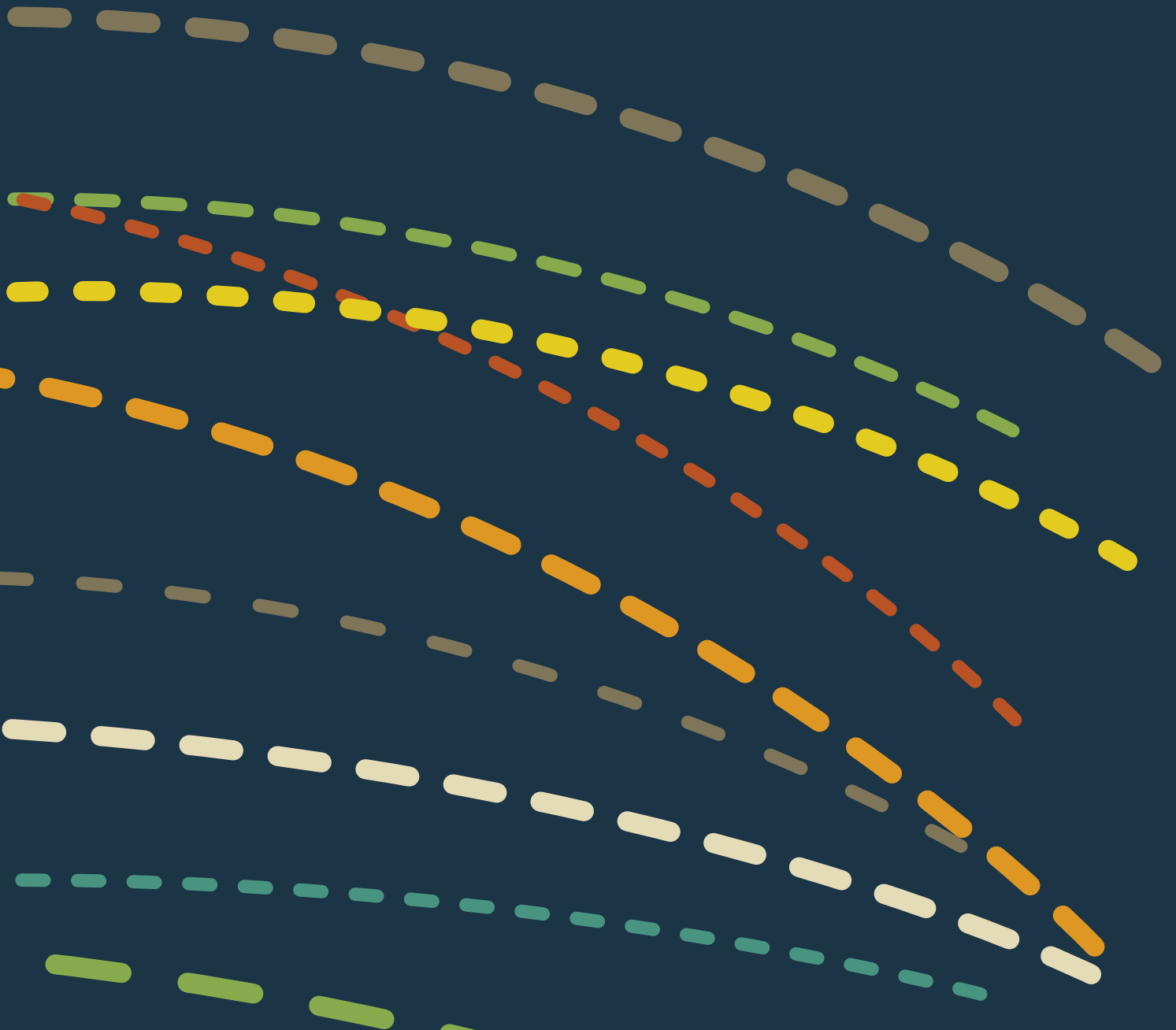




MasterCard Enterprise Partnerships

Connecting cities

Mobility: The key to unlocking the potential of cities



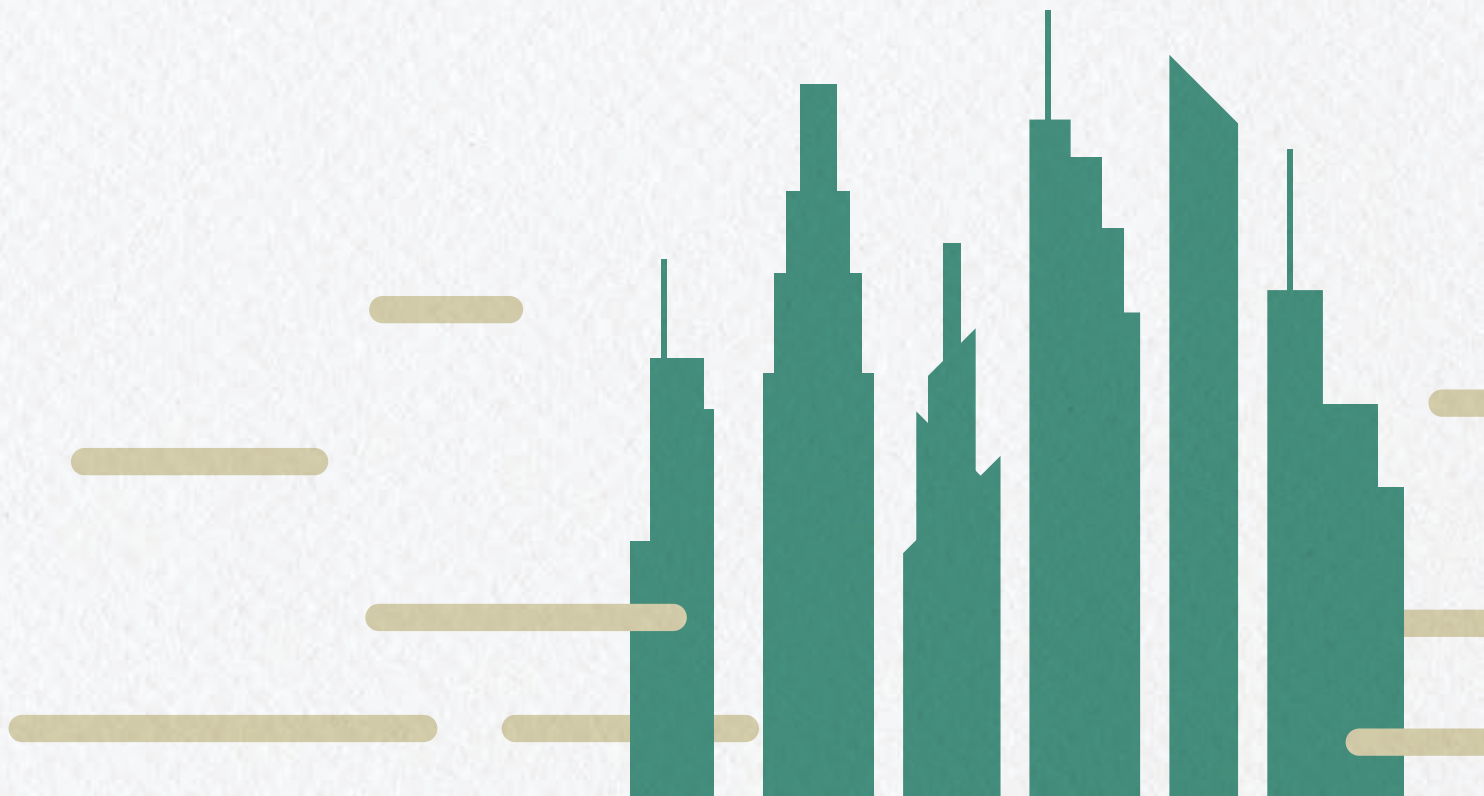
MasterCard is a technology company in the global payments industry. We operate the world's fastest payments processing network, connecting consumers, financial institutions, merchants, governments and businesses in more than 210 countries and territories. MasterCard's products and solutions make everyday commerce activities – such as shopping, traveling, running a business and managing finances – easier, more secure and more efficient for everyone.

The MasterCard Enterprise Partnerships team has been formed to bring MasterCard's existing assets, technology, network, reach, products and solutions to bear in areas that are outside MasterCard's traditional domain.

We are partnering with global market leaders who have significant depth of experience in their industries, combining their knowledge and infrastructure with our assets in order to drive real enterprise value.

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Foreword

Foreword from MasterCard Enterprise Partnerships

Cities are becoming victims of their own success. Today more than 50% of us live in urban areas and by 2050 this proportion will rise to 70%. Visitor numbers are rising too, with international arrivals expected to increase by nearly a billion from 1995 to 2020.¹

People love cities because they act as creative magnets, bringing work, culture and entertainment opportunities together to create rich, vibrant menus for urban dwellers. But crowding and congestion is already taking its toll on urban infrastructure and transport systems, and moving around cities is becoming a cause of significant stress for both residents and visitors. From an individual citizen's perspective, city travel is far too often both complicated and frustrating.

