

Trust in MaaS - Managing Rider's Confidence in the Sharing Economy

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Abstract:

Mobility as a Service (MaaS) promises to transform our cities into spaces where traffic, pollution, and congestion are things of the past. To accelerate this transformation, it must clear the way for more socially and environmentally friendly forms of transport, such as shared use mobility. By necessity, shared mobility services introduce a level of intimacy into our daily commute – and the smaller the environment, the greater the human need for managing safety and trust. Ultimately, it's trust that will cement the role of shared mobility in furthering the MaaS vision in our increasingly automated world. The future of transportation will depend on the emergence of a new breed of trust models, tools and services called collectively "Trust-as-a-Service." They will sit at the core of shared use mobility and promote a new culture of trustworthiness into an industry.

Keywords:

Mobility as a Service, Trust, shared mobility

Introduction

Peer and community trust are more influential and trustworthy than traditional institutional trust. Trust is rapidly moving from a centralised institutional model to a distributed community and peer-to-peer model.

Online commerce involves a level of trust relative to the action of paying for a good or service before having the product in hand. The purchase arrangement relies on trust that the delivery will occur after payment is posted. Lack of trust is likely responsible for the rise of third-party payment processors for these purchases as there is a trusted middle man that confirms available funds from one party while withholding the posting of the payment until the payee receives the product. Mobility is one of the area's most requiring trust as we move down the path of shared mobility. If people are to travel together, trust is vital for rider and driver safety in many forms of mobility. This paper reviews potential methodologies for instilling trust in shared mobility similar to the trust inferred via third party online payment processors.

Today, Mobility as a Service (MaaS) is a well-known concept. Defined as *a combination of public and private transportation services within a given regional environment that provides holistic, optimal and people-centered travel options, to enable end-to-end journeys paid for by the user as a single charge, and which aims to achieve key public policy objectives,*¹ MaaS is at a critical point of development. Cities around the world are adopting MaaS solutions, and while the speed of MaaS developments differ in regions around the world and regulation remains an issue, MaaS solutions are now technologically, financially and operationally achievable.

The success of any MaaS implementation depends on many factors, but adoption by the general population is crucial. While in many cases MaaS presents the most efficient, cost-effective and environmentally desirable mobility option, it must also be attractive to its most important stakeholders – the travellers. Without a significant, mass change in transportation habits and behaviors, the availability of MaaS solutions alone will have a marginal impact on a city's mobility. It may lead to undesirable travel behaviours as people pick and choose mobility solutions that most suit their immediate needs without consideration to the broader impact on society and the environment.

Trust is central to enabling change in travel behaviour in the context of MaaS and shared mobility. Worldwide, trust is in a current state of crisis. According to the Global Trust Barometer, conducted annually by Edelman, we now live in a world of “stagnant distrust”.ⁱⁱ The crisis of confidence spreads across industries and touches many of the traditional institutions, including government and media. Since the issue of trust is so pervasive, it must also be addressed in transportation. Questions such as will people allow autonomous buses to take their kids to school or choose to share rides with strangers in environments with or without a driver can only be answered through management of trust. In a world engulfed in uncertainty, addressing the issue of trust can greatly impact the broader adoption of shared use mobility – transportation services and resources that are shared among users – and other MaaS solutions in cities around the world. Human beings are creatures of habit – technology alone isn’t enough to change our ideas on transportation and overcome our attachment to traveling alone in private cars. Industry leaders must realize that technological advancements and new economic models are changing transportation faster than many people can comprehend. This has left wide swaths of the general public in a constant state of ‘catching up’ in adjustment to this new, strange reality, filled with smart devices, autonomous vehicles, and on-demand services. To ensure successful MaaS implementations, they must dig deep to reveal and address the psychological factors behind transportation choices.

