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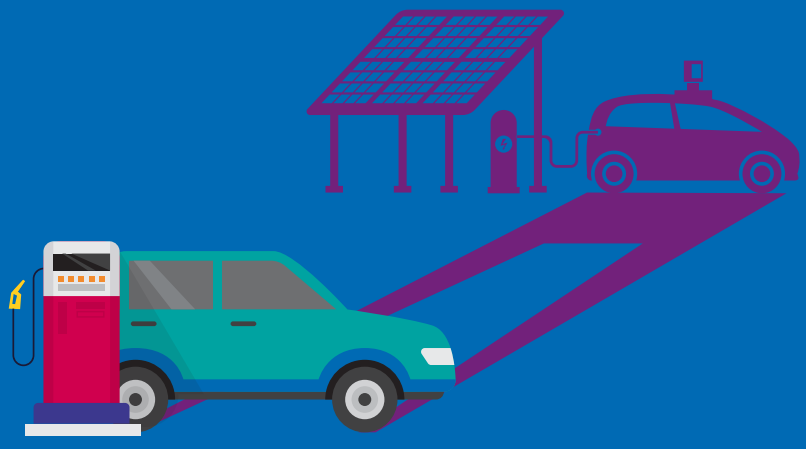
Reimagine Places: Mobility as a Service

The Mobility as a Service (MaaS) Requirements Index: A guide for determining the required regulatory, governance, commercial, and technological environment to facilitate policy and customer-optimised mobility services.



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Let's reimagine mobility

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This paper is one of a series of thought experiments in which KPMG staff imagine new ways for local and sub-regional public sector bodies to realise public policy and commercial goals. Many of these ideas will explore the growing opportunities for productive collaboration between public bodies and private sector providers as decision-making powers and budgets gravitate towards the local level.

This might mean working up new and disruptive business models. Or finding new ways to take advantage of growing mobile connectivity and data sharing. Or tapping into the power of markets, incentives, analytics or the wisdom of crowds. In every case, it involves fresh ideas.

But within this constraint we want to step outside conventional thinking, and test out new approaches and concepts which offer benefits to travel operators, public authorities and customers. We want to stretch ourselves, applying new technologies and techniques to solve complex problems. We are not calling for a specific future – but we are reimagining it.

What do you think?

The MaaS Requirements Index

Local and regional transport authorities face increasing disruption and challenge from demand-responsive private sector services, electric and autonomous vehicles, and integrated multi-modal journey planning and payment solutions. Our MaaS Requirements Index, provides a mechanism by which transport and local authorities, operators and other mobility services providers can understand the regulatory, commercial, governance and technology operating models that will be required to deliver strategic objectives for local and regional transport.

For instance, is a complex MaaS ecosystem an operation that requires a large amount of regulation to achieve policy goals and optimise the user experience, or is the transport system more straightforward, and in need of lighter-touch regulation? Do local authorities need to provide their own on-demand mobility services to cater for the needs of concessionary customers? How will authorities move from where they are now on the MaaS Index to where they need to be?

While this paper is predominantly focused on helping transport and local authorities to determine their future MaaS strategy, we believe that, through collaboration between authorities, operators and mobility service providers, the Requirements Index will be a universally helpful tool. The reader should also note that MaaS forms but one part of the puzzle: our expectation is that MaaS strategies are developed in tandem with urban planning and capital investment programmes, the latter being informed by the extent to which integrated public and private sector transport networks can be optimised to meet demand.

What follows is a twofold exercise: first, mapping the MaaS Requirements Index and establishing its utility as a tool for Authorities.

Second, positioning five MaaS ecosystems on the Index and reimagining the regulation and modal blend needed to balance optimal user experience with the authority's and operators' objectives.

Mobility as a Service: getting up to speed

Imagine a world where travellers move seamlessly from place to place. Where they stipulate their journey and travel preferences on an app, computer or kiosk, and are presented with journey choices, according to their preferences, which fully integrate public and private transport modes. Where payment happens automatically, using a processing method of their choice. Where the transition from one mode of transport to another is straightforward, perfectly timed and effortless. Where congestion is minimised, air quality improved, and passenger comfort enhanced. And where there's plenty of on-demand travel options, and users have ready access to real-time journey information and an integrated journey planning platform[1].

Such a world is now the stuff of reality. Travel can be this straightforward, and the building blocks are appearing in cities such as Vienna and Helsinki. With the right technology and modal blend, it's possible to create a travel ecosystem that significantly enhances the user experience and achieves key policy objectives, including economic growth.

The new paradigm is known as Mobility as a Service (MaaS). Like other aspects of the digital revolution, it uses the latest technology to empower consumers in making their own choices. At its most developed, every public and private transport option is presented in a single app, handling payment and bookings through the same platform and providing dynamic route-planning information to users.

But MaaS is about much more than this. It is about making every aspect of travel effortless, facilitating an ease of movement that would have been unimaginable to our forebears as they queued on platforms, fought over taxis, or squeezed into buses.

The digital travel revolution has happened. Now, transport authorities and local authorities need to get up to speed.

Helsinki: a test case

It has become commonplace to cite Helsinki in Finland as an exemplar of MaaS[2]. Residents of the city use the travel app, Whim, to select their favoured mode of transport from a list including trains, buses, bikes, trams, or taxis. In cases where they need to switch mode mid-journey, the app enables them to plan and where necessary adjust their route in real time to minimise hassle and delay.

Payment is handled by Whim, either through pre-pay or a payment card registered to the account. In consequence, the user has a seamless experience. They quite literally pay their money and make their choice. The result is reduced congestion, less reliance on personal mobility, and a greatly enhanced travel experience.

While a standout example of the development of a MaaS ecosystem, Helsinki raises some questions about the future. Whim is a commercially operated platform, and it may be that in other contexts authorities want to develop their own journey planners. There is no such thing as a one-size-fits-all approach to MaaS, meaning that what we witness emerging in Helsinki today may not be the version of MaaS that dominates tomorrow, or is right for every context.

So, where does the future lie for MaaS in your region? And how do you get there? These are the questions our MaaS Requirements Index can help to answer.

Unpacking MaaS: what are the factors in play?

Let's define MaaS as the full integration of private and public mobility services in a seamless manner, designed to meet the objectives and requirements of a variety of stakeholders. These include:

Customers, who have central importance in any transport ecosystem. User experience is crucial, and drives demand for MaaS. Standardly, success can be measured by reference to Performance (i.e. quality of mobility service, for example comfort and ancillary services), Cost, and Time (i.e. how long it takes to get from A to B). We use the shorthand PCT to refer to these criteria.

Mobility services providers/operators, who are usually commercial organisations, but can be Authorities who run their own services. Commercial operators seek to maximise their financial returns, and include market disruptors such as corporate and individual bus operators, Uber and OhBike, while authorities are more likely to be concerned with providing affordable mobility options - especially for concessionary travellers and providing mass transport services. For operators, PCT is crucial, since it shapes demand.

Local/City/Transport Authorities ("Authorities"), who have the power to intervene in the mobility ecosystem through regulation or in some instances as a provider. Their goals are not usually commercial, but have to do with achieving policy objectives such as delivering economic growth, social inclusion, space optimisation, and citizen health and wellbeing. In relation to transport, such goals are appended by other metrics, such as air quality, congestion management and aesthetic impact.