MasterCard Enterprise Partnerships is a new venture within MasterCard, a global technology company that is running the world's fastest payments processing network. Our focus is on leveraging MasterCard's solutions and reach to improve the user experience across big ecosystems. Transit is one of our core areas of focus.

We believe that smarter city transit and travel can bring enormous benefits to business and citizens. We are joining forces with experts at the forefront of change to create partnerships which have the intelligence and the capabilities to make the connected city of the future a reality.

We commissioned this Future Foundation 'Connecting Cities' report to kick-start a dialogue on the opportunities and challenges facing the world's major cities and to help take collaboration in urban transit and development to the next level. We wanted to uncover the difficulties faced by average citizens and to find out what global thought leaders had to say about future trends in urban mobility.

Collaboration is at the heart of what we do at MasterCard Enterprise Partnerships. Our work is based on combining our strength and expertise with others to deliver solutions that would just not be possible alone. So thank you to all the experts that took part, and to the Future Foundation for pulling together such a fascinating report. We truly hope that it creates new connections and collaborations that help to unlock the true potential of smart cities.

Methodology from the Future Foundation

In this report we describe how mobility between and within cities is changing. By 'mobility' we mean how people get from their origin to their destination by any means (public and private transport).

We have reviewed a wide range of sources and undertaken original research to inform and shape our analysis. We've also drawn on our understanding of more than 100 consumer trends that are shaping global consumer behavior. Our understanding of consumer change is drawn from our programme of rolling global research and our horizon-scanning 'Beyond 2020' series of reports.