The Sharing Economy in Practice

One of the central philosophies of MaaS is the concept of diminishing reliance on personal vehicles and encouraging widespread use of both public and private transportation options. Still, despite the proliferation of shared use mobility services in major cities around the world, people’s attachment to private cars is unwavering. Over 76 percent of Americans continue to drive alone to work every day.ⁱⁱⁱ Driving remains the dominant method of travel to work in Australia, where in Melbourne, 68 percent of travelers opt for single-occupancy private vehicles to reach their destinations.^{iv} As the number of cars on roads increase, traffic and congestion continue to worsen. In Asia, traffic is estimated to cost local economies between 2 to 5 percent of GDP in lost productivity each year.^v Even the continuously climbing costs of car ownership don’t discourage people from buying vehicles. In Mexico City, with some of the worst traffic on the planet, the vehicle fleet has grown more quickly than the population.^{vi} In the UK, the number of households with two cars has soared by more than half a million in the past year,^{vii} and in Asia, historically low car penetration rates are projected to explode, with Thailand, Indonesia, and Malaysia, expecting a 10.5 percent rise in car ownership *per year* until at least 2020.^{viii} The truth is – people like traveling alone in their own vehicles. Cars are a safe place to keep belongings that might come in handy in case of an emergency and driving alone in private cars allow drivers to enjoy some downtime without having to talk to anyone.

On the other side of the spectrum, public transit ridership numbers continue to drop, especially at night, as more people gravitate towards alternative transit providers.^{ix} In Asia, the ride hailing market is booming. Over 70 percent of the 16 billion ride hailing trips completed around the world in 2017 happened in Asia.^x While acceptance of private transport services such as ride hailing is growing each year, travelers tend to opt for single rides on their own. Instead of alleviating congestion, this adds to the growing problems many cities face today. Despite initial hopes, recent research indicates ride hailing alone does not present a viable alternative to car ownership. Its costs remain high and its effectiveness in reducing traffic is questionable. In fact, ride hailing creates 2.8 vehicle-miles for every mile of personal car travel it takes away.^{xi} Even ride pooling options, positioned by ride sharing companies as a way of cutting down the number of vehicles on the road haven’t delivered the expected results – at least not yet.^{xii}

A better and more city-friendly way to convince people to change their driving habits is to encourage true carpooling integrated with other forms of transport as part of the end-to-end journey management. There are already millions of single occupancy vehicles traveling together, at the same times of day, between the same origins and destinations – the key lies in effectively matching drivers with empty seats. And while

attitudes towards carpooling differ around the world – in some regions of Southeast Asia, carpooling is almost a social custom (unlike in the US, where cars are considered one’s private domain), all travellers share a common concern – safety. Recent incidents involving the murder of two female passengers while using China’s ride hailing giant, Didi Chuxing, as well as the death of a pedestrian in Arizona, US, struck by an autonomous vehicle, have brought issues related to safety and trust in the sharing economy into the spotlight and underlined a need for a systemic and institutional management of trust in the era of shared mobility.

Stumbling Blocks to Trust in Mobility

Until now, public transit agencies have given precedence to issues of mass transit, and rightly so. But as new transportation services and models emerge, the issues around trust can no longer fall into the blind spot. Service recovery costs of mass public transport are on the decline, yet shared use services can provide a more cost-effective and responsive service, especially for first- and last-mile connections. To encourage a greater uptake of true shared mobility in numbers large enough to reduce traffic and increase mass transit patronage, the transportation industry must focus on managing trust.

In studying the impacts of shared mobility on the automotive industry, McKinsey pointed to an interesting fact: *“Further growth in shared mobility will depend on how effectively the industry eliminates existing customer pain points. For example, some uses such as shared-mobility vehicle pooling can create uncomfortable dynamics among passengers who are basically strangers [...]”*^{xiii}

By necessity, shared mobility services introduce a level of intimacy into the daily commute and the smaller the environment, the greater the human need to manage safety and trust. Safety concerns intensify when traveling with strangers in confined spaces, such as private vehicles, especially if there’s a risk those strangers might exhibit antisocial behaviors – be loud, rude, drunk, or even worse – have criminal intents. The perception of trust is even more critical for women, who are often exposed to more severe threats. A report by Finance Corporation and Accenture released last year found that women often cite the shortage of female drivers and the risk of sexual harassment as reasons for avoiding shared services entirely.^{xiv} These safety concerns, have, in turn, given rise to a number of ride hailing services that cater to women only and hire female drivers, such as Femi Taxi and Lady Driver in Brazil or See Jane Go and Safr in the United States.