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What's the influence of market disruptors?

On-demand services and the rise of autonomous vehicles

Think of MaaS and one brand will jump immediately to mind: Uber. Of all the disruptors to enter the mobility space in recent years, this company's impact has been most dramatic.

Consider London, for example, where Uber has become a dominant force. Between 2011 and 2017, the number of private-hire vehicles in the capital is reported to have increased from 50,000 to more than 110,000. The effect of this has been to cannibalise the bus market, for two reasons: first, because Uber provides a viable alternative to bus travel around the city; and second, because its proliferation increases congestion, thereby slowing bus speeds and making them less attractive as a mode of transport.

Furthermore, the rise of on-demand services should be seen as a precursor to, and indicator of, the impact of autonomous vehicles – not least due to the cost savings available by removing drivers and the potential for the business models of automotive manufacturers to shift to fleet provision.

This raises a particular challenge: unlike private operators, authorities are required to continue providing transport services even when they are commercially unviable, to cater for demographic segments who cannot afford on-demand services such as Uber, and proactively to provide mobility to generate economic growth (rather than enter the market in response to economic growth). So although the arrival of disruptors like Uber enhances choice for many, it makes the task facing authorities harder, and may reduce mobility services for poorer citizens, while harming efforts to regenerate districts and regions.

Aggregators

In Helsinki, MaaS has proved successful thanks to the provision of Whim, a commercial platform through which customers can book and pay for transport around the city using a wide range of modal services provided by different operators.

Such aggregators provide a further disruptor to mobility ecosystems, in as much as they enhance market transparency, and disintermediate customers and operators. In simple terms, consumers have more freedom of choice about how to travel, can make better-informed decisions, and are therefore harder to influence through market interventions. From a regulator's perspective, that undoubtedly complicates the task of achieving policy objectives.

Electric Vehicles

Changes to road user charging – currently predominantly based on emissions – are likely inevitable. While not certain, a potential future charging system may be distance-based (Pay As You Go), with pricing by region or even route. These changes may provide levers for authorities to influence use of private vehicles, but may also make their use more attractive for travellers if they believe they are getting better value.

These changes extend to initiatives such as (Ultra) Low Emission Zones (LEZs) which, while intended to improve air quality, have the indirect impact of reducing slow-moving goods vehicles and, therefore, reducing congestion. Removing LEZs may adversely affect congestion as more goods vehicles join/re-join the road network.

What's the right mix for a MaaS ecosystem?

Let's be clear: private mobility and on-demand providers have an important role to play in a MaaS ecosystem. Their presence enlivens the market, encourages innovation and invites new players to push boundaries and offer fresh thinking to customers.

That's great news for citizens, and provides a helpful spur to economic prosperity, by creating a market in which SMEs and start-ups can play a role. What's more, private operators can plug gaps in the public transport network, as evidenced by the role Nippy Bus plays in enhancing the modal mix in the West Country. So while they can raise challenges for authorities, they can also help achieve their objectives.

What is needed, therefore, is a joined-up approach to mobility that makes use of the opportunities presented by MaaS and recognises the balance of priorities in the mix. Private operators and authorities have different objectives, as we have seen. As with any regulated market, the task is to hold them in tension with each other, establishing conditions in which the best outcomes for each player are achieved, while optimising the user experience.

This is the driving force behind the MaaS Requirements Index, pioneered by KPMG. It provides a tool that enables operators and authorities to understand the optimum level of regulation and policy needed to achieve their objectives while balancing the commercial needs of operators.

Future iterations of the MaaS Index, and KPMG's related thought leadership, will analyse different commercial, governance and technology scheme operating models and illustrate how these can be applied in the different regulatory settings. For now, we see the value of the Index as illustrative: it shows where an authority is, and helps it to understand where it should be, and where it may be in the future. So it informs the management of a context to determine the right balance between the interests of customers, operators and the authority. This involves configuring the optimum ride mix (i.e., range of mobility options for users) to achieve each player's objectives, recognising the need for compromise on all sides.

The MaaS Requirements Index: how it works

By measuring a setting against a variety of factors, we can ascertain its position on the MaaS Requirements Index. Factors we consider include:

- **Complexity of modal choice (x axis):** The extent of modal choice for strategic transport networks – spanning public and private services.

- **Level of congestion (y axis):** As road congestion increases there is an immediate impact on the effectiveness of any form of road transport, thereby harming economic stability (e.g. the ability to get freight and logistics around, the mobility of emergency services, worker mobility). This also compounds – at least in the short term before widespread adoption of electric vehicles – air-quality issues, and has an impact on the attractiveness of road-based public/mass transport.

- **Crowding on public transport (y axis):** A similar impact to road congestion. On public transport, crowding causes delays and makes the mode seem less attractive, potentially compounding road congestion because users opt for alternative means of transport, including private-hire or on-demand cars.

- **Air quality (y axis):** All transport authorities in major cities have air quality targets and therefore want to reduce congestion and the use of polluting forms of mobility.

- **Resilience to disruption and delay (y axis):** If a context has low resilience to disruption and delay it is crucial to keep integrated transport systems running smoothly as they are less able to absorb fluctuations. Delay and disruption have an impact on crowding and, ultimately, economic growth.

- **Public Health (y axis):** Local authorities have targets for improving public health and reducing heart disease and obesity. Walking and cycling need to be actively encouraged, meaning authorities have a vested interest in reducing car use among citizens.

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- **The need to provide concessionary mobility (y axis):** Unlike commercial operators, authorities are required to provide concessionary transport for society's least well off, even if it is not profitable. This is not only a social justice issue. Personal mobility is a key driver of economic growth, because it ensures a ready supply of staff for every sector of the economy, including retail and health, and reduces the burden on the state to support disadvantaged citizens.

- **The need to provide mobility services to facilitate economic redevelopment (y axis):** As discussed above, private sector mobility providers are unlikely to prospectively invest in areas targeted for economic redevelopment, preferring to enter when the market is profitable (or when sufficient subsidies are available). But there is an onus on local authorities to provide mobility services to enable access to employment, thereby requiring their investment regardless of the immediate returns available.

As already intimated, we weigh these measures against a wider question for an authority, namely: how does the mobility ecosystem contribute to its achievement of overarching policy objectives such as economic growth, citizen wellbeing, space optimisation, and social inclusion?

Thus, analysis of the degree of MaaS in a setting, and the level of regulation required in that setting, is driven by recognition of the impact of MaaS regulation and policy on achievement of an authority's overarching objectives. Principal among these is economic growth, including the incentivisation of new business in a region. So it needs remembering that effective MaaS regulation necessarily sets up the right conditions for new market entrants that can facilitate the flourishing of mobility services alongside the pursuit of commercial success. Such a mixed, but balanced, market is key to the success of any MaaS ecosystem.

Assessing MaaS

Taking our metrics and an authority's overarching objectives into account, we position a MaaS context on our Index. From a regulatory perspective, we divide roughly into three categories (acknowledging that there is, in reality, no mutual exclusivity and these should not therefore be treated as discrete silos):

Open MaaS Market

(e.g. Bristol, Exeter, Birmingham): This is a context where complexity of modal choice does not necessarily correlate to elevated risk factors such as air quality or congestion. At the lower-modal-choice end, resilience may not be high, but travellers are able to take direct responsibility for mobility, thereby relieving reliance on public transport in the general case. Regulation tends to be light touch (if relevant at all), though in some cases it could be ramped up to help the authority achieve its objectives. This would involve a movement in position on the MaaS Requirements Index, into a more regulated market (see below).