To probe specific areas of interest against the initial trend framework, we commissioned quantitative research among 500 consumers aged 18+, per market, in the UK, US, Sweden, South Korea and Brazil during quarter four of 2013. In parallel, we interviewed a number of mobility experts and analysts – and we gratefully acknowledge their input:

- Elizabeth Deakin, Professor of City & Regional Planning and Urban Design, College of Environmental Design, University of California, Berkeley.
- Martin Wachs, Distinguished Professor Emeritus, Urban Planning, University of California, Los Angeles.
- Robert Bertini, Professor of Civil and Environmental Engineering, Portland State University.
- Rachel Weinberger, Director of Research and Policy Strategy, Nelson\Nygaard Consulting Associates.
- Professor Ian Yeoman, Associate Professor, Victoria University of Wellington and author of 12 travel books.
- Rochelle Turner, Head of Research, World Travel and Tourism Council.
- Matt Armstrong, Head of Marketing and Distribution, British Airways Holidays.



Executive summary

With more than half the world's population now living in cities, and as the speed of urbanization continues to increase, urban mobility is fundamental to the ability of cities to work effectively. In this report we argue that friction in mobility will be reduced by mobile technologies and that this will unlock the potential of cities for both residents and visitors.

- **When people travel for leisure they want to ensure their trip is a success and will invest considerable energy in researching locations and travel options.**
- People don't want to make mistakes in choosing destinations. They are looking for **better ways of making decisions**, especially around vacations. **Automatic booking systems will offer risk-free adventure**, greater certainty and guaranteed quality. There is a clear consumer desire for this type of technology, especially in Asia and among business travelers.
- **Journeys by car will become connected and effortless.** Guided by a new generation of smart roads, car journeys will be made more efficient through the integration of mobile devices with the car's own systems. Consumers show a surprising willingness to travel in driverless cars.
- **Car ownership will decline in the West**, as the costs (both personal and environmental) come to be fully appreciated by a new generation of travelers. In Asia the desire to own a car (and to enjoy the status that comes with it) will be curbed by more thoughtful planning of new cities with less space given over to parking.
- **Multi-modal transport will become increasingly common in cities with legacy infrastructure systems.** Shared ownership of both bikes and cars will move people away from owning cars.
- The **potential offered by converged payment devices is enormous**. When combined with flexible pricing to spread passenger loads through the day, it also provides a means for urban transport systems to manage increasing domestic and international demand.
- The **smartphone** offers travelers both a navigation device and a means of universal payment. Its ability to unlock the potential of cities is transformative. Innovation and government intervention are combining to bring down the cost of international roaming, heralding a new era of smart travel.
- One of the biggest improvements in travel – and a key element to unlocking the potential of cities – is to **make paying fares between destinations consistent, interoperable, immediate and easy**. From a consumer point of view the latest generation of payment cards and smartphones offer this potential; there is already considerable trust in global payment brands. From a corporate angle, there is a global opportunity in facilitating effortless travel.
- Perhaps the most fundamental approach to improving mobility is to change how cities are designed and created. **Many cities, particularly in China, are now building transport infrastructure into land development patterns in a new era of 'smart growth'.**

The **growing populations of major cities will force change and innovation**. Ultimately it will shape the cities of the future as 'smart growth' principles are applied in cities across the globe, integrating residential areas with business districts and developing areas of 'mixed', as opposed to 'uniform', land use.



Mobility futures: 2024

Guangzhou

Jing is on his way to work on a perfect May morning. He works in the International Finance center in the Pearl River New City.

As an ambitious 27-year-old, Jing dreams of owning a car. The practical reality is that new environmental controls have made it difficult to own a car privately. He enjoys using a rented car for weekend trips to the countryside but for his urban commute it is more practical to use a rented bike. With apartments both small and expensive, it makes sense to use a shared bike rather than to own one. There simply isn't space to store a bicycle. He navigates carefully through crowded streets, his phone recording the journey and his state of physical fitness as he heads towards the city. Jing, like many people, quantifies his exercise using his phone to analyze his fitness and stamina. This morning he feels a little bit sluggish so he decides to pass the metro station on the new 13 line and to connect with the Bus Rapid Transit system instead. The city feels proud of its bus network. As long ago as the early 2010s the bus fleet – using mainly LPG fuel – was playing an important part in beating congestion and reducing pollution.

He freewheels to a halt at the bus station, docking his bright orange bike and swiping his phone to pay for its use. Jing's trip is added to his real time budgeting app, keeping him in control of his spending. The bus system has expanded recently as Guangzhou continues to grow. Unlike a less flexible underground system, the BRT can serve new residential and mixed use communities and keep pace with the city's irresistible rise.

As he is early the bus is less busy and alters its stopping pattern based on the destinations of the passengers – all of whom have a phone which alerts the bus to their destination. This technology has cut commuting times recently.