Since there’s no current methodology to vet fellow riders, it’s no wonder people aren’t ready to take the risk, especially at a time when trust issues around drivers forced the world’s largest ride-hail company (by the number of trips) to suspend operation. Didi’s safety problem is an issue that lies at the core of all shared mobility services around the world regardless of the mode of transport. There is a limit to the level of inherent trust in a system, and once trust is broken it is difficult to repair.

One way of addressing the problem and improving the actual and perceived safety of riders and drivers is to start managing single identities of users for all modes of transport through new services, applications and a creative use of technology. Mobility applications will need to evolve past simple ticketing and journey planning services to manage trust characteristics of riders and drivers, enable active monitoring, and allow rapid access to police and loved ones if something goes wrong or just doesn’t feel right. Applications that manage and match user’s detour tolerance, as well as “trustworthiness” or preferred rider’s profile (e.g. Women can choose to share after-dark rides or carpool with women only) can ensure first/last-mile journeys are safer and thus more attractive.

Since there is no single measure of trust, future systems are likely to look to multiple trust “markers” which show someone is authenticated as having trustworthy credentials or as belonging to trusted communities. In combination these trust markers together with algorithms may be able to produce trust scores, which can

be used to remove some barriers to shared mobility. On an institutional level, cities could help riders find trusted partners to share rides with, taking into consideration factors such as trustworthiness and driver vs. passenger preference, while promoting carpooling among trusted peer networks, such as employees. Other solutions, including safe pick-up and drop-off zones on routes can further increase riders' confidence in shared mobility options – those with safety concerns no longer have to expose their private address to strangers.

In a true spirit of MaaS, any future solution for managing trust in transportation will need to be actively managed across transit modes. Nobody wants to go through a customer on-boarding and vetting process multiple times with several different providers. Choice, convenience, and interoperability will be key to successful identities management, ensuring that seamless end-to-end journeys can occur irrespective of the operator. Importantly, any trust scoring system for mobility will need to be user - rather than government - controlled, enabling each user to determine how and with whom they are prepared to share their trust scores. The right solutions, however, underpinned by appropriate regulation and supported by relevant institutional programs, will have the power to permanently redefine people's ideas about shared transportation. For instance, in Southeast Asia, where tech-enabled pooling is still in its infancy, the opportunity to influence commuting patterns of entire future generations in favor of sharing and prevent the growth of car ownership is tremendous.

Delivering and managing shared use mobility services that are convenient, cost-effective and instill rider confidence, can – but doesn't have to be – a challenging task. There are already solutions and services, both within the public and private sectors that can cater to those requirements. Integrating them is a logical next step, but that cannot happen without an honest collaboration between governments, public and private transit operators, as well as MaaS solution providers.

Public transit agencies will have to trust third-party transportation providers to deliver the technology that enables the quickest, easiest, most convenient and cost-effective solutions. Third parties will need to become transparent in their vetting of drivers, sharing of data, reporting of incidents, and take significant steps towards improving the safety of riders and drivers alike. They will also need to allow public transit providers to manage the marketplace for transportation services to ensure they serve the public good and are aligned with the overall objectives of a city or a region. Both sides will have to remain openminded and allow independent watchdogs to ensure safety remains a priority.

Trust in the Era of Automation

As yet another car manufacturer joins the race to develop self-driving cars, it's safe to say the automotive industry has made up its mind about autonomous vehicles (AVs) – they are here to stay.^{xv} When AVs first hit mainstream headlines around 2012, many people considered them an ideal solution to major city pain points, such as traffic, pollution, and accidents.^{xvi} Today, the enthusiasm has stalled, as city officials realize replacing personal cars with automated pods won't rid them of gridlock.^{xvii} In fact, many studies, including research from the World Economic Forum and Boston Consulting Group, warn that self-driving cars could increase urban traffic, as people flock to AVs over public transportation, especially if they prefer to travel alone.^{xviii}

A sustainable transition to AVs considers the use of self-driving cars for shared use mobility, last mile transit, microtransit, and paratransit. Electric shared autonomous vehicles could improve traffic flow on city streets, limit congestion, and increase air quality without adversely affecting public transit ridership. But encouraging riders to shift to autonomous buses, trams and ride-shares won't be easy without first addressing the underlying issue of managing riders' trust.