Light MaaS Regulation

Light (e.g. Helsinki, The Vienna Smile Project): In this context, modal choice is greater, and the risks to mobility are moderate. Air quality and congestion can be problematic. While the transport or local authority regulates the travel ecosystem, it is likely that one or more MaaS schemes are operated principally by private sector players, with the user interface being managed commercially to provide integrated journey planning, payments and choose and book for on demand services. An example of the sort of regulation in place may be a stipulation that any mobility services provider offering integrated journey planning has to display all the travel options available, not just its own services.

Full MaaS Regulation

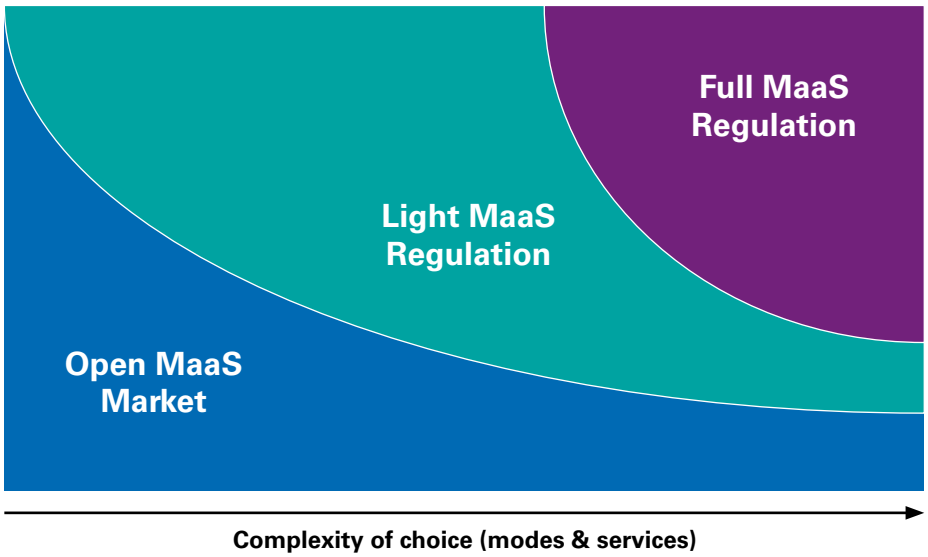
(there are no standout examples as yet, but it is apparent that some cities in the world are on a trajectory towards this, or otherwise ought to be): This is the most developed MaaS regulatory context. A number of players operate, offering huge complexity of modal choice and elevating the risk of congestion, as well as threatening air quality. Without intervention, it is hard for the authority to achieve its policy objectives in these areas. Thus, this MaaS context requires substantial regulation, with the MaaS scheme being operated by the authority itself, and private-sector suppliers operating under the authority s scheme, or private schemes being tightly governed by the authority in respect of pricing and service provision.

As the diagram reveals, authorities can fall anywhere on the Index. They do not fall neatly into one of the three heuristic segments that we identify above and in the diagram. In fact, we expect that each MaaS setting will have its own position on the Index, but the process of locating it will provide a means of determining both where an authority currently sits in relation to its mobility ecosystem, and what interventions it needs to achieve the optimum balance between every players' objectives.

In reality the achievement of the targeted level of integration of mobility services in a city or region will not be delivered through a "big bang" initiative. A critical path of initiatives and interventions will need to be developed and enacted. This will be different according to the policy objectives and focus areas of cities and regions; for example, cities who have already adopted integrated payment platforms may initially focus on active traffic management whilst rural regions may initially focus on data sharing and integrated journey planning.

All of which prompts our KPMG thought experiment. Because the best way to make sense of the MaaS Requirements Index is to see what happens when we locate a particular setting by reference to it. That's what we do in the rest of this paper, reimagining each context by reference to examples of regulatory choices the authority may make in order to establish the optimum ride mix while achieving its objectives. And to ensure our focus remains firmly on the user, we view each scenario through the lens of a citizen's experience.

MaaS Requirements Index



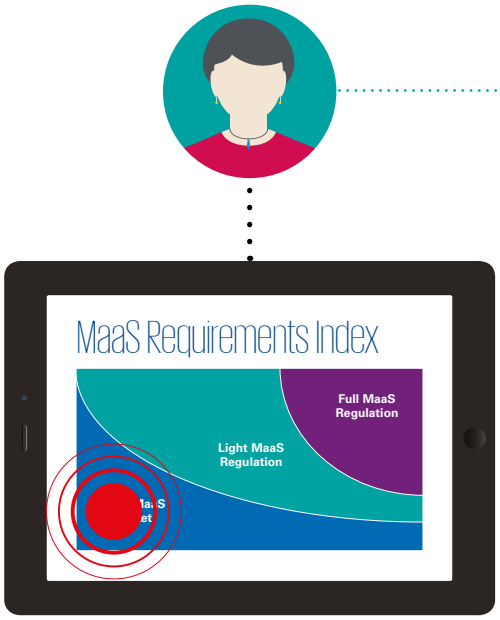
Indicative scheme architecture to be developed in future iterations of this tool

Governance & Regulation:	**Permissive Management** ⟷ **Directive Control**				
MaaS Propositions / Products / Functionality:	Integrated Journey Planning	*Add* Integrated Payment Platform	*Add* Integrated "Choose and BooK" on-demand public & private mobility	*Add* Customer-optimised dynamic service management and route planning	*Add* Capacity-optimised dynamic service management and route planning
Scheme Architecture:	Open market with one or more MaaS providers working independently to address customer needs		Regulated market with one or more MaaS providers mandated to share data and APIs and adhere to ground rules set by the local/regional authority(ies)		Highly Regulated market with one MaaS aggregator which governs demand and supply across all public and private mobility services in the region*.
Public Authority capabilities required:	Regulatory oversight		*Add* Cross-modal Transport Modelling and Management		*Add* Technology Integration and Service Management, Data Sciences, Dynamic Network Management

**N.B. In this scenario the aggregator may mandate and provide a single customer interface (likely it's own) or may enable multiple MaaS platforms to interact with the aggregation platform in a federated architecture.*

Scenario one

Rural, low modal choice, open regulation



1

Mrs Alpha lives in a rural location. She's in her sixties, and has lived here since the 1980s, when she moved to take a teaching job at the local school.

2

Like most of her neighbours, Mrs Alpha owns a car. It's a modest family hatchback, bought for reasons of economy and reliability. She tends to use this whenever she travels, unless a friend takes her to a social event or day trip.

Let's reimagine what an authority could do

It's tempting to say nothing. Local residents like Mrs Alpha are solving their mobility challenges with the aid of neighbours and local voluntary organisations. The system could be more resilient, in as much as a breakdown or loss of personal transport causes disruption for the individual concerned. But the level of investment needed to ameliorate that risk for every citizen is unsustainable.

Those empty buses are a source of concern: wasted resources, unnecessary pollution and a service that remains unsatisfactory.

