	Features	Benefits
Loyalty	New MaaS user adoption.	Offer card-linked offers, rewards, and redemptions.	Enables B2B MaaS user experiences.
	Need to encourage ridership volume.	Offer loyalty programs.	Incentivize new MaaS users.
	Operational inefficiencies and network demand.	Offer card and behavior-linked offers.	Loyalty products can be used to manage network demand by incentivizing passengers to choose alternative travel routes.
Visa Direct	Complex travel refund process.	Real-time payments refund and rebate origination.	MaaS providers can immediately rebate, refund, and offer goodwill payments in the face of service disruption.
	Gig workforce attraction & retention.	Supports immediate earnings payout.	MaaS providers can seamlessly onboard and pay out gig-economy drivers and other workers in real-time.
	Frustrating local integrations required to support refunds.	Support for refund origination in 190+ countries.	One integration providing a smooth refund experience across 190+ countries.
Tink	Difficult customer onboarding.	Instantly and securely verifying customer or business accounts.	Enables high-performing account-to-account payment experiences for MaaS users.
	MaaS user abandonment.	Enables open banking payment at point of purchase.	Allows MaaS users to pay for products directly from their bank account.
	Fragmented payment experiences.	Seamless integration into the in-app and in-browser checkout experience.	Pain-free integration for MaaS providers, allowing greater flexibility and choice for MaaS users.
Digital ID	Support concessionary travel in MaaS.	Ability to link user's existing card to their identity.	Allow MaaS users to use their existing payment credential while qualifying for concessionary benefits across a MaaS ecosystem.
	Authenticating MaaS passengers.	Validate the user's identity and right to concessionary travel at point of onboarding.	Allow MaaS users to register for a concessionary travel right across a MaaS system.
	Fraud losses for mobility providers.	Validate user's identity and right to concessionary travel.	Mitigate risk of human error or fraud in validation of concessionary right to travel across a MaaS system.
Data & Analytics	Need to optimize transportation network.	Provide data on card or credential usage within a transportation network.	Show network usage, allowing MaaS providers to optimize transportation network for actual network usage, not tickets sold at a station.
	Revenue allocation for cities & MaaS providers.	Provide data on card usage.	Show usage of different modes of transport within an interoperability scheme, allowing the MaaS provider to perform effective revenue allocation.
	Evolving passenger needs and trends.	Show current and historical passenger usage across a MaaS ecosystem.	Show MaaS providers evolution in MaaS passenger usage, enabling them to optimize MaaS service offering in line with emergent passenger behaviors and needs.
Sustainability Solutions	Need to neutralize environmental impact of urban mobility.	API that offers real-time carbon impact analysis of payment data.	MaaS providers can demonstrate carbon footprint and offset in real-time.
	Need for sustainable travel options.	API that offers real-time carbon impact analysis of payment data.	MaaS providers can demonstrate sustainability of MaaS solutions, and personalize passenger communication to help develop sustainable travel patterns.
	Passenger demand for greener travel options.	Access Lune's APIs that connect to carbon offsetting tools.	MaaS providers can offer passengers immediate carbon offsetting tools.

We are here for the journey

Visa, as a leader in the mobility space, is committed to empowering MaaS partners and revolutionizing the urban travel experience through digital payments. In a world where mobility environments are far from seamless, Visa helps ensure that no rider is left behind in their quest for sustainable, frictionless, and multimodal journeys.

Through our extensive global presence, robust platform, expansive reach, and suite of value-added products, Visa is helping address the challenges faced by the urban mobility ecosystem, enabling MaaS providers to deliver bold solutions that surprise and delight users, uplifting communities everywhere.

In this paper, we have explored the inherent challenges faced by the MaaS ecosystem and presented a range of solutions that bolster MaaS providers, transit operators, and other key players as they strive to enable MaaS experiences. From unified payment checkout and intermodal in-app transit payments enabled by Visa Acceptance Platform, to ride-hailing driver payout facilitated by Visa Direct, and alternative payment acceptance with Tink, Visa's solutions are being adopted globally in support of Mobility as a Service.

Our focus lies in creating interconnected and convenient payment options that inspire increased ridership, foster livable and sustainable cities, and pave the way for enjoyable and efficient door-to-door journeys where people get to where they want to be with minimal time and effort.

To learn more about Visa's solutions for Mobility as a Service and to contact us, please visit Visa.com/urbanmobility.

Appendix

Challenges facing transit

How people and goods are moved to, from, and within cities must evolve to meet the needs of a growing urban population. Efficient, reliable, and frictionless transportation systems will be the backbone of sustainable cities of the future.

Explosive growth.

Around the world there has been an unprecedented movement of people to urban centers.

Today, nearly 54% of people worldwide live in cities, up from 30% in 1950.[15] With an estimated three million people moving to cities every week,[16] the global urban population is expected to reach 68% by 2050.[17]

By integrating various transportation modes and streamlining mobility services, MaaS can enhance efficiency, reduce congestion, and contribute to the overall sustainability of cities.

Shifting travel & work habits.