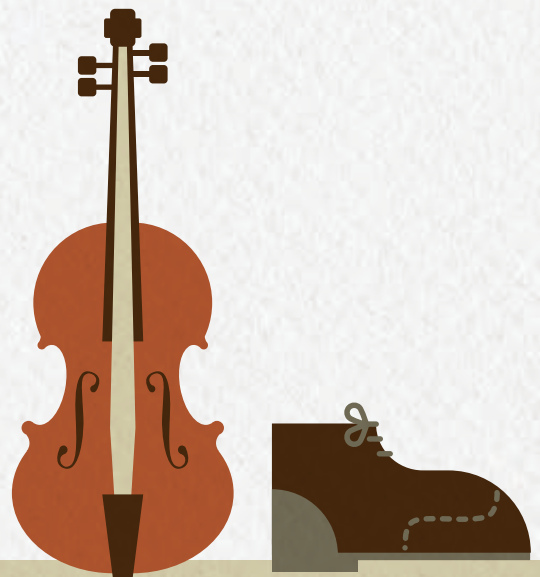
When he gets onto the bus, Jing has the choice of using a contactless card or his phone to pay for the journey. The same payment system exists throughout the city allowing him to pay for bikes, buses, metro trains, taxis, hire cars and mileage in private cars. He reflects that it seems incredible that people used to pay separately for each stage of a multi-mode journey – so slow!

He's also looking forward to a forthcoming business trip. His journey to Baiyun airport and beyond is greatly assisted by having his boarding pass on his phone – he'll swipe through directly to his China Eastern flight. Once in Hong Kong he'll be able to go to his hotel and open the door to his suite simply by using his phone.

Locks, barriers, queues, check-ins and delays are increasingly a thing of the past.

Current State of Play: China

- 56% of Chinese smartphone users expect to be “making purchases more often on their smartphone in the next 12 months” – a significantly higher proportion than in the USA (31%), Germany (16%) or the Netherlands (12%).²
- Chinese consumers – many of whom find car ownership highly aspirational – expect to pay much more for a luxury car (\$116,592) than citizens of Brazil (\$49,587), the USA (\$50,000) or Hungary (\$33,756). For many Chinese consumers, car ownership remains an aspiration rather than reality.³
- The bicycle remains important – 39% of Chinese citizens use bicycle transport at least once a week. In Brazil it's 24%.⁴
- The use of travel apps in China is growing rapidly. Among the urban, online population, 22% used travel apps at least once a month in 2011. By 2013 the proportion had reached 27%.⁵



Stockholm

Axel is lost. Purposefully lost. He often is these days. As the Creative Director of a Swedish advertising agency he craves inspiration and stimulus. He likes to explore unfamiliar cities such as Gothenburg. The problem with wandering around a strange city is that there is no guarantee you'll chance upon interesting things. There's a risk that the exercise will waste time. For Axel this problem is overcome by using his RayBan sunglasses which offer a range of services including Google Field Trip. He's on a curated tour of Gothenburg, led by his own preferences (for quirky architecture, design shops and independent bookshops). Axel's wandering provides guaranteed serendipity; he knows that he will 'chance' upon things that he likes and this hour of spare time will be put to good use.

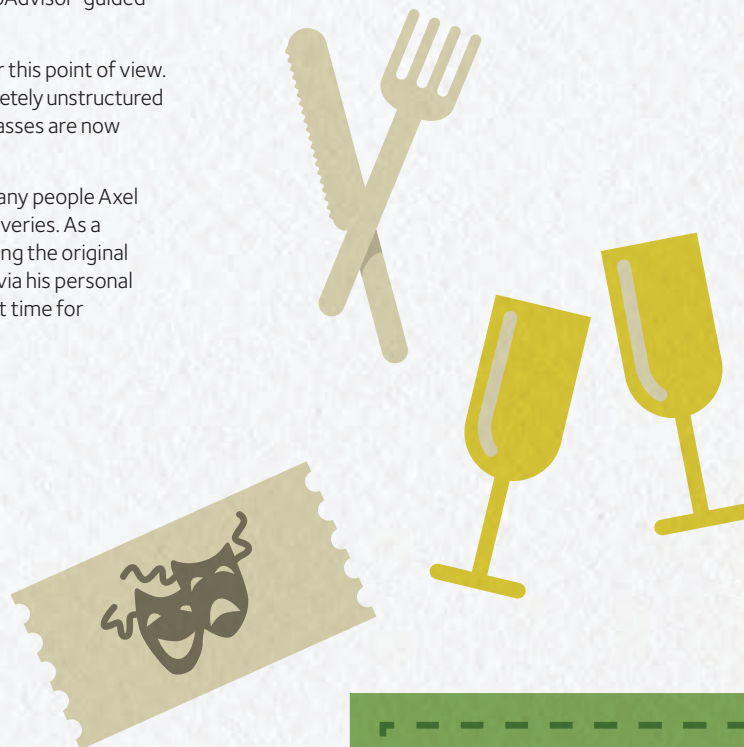
Axel is reflecting on a travel blog he read that morning which criticized the increasingly common phenomenon of 'curated travel' – of people using mobile technologies and being guided through cities by an unseen hand. The argument is that individuals using these services see only a highly selective and unrepresentative slice of any location; that 'travel' is diminished through the elimination of the bad and the unnecessary. In an age of guided tours, all travelers are now merely tourists. People miss the true nature of a town by shuttling between only those things which are of direct interest to them. The article was a development of an old argument that people plan trips too much and that most follow an increasingly well-worn, TripAdvisor-guided itinerary through towns.

Axel surprises himself by having some sympathy for this point of view. Given limitless time he would be interested in a completely unstructured walk and following his nose – the nose his smart-glasses are now resting on.

The problem of course is that time is limited. Like many people Axel wants to be able to share pictures of his travel discoveries. As a Creative Director people expect him to be uncovering the original and the interesting and he is keen to share pictures via his personal and professional networking sites. There simply isn't time for aimless wandering.