What if the authority invites more third-sector and commercial players to offer transport solutions for residents – possibly through subsidies or commissions, or provides more of its own on-demand services, especially in relation to last-mile journeys? This would enhance resilience in the setting, reduce reliance on individual mobility and make more sustainable use of resources. It would also mitigate the risk of the church minibus ceasing, and ensure concessionary travel remains on offer.

3

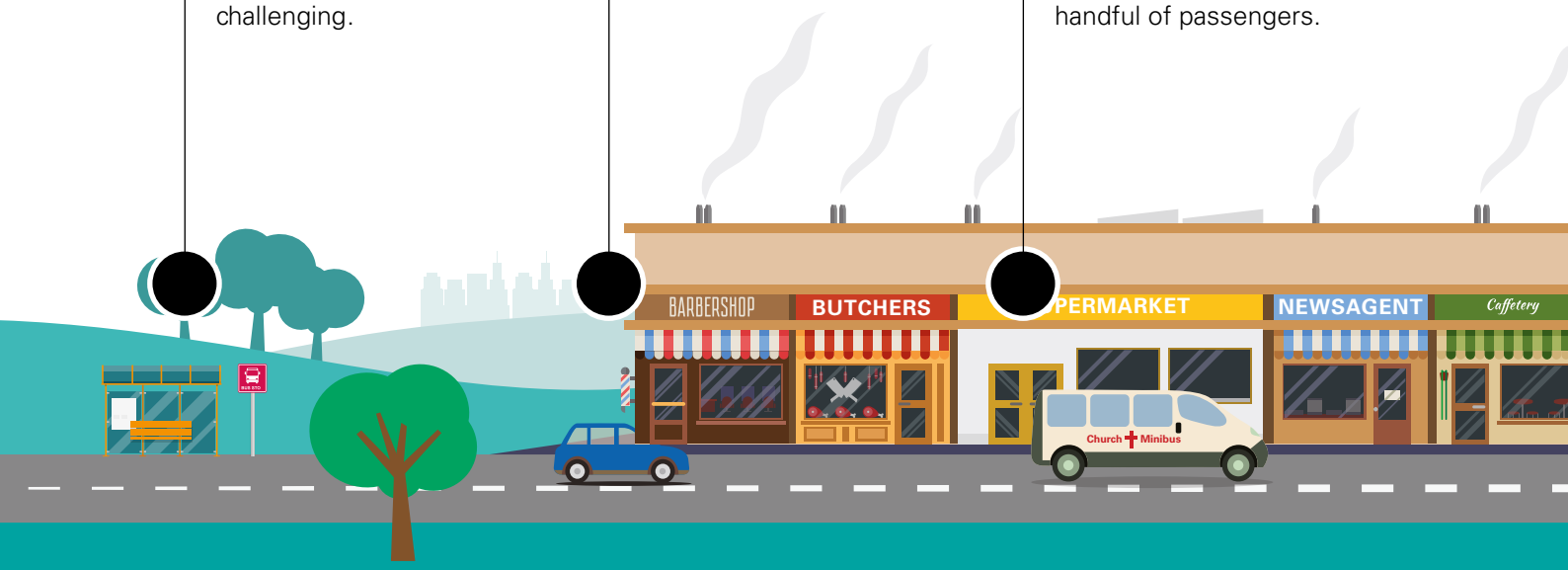
It is lucky Mrs Alpha has a car. There's only one bus each day that travels to and from the nearest town. On the rare occasions she books a taxi, she calls the local private-hire company, and most likely waits at least 40 minutes for it to arrive. The nearest train station is in the next town along, and cycling on the country lanes is treacherous, not to mention physically challenging.

4

Mrs Alpha is fine all the time she can drive. When she becomes unable to use her car safely, she's faced with a couple of options: move to a bigger town where there are more facilities on hand and better transport links, or rely on friends to get from A to B.

5

Mindful of this dynamic, a local church has set up a minibus service for elderly residents. It advertises trips out to local shops, attractions and events, as well as a regular hospital run. People sign up for journeys via a Facebook page. The minibus is usually full, in stark contrast to the local commercial bus, which often carries just a handful of passengers.



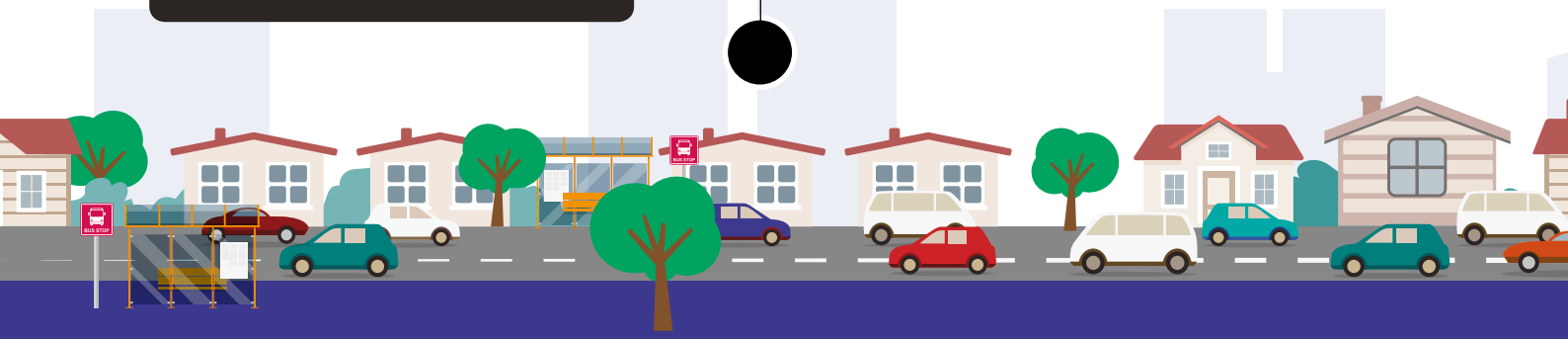
While this may reduce demand for buses, it would probably provide a more effective means of transporting citizens, and reduce the authority's own cost base in respect of the subsidies that it needs to pay the commercial bus operator for that service to be viable. And since the risk of greater modal choice to air quality, congestion and crowding is slight, it is a move that seems well worth trying.

Scenario two

Urban, low modal choice, open regulation

1

Mr Beta lives in a growing urban setting. There aren't many options when it comes to getting around, beyond a handful of commercial buses and private cars. Even so, there are a lot of cars on the road, and the small city's infrastructure is ill-equipped to cope. As a result, congestion is a recurring problem, and air quality is very poor.



Let's reimagine what an authority could do

This is a good example of a context in which careful intervention in the market could achieve very positive outcomes. What if, for example, the City Council encouraged commercial on-demand disruptors to enter the local market, but allied this to a limit on the number of private-hire vehicles allowed into the city centre at peak times? It could also incentivise use of electric vehicles among operators.

The result would be greater modal choice for citizens like Mr Beta, giving them the freedom of personal mobility without relying on their own car. But by regulating numbers of cars, and how they're powered, the authority mitigates the risk of increased congestion and poorer air quality. Such a move may even enhance the desirability of buses, making them less crowded and reducing journey times by minimising traffic. And it's easy to see how an on-demand bike-sharing scheme could thrive in such a context.