The pandemic has significantly impacted travel and work habits, leading to a surge in demand for contactless payment options and flexible mobility solutions.[18]

In this changing landscape, MaaS emerges as the key to unlocking personalized and optimized travel experiences. By embracing MaaS, cities and mobility providers can offer personalized, flexible and on-demand mobility options that cater to individual needs, helping to foster trust, loyalty, and ultimately, higher ridership and customer satisfaction.

Infrastructure constraints.

The competition for finite road space and resources between different transportation modes hinders smooth mobility within cities. To achieve prosperity and an enhanced quality of life, cities must optimize their urban infrastructure and ensure the harmonious coexistence of public, private, and emerging transportation modes.

MaaS plays a vital role in this by optimizing travel routes based on real-time traffic conditions, staggering travel timings, and redirecting travel patterns, thus reducing congestion during peak hours. MaaS enhances the reliability and predictability of multimodal journeys, providing an appealing alternative to private car usage.

By fully embracing MaaS, cities can alleviate strain on their mobility networks, create efficient transportation systems, and enhance the overall urban experience for residents and visitors.

Financial barriers.

Underbanked and unbanked individuals often lack affordable access to public transport, hindering economic opportunities and contributing to further disenfranchisement. By implementing MaaS solutions with alternative payment methods, such as prepaid cards, cities can overcome traditional banking barriers and provide affordable and flexible mobility options tailored to the specific requirements of all, ensuring equitable access to transportation services.

By removing financial barriers, MaaS promotes social inclusion, economic opportunities, and sustainable city growth.

Climate emergency.

Studies show that cities currently consume 78% of the world's energy, and produce between 60-75% of the world's greenhouse gas emissions.[19] Not surprisingly, the major contributor is transportation – with passenger vehicles accounting for 70% of emissions and 50% of urban air pollution.[20]

The mobility solution to the climate crisis clearly requires a multipronged approach with an emphasis on reduced reliance on single-occupancy vehicles. MaaS is a catalyst for sustainable means of transportation that helps bridge public-private mobility options and offer seamless door-to-door journeys.

Challenges to implementing MaaS

The problem with much discussion around MaaS today is a fixation on a limited yet idealistic vision of a singular MaaS app that will be used by all. While an app, or perhaps multiple apps, will almost certainly play a role in wide-scale MaaS implementation, the discussion would benefit from a step back to understand the core of what is needed to realize the frictionless mobility vision. The central elements needed for a successful MaaS implementation can be split generally into three categories: policy, partnerships, and technology.

Policy changes are crucial for the success of MaaS as they drive marketplace participation and strategic partnerships, and incentivize necessary technology and infrastructure developments. The public policy enacted to enable MaaS will necessarily vary across countries, but several core policy issues must be settled to allow for the successful implementation of a MaaS solution. These issues include, but are certainly not limited to, open data, data privacy and equitable and non-discriminatory access.

Visa recognizes the significance of open data in driving MaaS innovation. Countries like the UK are leading the way by adopting an "open by default" approach to data sharing, as outlined in their recently published Transport Data Strategy report.[21]

Visa's solutions can seamlessly and securely integrate with these initiatives, leveraging open data to enable collaboration amongst mobility operators and create a robust MaaS ecosystem.

Key to the success of any MaaS implementation is forging strategic partnerships among the mobility ecosystem to align priorities and collaborate towards a shared vision. These partnerships foster thriving marketplaces of mobility operators, enabling integration across transit modes and promoting optimized route planning, travel services, and infrastructure design.

Visa's expertise and solutions help facilitate these partnerships, empowering operators to enhance their offerings and provide resilience and optionality across transport networks and neo-modalities. With Visa, a ride-hailing platform could offer mass transit tickets and last mile rentals to their customers, creating a comprehensive and convenient mobility experience.

Developments in infrastructure and technology are needed to facilitate seamless data collection and enable real-time information exchange between intelligent transport systems. Integrated payments infrastructure is crucial to the success of intelligent transport systems, making services appealing to potential users and ensuring convenience and simplicity in fare payments.

Some transport operators in the same city are reluctant to sell their tickets to an integrated MaaS platform, feeling that they lose control of the customer touchpoint and economics. However, with Visa as the underlying trusted network for mobility services, MaaS presents a unique opportunity for forward-thinking mobility operators to enhance their offering, expand their customer base, and improve operational efficiency.

A key to supporting MaaS-enabling policy and technology providers is the ability for passengers' existing payment credentials to be used seamlessly in a MaaS environment. Visa is the driving force behind a frictionless and connected MaaS experience, providing crucial support across both payment acceptance and payment issuance, from unified tokens across multiple modes of transit to empowering employers with prepaid credentials to drive more convenience and corporate travel options.

Annex

Figure 1: Putting customer experience at the heart of our solutions

- Visa Acceptance Solutions
  - Visa Acceptance Platform
    - Digital Accept
    - Tokenization
    - Decision Manager
    - In-person Accept
  - Click to Pay
- Visa Issuing Solutions
  - Loyalty
  - Private Label
  - Prepaid
- Additional Visa Solutions
  - Sustainability Solutions
  - Tink — Open Banking
  - Data and Analytics
  - Digital Identity
  - Visa Direct

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