Current State of Play: Sweden

- In Sweden, 46% of consumers like talking to others about the creative activities that they do. In Russia, only 41% of the population derive satisfaction from this activity.
- Seven in ten Swedes aged between 16 and 24 feel a strong or moderate need for new experiences. This need declines with age; only 41% of those aged between 55 and 64 are seeking new experiences.
- Nine in ten Swedes agree that they really value moments when they can just relax. While a high proportion, it is similar to many other countries.
- 45% of Swedes have shared content online in the last six months. In Germany the figure is 34%.



Chicago

Lauren terminates the call on her Apple iPhone – a little antiquated these days – and settles back into her seat. Her driverless Chrysler 400C changes lane smoothly to take a less congested route to the Amtrak hub. Lauren feels a bit guilty about using a train rather than her driverless car (especially as her journey is faster now on a ‘smart’ interstate) however the time saving offered by the train is too great to ignore. She also wants to have a look at the Shared Transport hub at the Amtrak station. Fiat Chrysler has invested heavily here in addressing the needs of younger motorists. In the last few years it has become very evident that younger people feel more comfortable sharing a car than they do owning one. She has responsibility for the young driver programme – one of the most prestigious posts at Fiat Chrysler. At the station she looks on at a row of parked and charging Fiat Electros. These cars have been developed for the needs of Millennials and offer driverless capability, allowing their users (‘driver’ is beginning to seem an antiquated word) to enjoy 4G connectivity. Time spent in cars is now productive and useful – for many they are a favorite place to work. Lauren’s own work shows that Millennials are more interested in cars now than at any time in the past ten years. This is a hugely positive development; in 2016 it looked as if, for the first time, a generation of young people would grow up without any great affection for the car. As unconnected and ‘dumb’ environments, cars had little to offer this generation of hyper-connected individuals. Fiat Chrysler was one of the innovators that reinvented cars for younger people.

Next to the line of Electros are a collection of rental bikes. Tough and sturdy, these electric bikes are cheap, easy to access by phone or card and appeal to younger people through navigation devices and an ability to capture data on each bike journey. The bike is a fierce competitor to cars in cities now, following the construction of dedicated bike lanes. Electric bikes have encouraged far more people to start cycling and many cities are adopting them after the successful introduction of these machines to Barcelona in 2014.

Lauren strides across the car park and enters the station. Today’s journey will ultimately take her to Detroit where large parts of the city are being redeveloped using ‘smart city’ principles. The city is being revitalized through imaginative redevelopment with efficient transit at the heart of the reforms. Aided by low property prices and a rising reputation as a hub for creative industries, Detroit is a city reborn.

Current State of Play: United States of America

- In the United States, 60% of consumers would be likely to ride in a car controlled entirely by technology. The Americans have more faith in this technology than the British (45%), the Germans (37%) or the Japanese (28%).
- If it was safe and easy to do so, 38% of Americans would consider using a smartphone to make payments. In Germany the figure is 31%.
- In the United States, 44% of consumers would consider renting a car for a short period rather than owning one.



The success of cities creates new challenges

2010 was a landmark year; for the first time the majority of the world's population lived in an urban area. By 2030 six in ten of the world's population will live in cities and by 2050 the proportion will be seven in ten.⁶

Currently, moving around cities is a cause of significant stress for both residents and visitors. Our research indicates that the most frequently cited causes of frustration are issues around mobility.

What causes you most anxiety when you travel?

	Global response
Missing flights, connections	37%
Delays	31%
Being exploited by hotels, taxis, restaurants	29%
Crime	29%
Whether the accommodation will be suitable	28%
Transport links around the destination	21%

With growing demands on infrastructure, transport systems have the potential to become overwhelmed or at the least provide an uncomfortable experience. They also have the potential to limit the physical and economic growth of cities and countries, disadvantaging them against international rivals. The long-running and unresolved debate about runway capacity in London is an example of how transport infrastructure is a key element in the attractiveness of cities as global destinations both for business and leisure. Enhancing mobility encourages investment, tourism and the location of international businesses.

While cities must cope with increasing numbers of residents, they must also be able to meet the needs of growing numbers of international travelers.

Foreign visitors are an increasing presence in cities; globally, international arrivals will be close to 1.6 billion by 2020 – up by nearly a billion from 1995. The average annual growth rate between 1995 and 2020 is forecast to be 4%.⁷

Personal foreign travel remains highly aspirational, but many people feel that travel is something they should be able to achieve. The extent of your travels has become a marker of your sophistication and success as an individual; travel is a key source of social status. So much so that in the developed world luxury is increasingly defined in terms of time and experience rather than the ownership of prestige consumer goods.

In some cities the number of international travelers puts great strain on urban mobility. Key attractions become bottlenecks and queues form daily. The frustration caused by these delays is sufficient for a significant number of visitors to consider experiencing attractions virtually (rather than in person).

	Brazil	South Korea	USA	UK	Sweden
Interest in virtually visiting a museum or art gallery	75%	69%	48%	38%	33%

Crowded attractions are not the only problem for the international traveler. Unfamiliar cities – and their transport systems – can present a forbidding challenge even for more adventurous travelers. These factors combine and create a tension between the desire to explore and the frustrations of getting around. For business travelers these problems can be mitigated by expense-funded taxi travel but for leisure travelers the problems are unavoidable.

SMARTER
CITIES
CAN SOLVE THIS

One consequence of this is a greater consumer desire to research trips in advance and to reduce the risk involved in going somewhere new.