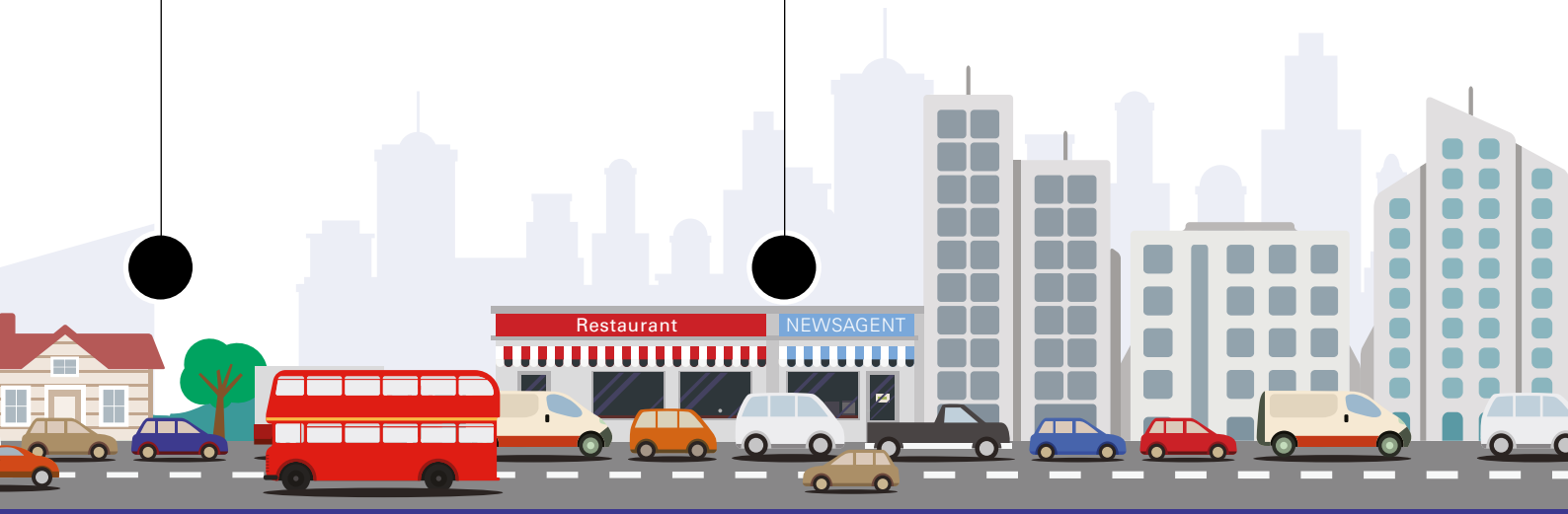
As a further intervention, the authority could encourage an organisation to deliver an integrated travel planning platform for use by residents, showing both public and private transport options along with pricing and estimated travel times. That would enable Mr Beta to choose

2

When Mr Beta goes to work, he drives, because he views it as his only realistic option. It costs him £30 per week to park in the city centre, and it takes him at least half an hour to get home, even though he only lives in the suburbs. He could catch a bus, but it's always crowded at rush hour, each bus has its own proprietary ticket type, and at least in his own car he can take short cuts to avoid the most troublesome tailbacks.

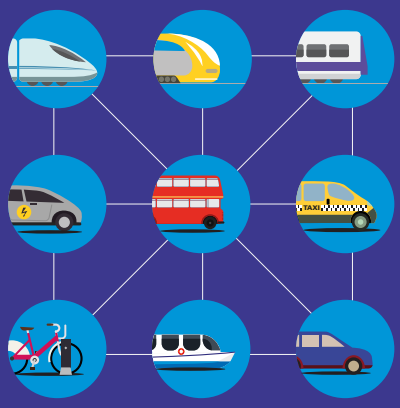
3

It's a similar story when Mr Beta goes out at the weekend. He and his wife tend to drive back into town to go to a restaurant or the cinema. It's a pain, because it means one of them can't have a drink, and they're always nervous about leaving their car parked up in the evenings. But once again, the bus service just isn't suitable: they're not always ready to go home in time for the last bus; and anyway, it's a hassle to walk home from the bus stop.



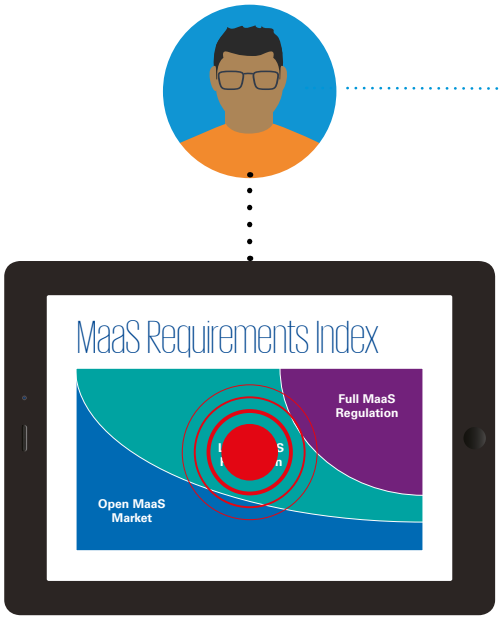
the best mode of transport on a day-by-day basis, greatly enhancing his experience of travelling around the city.

From the perspective of the MaaS Requirements Index, interventions such as these would effect a change in the city's position. It would move from top left to the middle, courtesy of greater regulation. But the pay-off would be a lower position on the left-hand vertical axis, because the risk of greater modal complexity to the achievement of policy objectives would be mitigated by regulation.



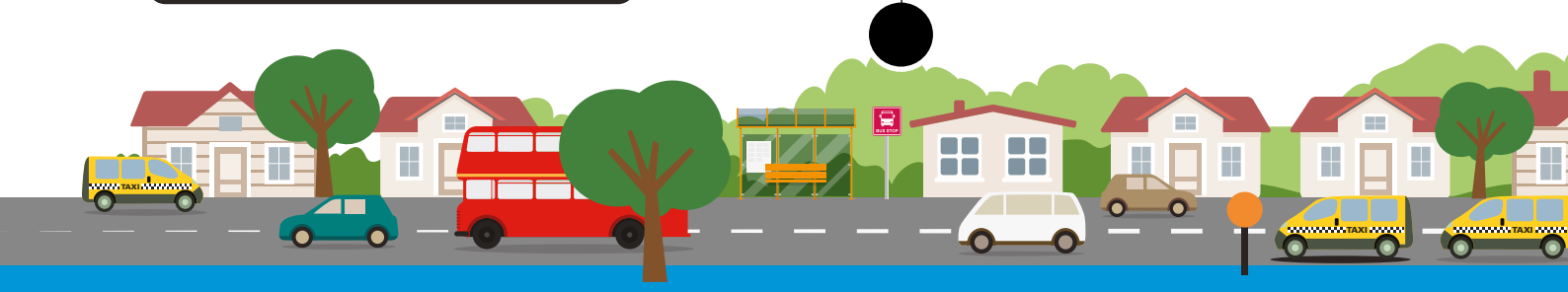
Scenario three

Urban, medium modal choice, light regulation



1

Mr Gamma doesn't live in Helsinki, though he sometimes wishes he did. Instead, he's in a busy market town, about two hours outside of the regional metropolitan city. There's a train station with good links to the capital and the rest of the UK, and regular bus services around the town and to outlying villages, operated by a number of different companies.