Although millions of people catch public transit regularly, including at night, without so much as a second thought about safety, the presence of a public sector employee – a driver, a ticket inspector, or even a transit police officer, goes a long way when it comes to people’s perception of safety. In scenarios where riders share driverless vehicles, that perception suffers, especially when it comes to women. A recent study conducted in Finland (which according to Eurostat,^{xix} holds the second highest rating when it comes to trust in others in the European Union), shows that 64 percent of participants rated their sense of in-vehicle security in a driverless public transit shuttle bus as worse or much worse than in a conventional bus.^{xx}

If AVs are to make a positive difference in our cities, we need to establish industry-wide trust models and trust management tools. Trust in Mobility will need to sit at the core of autonomous shared-use mobility and instill a regimen of trustworthiness into an industry that has so far avoided regulation. While many existing applications can carry out identity checks, few, if any, are able to conduct trust-worthiness checks in a systemic manner. Yet, there are hundreds of opportunities to authenticate people above merely confirming their identity, and there are companies that have begun developing IP around how trust can be identified, managed and shared for use in mobility. To effectively manage trustworthiness, Trust applications would ideally need to assess trust on several levels:

- **Institutional** – which looks at typical identity checks, such as passports, driver's' licenses, and ID cards
- **Community** – which considers the communities users may share with others which engender trust, e.g. employers, schools, universities, sports clubs or volunteer organizations
- **Peer-to-Peer** – which directly and indirectly link to trusted peers and their networks

Using artificial intelligence, data science, and algorithms these trust factors can form the basis of sophisticated trustworthiness measures for use in autonomous shared mobility services. This will provide riders the tools they need to make confident travel decisions that increase their perception of safety and trust – especially in small-scale transit environments.

There are also technological innovations that can help further improve the subjective sense of safety on board of autonomous transit fleets. In transit environments that already take advantage of account-based fare collection systems, transit agencies might consider requiring anyone interested in using AVs to sign up for a chosen mobility trust service. Trust credentials could become part of an existing travel account, permitting holders of transit cards to safely use autonomous public transit vehicles and other shared mobility services. Since every rider would be linked to an account and identifiable (under pre-determined conditions) such an approach would improve the overall perception of safety among passengers.

Equally, pick up and drop off spots would only happen in designated safe areas or terminals, and vehicles could be fitted with advanced safety features such as real-time security cameras, emergency buttons, and automated alert systems. Voice-recognition technologies could monitor for sounds of hostile language and alert a human operator if things escalate, enabling quick and appropriate action. Safety applications on personal mobile devices could allow passengers to discreetly inform the authorities of a developing situation, taking advantage of location tracking and Bluetooth technology to identify the vehicle in question alongside all passengers on board. At a time where more than half of large cities is preparing to roll out AV technology, considering the possibilities for increasing passenger trust is definitely worthwhile.^{xxi}

Conclusions

The advent of the sharing economy promises to redefine consumption. It is hailed as a world where usage will trump possession and where consumption will become collaborative, rather than self-centered. Today, it is clear that the move from the culture of “me” to the culture of “we” in transportation isn’t happening as fast as it could.

Current discourse around MaaS focuses on issues related to technological, operational and financial aspects of shared mobility, paying little thought to psychological implications. Yet, the answers to questions: **Why** people like traveling alone, **why** private cars are so attractive, **how** to manage trust and **how** to maintain personal cocoon for those who most need it, are likely to determine the direction of future mobility. Whatever the answers, city authorities, public transit operators, and private transport service providers must come together to deliver and incentivize safe, simple and cost-effective shared mobility solutions which address the personal and psychological reasons for people's travel preferences, expectations and concerns.

As the sharing economy continues to progress, shared use mobility services will play a critical role in advancing the MaaS agenda. Policy makers, technologists and transit agencies must walk a delicate line between technological innovation and rider's confidence. It is time to open a discussion about Trust-as-a-Service and determine the best path forward.

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