“When I plan a trip abroad, I find out as much as I can about the destination before I go.”

	UK	USA	Sweden	Brazil	South Korea
Agree or agree strongly	72%	66%	68%	78%	83%

‘Everybody has always wanted to get great results from their travel but what I would say is that they leave less to chance than in the past. There is a real pressure to get it right and not waste your valuable two weeks away.’

Matt Armstrong, Head of Marketing and Distribution, British Airways Holidays.

As part of their planning process consumers are increasingly turning to expert sources of advice. Globally, 31% of people turn to an expert for advice on holidays and travel.⁸

‘More and more they [consumers] are looking for credible sources so they feel they are making the right choices. But then as they move down the [decision-making] funnel they will check a number of sources as they go into decision-making mode.’

Matt Armstrong, Head of Marketing and Distribution, British Airways Holidays.

Sources of expert advice and information are not in short supply; Google’s acquisition of content providers such as Frommer’s is an indication of the sort of expertise that can now be found online. However the sheer amount of advice and information available can be a problem in itself.

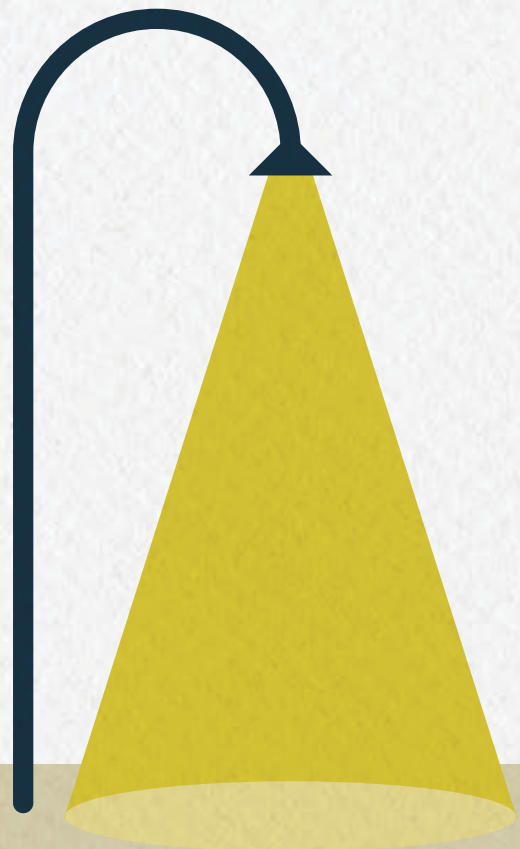
‘I think the plethora of information is starting to be seen as a chore.’

Matt Armstrong, Head of Marketing and Distribution, British Airways Holidays.

Future Foundation data shows that 60% of British consumers think there is “too much information to go through when making an important purchase decision”. Nearly half of British consumers are looking for a better way of evaluating the quality of services they buy – a trend that is growing.

Technology offers a clear route to making better decisions. Consumers’ own data can be used by a new breed of smart travel agents who will offer automated but personalized experiences with very little risk of disappointment.

For foreign visitors, technology will have an increasingly important part to play in selecting a destination. Technology will also have a critical role in helping residents travel through their own cities.



Increasing mobility through smarter public transport

'...[there is] some evidence that people are stepping from two-wheelers to four-wheelers as income grows. This is probably the biggest trend and the one that deserves most attention. It has serious energy, greenhouse gas and congestion consequences for people trying to do business in [developing] countries.'

Professor Elizabeth Deakin,
University of California at Berkeley.

If mobility within cities is to be improved, people need to be encouraged to use public transport rather than private cars.

The introduction of multi-modal transport is a critical stage in unlocking the potential of cities and avoiding gridlock. Multi-mode transport refers to journeys in which a number of different forms of transport are used. While cars can bring people to cities from the suburbs or nearby towns, the journey to the centre of the city is achieved through transferring to public transport.

'...multi-modal transport is critical and that's a place where we're not seeing the kind of progress in many countries (including by the way the United States) that we would like to see.'

Professor Elizabeth Deakin,
University of California at Berkeley.

The problem with multi-modal is one of perception:

'...a modal change as part of a trip is among the more onerous parts of the trip... we psychologically weight the time we spend doing that two or three times as heavily as we weight moving time.'

Martin Wachs, Distinguished Professor Emeritus,
Urban Planning, University of California, Los Angeles.

The solution (other than forcing people from private transport through fiscal or regulatory means) lies in the positive application of information technology. If people can see their journey mapped out and are guided through public transport in real time, the hassle factor is reduced and the car seems a less desirable option.

Mobility apps are already being used by significant numbers of people: 28% of urban Indians and 27% of urban Chinese, 14% of Brazilians, 16% of Argentinians and 18% of South Koreans.⁹

'...clearly one of the most powerful ways of affecting [multi-mode] is through information technology... we complement our ability to move with our ability to know where the opportunities to move are occurring. The use of information is extremely important and it explains a lot about how travel is changing. That, in turn, explains a lot about how cities are changing.'

Martin Wachs, Distinguished Professor Emeritus,
Urban Planning, University of California, Los Angeles.



Smarter – and ultimately faster and more convenient – public transport will also encourage people away from cars.