Let's reimagine what an authority could do

First up, it might imitate Helsinki and collaborate with a private sector partner to facilitate the deployment of a travel app for the whole town. It could invite a local software developer to take a lead on this, generating economic growth in the area and creating a new commercial opportunity. The authority doesn't need to operate the app itself, though it may need to regulate the travel ecosystem to optimise efficiency.

For example, what if the university were encouraged to expand its bikeshare scheme to all local residents? Looking at the wider urban planning context, some additional cycle lanes could be built in the town centre to encourage their use, and ease congestion. Maybe Mr Gamma could jump on a bike to the station, rather than sitting on a bus? This could be included in the integrated travel app, including real-time location of available bikes and integrated payment to facilitate use by Mr Gamma.

2

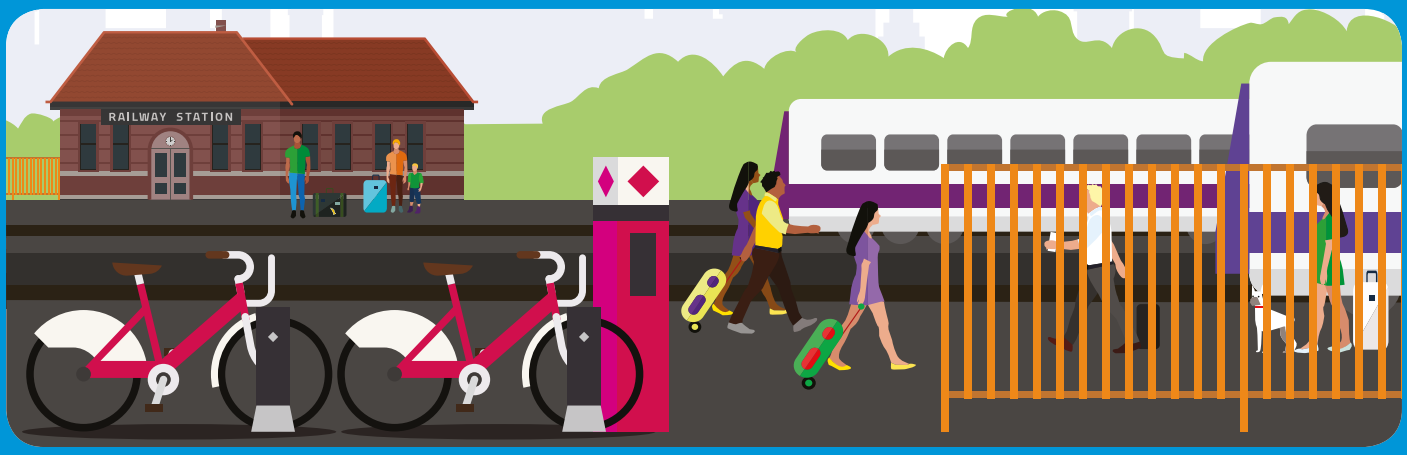
Taxis can easily be hailed in the town centre, and private-hire companies usually respond to calls within 10 minutes. The local university is trialling a bikeshare scheme, to help students travel between campus and their accommodation in town. Uber is also becoming more popular, particularly among the student population, but Mr Gamma avoids it. He prefers the security of a licensed taxi and wouldn't know how to use the app, anyway.

3

On the days he doesn't work from home, Mr Gamma uses a bus and a train to get to the office in London. He pays for them separately each time, because he doesn't travel regularly enough to need a season ticket. It's expensive, but much better than taking the car. If he works late, he takes a cab from the station back home.

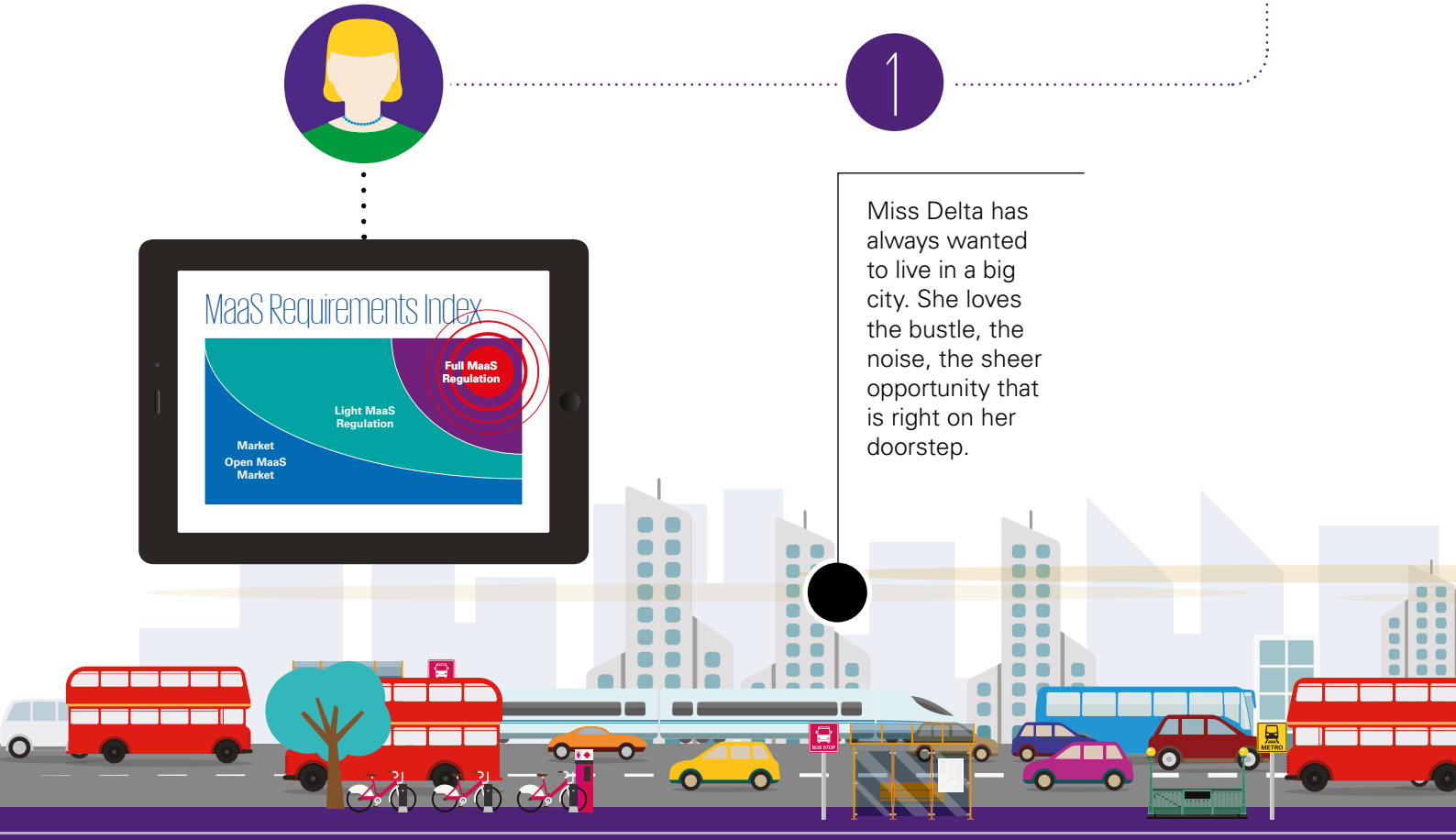
4

At weekends, he and his wife tend to use the car, even when they just pop to the shops. The traffic around the town centre is annoying, and parking is a nightmare. But they like to come and go at a time that suits them, so it's worth putting up with the inconvenience.



Scenario four

Urban, high modal choice, full regulation



Miss Delta has always wanted to live in a big city. She loves the bustle, the noise, the sheer opportunity that is right on her doorstep.

Let's reimagine what an authority could do

Take control. It already regulates fairly heavily in order to optimise road-space capacity, incentivise use of public transport, ensure passenger safety, and to ameliorate the potential disruption in such a busy marketplace. But the high degree of mobility services and options in this context could be built upon significantly to improve the user experience. And the arrival of disrupting private operators like Uber has moved the regulatory context on, necessitating careful consideration of governance models, taking care not to stifle the market.

A good start would be to develop a single, Whim-style, app and associated MaaS scheme, through which all transport modes available to a traveller are made available. This should include real-time information on travel times and prices, making it easy to reroute mid-journey. As a neat feature aimed specifically at travellers like Miss Delta, it could also rate each option's green credentials, helping them make informed choices about their mobility. Allied to a "nudge"[3] communications strategy that engages the environmental sensibilities of all travellers, this would make a tangible difference to air quality, congestion and crowding.

From a regulatory perspective, the authority in Miss Delta's city will probably need to aggregate all

2

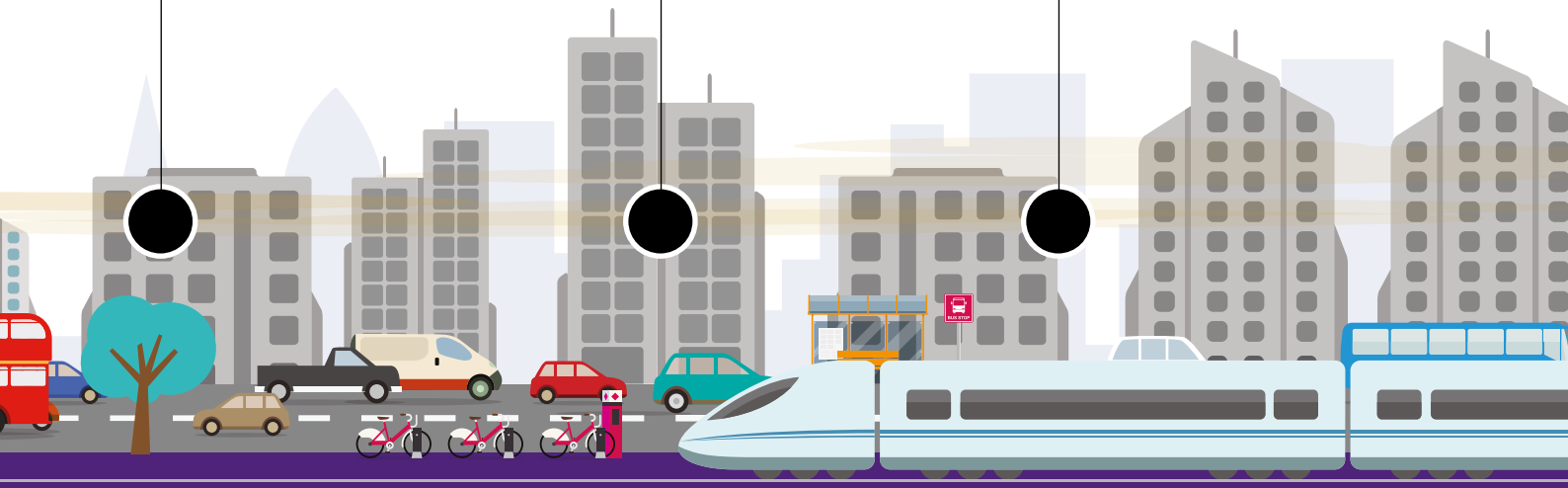
Accessing that opportunity involves interacting with a bewildering array of travel modes. Within two minutes of her front door are a bus stop, an underground station, and a bikeshare hub. Then there's Uber, local private hire, and cabs, all jostling for her attention and filling up the city with their presence. One day, she expects to see autonomous vehicles on the city's roads, though she's not sure what they'll bring beyond yet more traffic and congestion when pedestrian behaviour changes and people start walking out in front of cars.

3

Miss Delta needs a way of working out the best mode of transport for her journey, given dynamic factors like congestion, delays, crowding and travel time. She can use a handful of apps to book her chosen means of getting around. But none of them offer guidance about the most efficient mode at that moment, and she has to flick between screens to compare prices.

4

A committed environmentalist, she's also concerned about air quality in the city, and voted in the local elections for a candidate promising to clean up the transport network. But she can't make an informed choice that perpetuates her principles, because the relevant information isn't readily to hand.

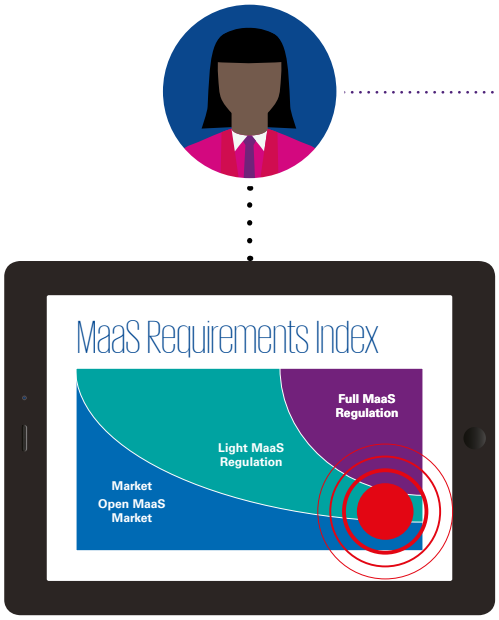


mobility, governing demand and supply across public- and private-sector operators and using regulation to influence customer behaviour where possible (e.g. using levers such as dynamic pricing, dynamic traffic management, and dynamic licensing of private hire vehicles). That necessitates close relationships with providers, including those developing autonomous vehicles, to develop infrastructure and governance models that are fit for purpose. Strong partnership working across the supply chain is therefore essential, as is a commitment to keeping the market vibrant and open.

From Miss Delta's perspective, the task facing the authority is simple: bring the joy into city living, by optimising the transport ecosystem to deliver efficiency, ease of use, and modal choice, while heightening resilience, minimising disruption and improving quality of life for all the city's residents. For the authority and operators, however, this will necessitate a complex and carefully balanced MaaS scheme.