Another factor will be the ease of car parking at the places where drivers become passengers on public transport. The vast majority of drivers want devices that allow them to use the most efficient route and this would extend to connecting with public transport – 91% of South Koreans and 88% of Brazilians are interested in a service that automatically reprogrammes their route for example.¹⁰ These two countries are significantly ahead of the UK and the USA in this regard.

Getting to the transfer point is part of the solution – efficient onward progress is the other. The transfer between private and public transport must be easy and effortless and contactless payments are key in this. Despite this type of technology being relatively new to many domestic travelers, significant numbers have confidence in this type of payment. In Brazil, 20% of consumers feel confident using contactless payments on the metro or underground – a proportion that rises to 22% for buses. The widespread use of credit cards in South Korea is reflected in the number of citizens who have confidence in cashless payments for public transport – 23% would be comfortable in using this form of payment on the metro, underground and buses.

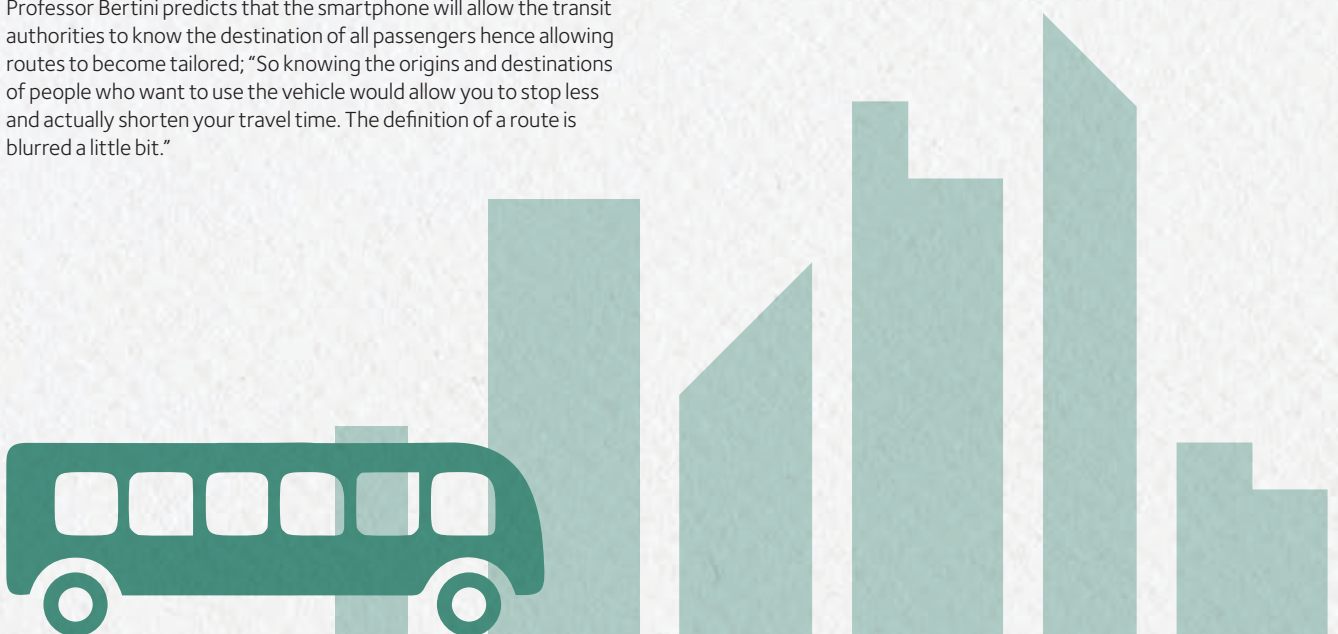
The ease that comes with using a single payment device for all our mobility needs will significantly change our confidence in using public transport and is likely to boost the number of people using it.



'I think ten years from now it will feel like you're simply extending your range; the distance with which you can travel on a street using this extension of the street that happens to be a transit vehicle.'

Professor Robert Bertini, Professor of Civil and Environmental Engineering, Portland State University.

Professor Bertini predicts that the smartphone will allow the transit authorities to know the destination of all passengers hence allowing routes to become tailored; "So knowing the origins and destinations of people who want to use the vehicle would allow you to stop less and actually shorten your travel time. The definition of a route is blurred a little bit."



The role of the car in integrated transport

‘The other big trend is the integration of IT into vehicles and roadways... it’s going to be possible for motor vehicles to be operated far more efficiently than they are today – to be operated in transit-like ways when they’re in cities and possibly to be shared more than they are today.’

Professor Elizabeth Deakin,
University of California at Berkeley.

Consumers have many considerations when choosing a car; style, perceived quality, economy, performance, emissions and so on. Very shortly that list of considerations will lengthen as drivers wonder if their car will be compatible with their mobile device and what sort of software the car is equipped with.

Google’s Open Automotive Alliance seeks to find new forms of integration. They are not alone; Apple and Microsoft have their own projects with auto-makers. Generally there is a feeling that the phone doesn’t connect as seamlessly with cars as it does with most other areas of consumer life.

Interest in in-car services:

	UK	USA	Sweden	Brazil	South Korea
A car that drives itself	34%	45%	36%	76%	72%

Is the technology racing ahead of consumer need? Our research suggests not. Indeed the appetite for more automation in cars is marked among our sample. Convenience and speed are the motivations for much of this support (e.g. paying for petrol remotely). However consumer interest extends beyond this and the full capabilities of mobile internet are welcomed in the car – 55% of our international sample are interested in an in-car device that could alert them to roadside restaurants and pre-order food.