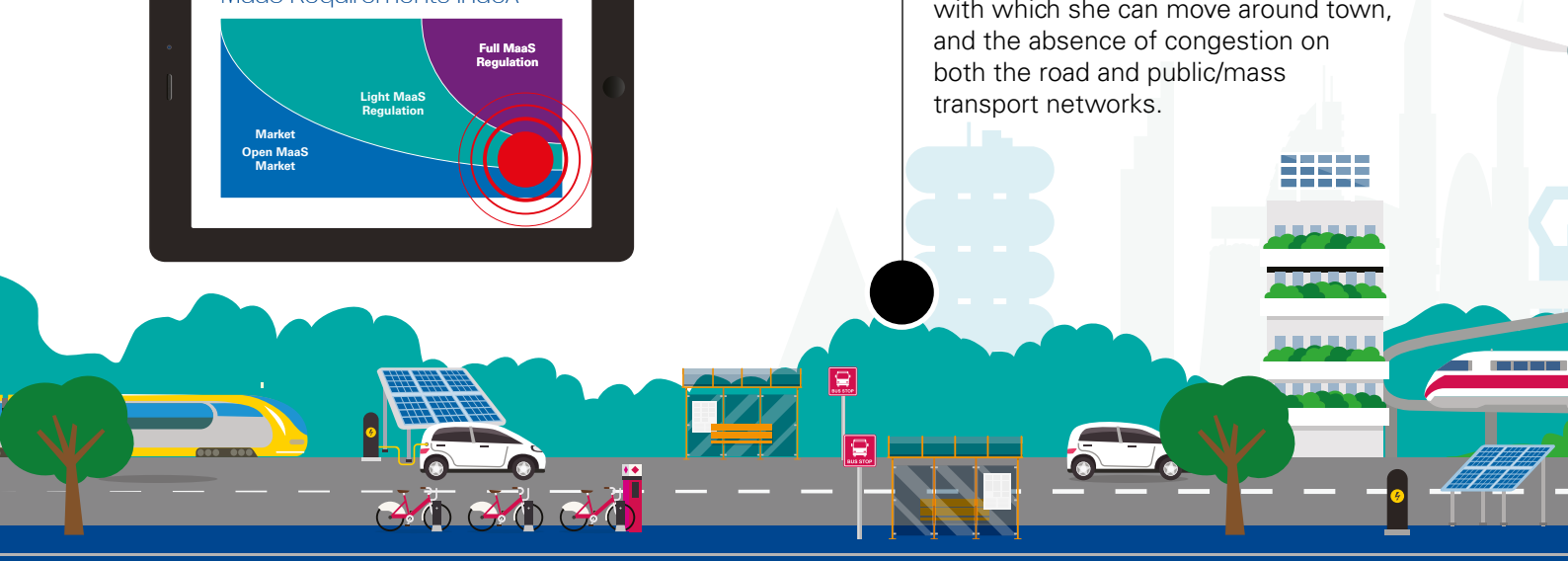
Scenario five

Urban, high modal choice, no issues delivering policy objectives, open regulation



1

Ms Epsilon loves living in a new, purpose-built city. She enjoys the clean air, the gentle hum of electric vehicles drifting around the streets, the ease with which she can move around town, and the absence of congestion on both the road and public/mass transport networks.



Let's reimagine what an authority could do

It's clear that this authority is in an enviable position, where good planning has meant regulation is not necessary to achieve policy objectives. Even so, the authority must be mindful not to become complacent, and keep any eye on the future development of the city's infrastructure, modal blend and population trends. Should any of these factors adjust, the finely-tuned mobility ecosystem may not work so effectively.

For example, the emergence of Autonomous Vehicles (AVs) may have an impact on congestion, because citizens like Ms Epsilon may eschew walking for the convenience of this mode. Or other disruptors may emerge in the market, changing the balance of options open to users and having an impact on their mobility preferences.

So it is worth the authority looking over the horizon to see how future regulation can maintain its current favourable conditions. It needs to keep abreast of changes in the MaaS context, perhaps through regular use of the MaaS Requirements Index, and model what the future looks like, and what proactive steps to take now.

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2

She doesn't own a car herself. There are so many on-demand services, and because they use green technology, there's no concern about their impact on the environment. So she can jump in an ultra-low emission car to go shopping, meet friends for supper, or even head to work. Or, if she's feeling active, she can pick up a bike from the bikeshare scheme around the corner. And actually, because the city is so airy and beautiful, quite often she loves simply to walk.

3

Ms Epsilon isn't sure how long she'll stay in the city. She knows that one day she'll want to go move back to the country. But all the time it's such a pleasant place to live and work, the draw of home doesn't feel all that strong.

For example, the authority may need to ensure that all new development in and around the city is easily accessible by foot and bicycle, and perhaps require developers to install bikeshare hubs and regulate that booking and payment facilities for these hubs are integrated with other MaaS schemes. Moreover, developments should be designed to minimise congestion, through construction of effective infrastructure for the modal choice available in the city, now and in the future.

KPMG: partnering with you for MaaS optimisation

Our thought experiment reveals the extent to which an authority's regulatory decisions can flow from, and be shaped by, an understanding of the complexity of the mobility ecosystem and challenges in delivering against their policy objectives in their setting. While it is possible to make rough calculations on the basis of a context's salient features, as we have done in our imagined scenarios, a more detailed analysis is required to establish a full understanding of MaaS requirements.

KPMG is an industry-leading adviser to the world's transport and local authorities. With our deep expertise, cutting-edge analysis tools, and relationships with leading providers in the field, we can help our clients determine their optimum position in the MaaS Requirements Index and answer the "so what" question for authorities, operators and mobility services providers alike.

This includes assessing the impact of disruptors – both existing and forecast - on the mobility ecosystem and the delivery of policy objectives.

With our support, authorities can enhance their modal blend through equitable and effective MaaS scheme design, develop techniques and tools that minimise disruption, enhance the user experience, develop in-built resilience, and encourage a lively market in which private operators have every chance to innovate and improve their services, as well as encouraging economic growth.

KPMG can support you in making the best of the opportunities presented by mobility ecosystem innovations and disruptors while minimising risks.

Six questions to Identify your position on the MaaS Index

Want to work out where you fall on the MaaS Index?
Here are six quick questions to consider as a rough guide

1. What is the complexity of modal choice in your area?
2. How easy is it to achieve key policy objectives, such as good air quality, reduced congestion, public health, economic growth, and the avoidance of over-crowding?
3. What is the mix of public- and private-sector operators in your context? What is the balance of commercial, economic and policy objectives?
4. How seamless is journey planning and payment within your region and neighbouring regions? To what extent does inertia in payments and planning impact mobility choices?
5. What happens when things go wrong? Is your transport ecosystem resilient? If one mode fails, can others take up the slack? Does this apply to all customer segments?
6. What is the critical path of initiatives and interventions that you will need to deliver your target MaaS ecosystem?

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What next?

KPMG continues to build its MaaS Requirements Index model. In future communications, we will consider a variety of further topics, including

- Regulatory models
- Effective scheme commercial models between authorities and operators/providers
- Effective scheme governance operating models
- Customer propositions and technology operating models
- Benchmarking of authority positions and real-world analysis for selected case studies

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Ben is an Associate Director in our Transport Advisory Practice and helps lead KPMG's team providing consultancy services to transport operators and authorities worldwide with respect to integrated and intelligent transport including smart ticketing/mobility payment systems, journey planning and customer information services, Command & Control solutions (including advanced traffic management and signalling), and asset management. We advise clients across the technology life-cycle, from costed options appraisals and development of technology strategy and operating models through to requirements definition, sourcing, project management and operational assurance.

Learn more about KPMG's Reimagine programme or join in the debate:

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Sources

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[3] Cf. Sunstein, Carl and Thalera, Richard H, 2009, Nudge: Improving Decisions About Health, Wealth and Happiness, London: Penguin.

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