In the developed world, the car will become a declining part of urban mobility.

‘I think cities in the United States in the next ten years are going to continue something that many of them have started, in transforming the infrastructure to focus more on people as opposed to vehicles.’

Professor Robert Bertini, Professor of Civil and Environmental Engineering, Portland State University.

There was a consensus among our experts that road pricing will become the primary way of taxing car use (as opposed to taxes on fuels). This is an additional driver in the progress of connected cars. Connected driverless cars can use the road space more efficiently and be taxed more effectively.

Our own data shows significant support for driverless cars especially in South Korea and Brazil.

‘I think people will love [driverless cars]. A lot of people really want to be doing something else other than just driving and if they can do that safely, I think that would change matters.’

Professor Elizabeth Deakin,
University of California at Berkeley.

In 2012, Ford’s then new Focus came equipped with a self-parking facility. What’s remarkable is not the technology itself but the fact that it was offered on a car that defines the mass market. It suggests growing consumer confidence in very advanced technology. It’s this acceptance that provides the high levels of support for cars that drive themselves. Toyota promises an autonomous car by the “mid-2010s”, Audi anticipates a self-drive A8 by 2017 and Mercedes-Benz expects to launch a self-driver in 2020.¹¹

These advances in the intelligent use and control of cars are important, as increasing urban populations mean that car parks become a less viable use of space.

‘...in California we’re talking about parking spaces that are costing \$50,000 to \$80,000 per space and that has to be charged at \$300 to \$500 a month per parking space just to cover the cost. That is not a sensible way to use urban land... new parking technologies that let you have something other than self-parked vehicles also begin to make sense.’

Professor Elizabeth Deakin,
University of California at Berkeley.

Other considerations will curb car use as a means of urban mobility:

‘...most people don’t understand how much car ownership and driving costs them and costs society, so I think this generation [people currently aged between 16 and 30] is the first to grasp that full cost and understand the impact of emissions and the impact of our energy profile – and the impact on their own wallets.’

Robert Bertini, Professor of Civil and Environmental Engineering, Portland State University.

**“I am concerned about what I can personally do to help protect the environment”
Generation Y respondents (people aged 18-34)¹²**

	USA	Argentina	Brazil	Japan	South Korea
Agree/agree strongly	52%	78%	84%	49%	54%

Our data shows the vast majority of young Brazilian and Argentinians are concerned with living a more sustainable life, a sentiment stronger in BRIC nations than it is in Europe or the USA.

Professor Elizabeth Deakin also believes that – in the developed world – urban dwellers are likely to be more hard-headed about cars, weighing up the cost of ownership versus car-sharing schemes for urban use and ad hoc rentals for weekends away.

In Asia and Latin America the car stands as more of a status symbol and despite the cost consumers aspire to ownership:

‘[In China the car] is a symbol of who you are and what you’ve achieved in life. Not having a car is looked at as a kind of incompetence.’

Professor Deakin’s perspective is corroborated by our own research. In Sweden, 80% of the population disagrees that “owning a luxury car is an important goal in life”. The proportion in China is 44%, in Russia it is 65%, in Argentina 67%, in Mexico 59% and in South Korea it is 54%. Tellingly, the trend over the last few years has been for fewer people to be motivated by the prospect of owning a luxury car – this is true in Mexico, Argentina, Brazil and China. Russia is something of an exception to this rule.¹³

However, if the potential of cities is to be realized cars, will have to be used more intelligently and alternatives provided. This will be reflected in how we pay for mobility:

‘We’re coming into an era, it’s already here really in some ways, in which both public transport and highway use will be charged for electronically...’

Martin Wachs, Distinguished Professor Emeritus,
Urban Planning, University of California, Los Angeles.

Consolidating travel payments offers significant benefits to the consumer – increasing transparency, helping budgeting and putting them in control.

Indeed, one of the most significant ways in which the public and private mobility can be enhanced is through simplified, effortless payments.



Unlocking potential through automated access

Interest in a device or app that allows access to public transport (instead of tickets):

	UK	USA	Sweden	Brazil	South Korea
Business travel	41%	50%	48%	56%	59%
Leisure travel	43%	36%	49%	58%	64%

Across our international sample half of leisure and business travelers would be interested in using a device or app to access public transport (rather than tickets). Despite limited current applications of phones as payment devices, 55% of our sample are interested in using a smartphone as a means of accessing public transport.

Significantly, a majority of smartphone users would consider using their phone to pay for goods and services in the future. As we might expect, South Korea leads the way with 76% of citizens agreeing. Agreement levels are even higher among urban Chinese (81%) and urban Indians (79%), with Brazil (67%), Argentina (66%) and Australia (51%) following behind.¹⁴

Our research shows that the greatest anxiety that travelers have is missing flights, trains and connections. Additionally, one in five of our sample finds transport links around their destination to be their greatest source of stress. The anxiety involved at connection points would be eased if consumers didn't have to worry about how they paid for travel and which ticket they needed to get. This explains the high levels of interest in using a card, device or app for ticketing.

Pre-payment systems such as Navigo in Paris offer benefits beyond the reduction of traveler stress:

'...pre-payment is well understood to be faster – especially for buses. It is miraculously faster. We've done a lot of studies on what causes delay in transit and that is a huge part of it.'

Professor Elizabeth Deakin,
University of California at Berkeley.

'...we lose a huge amount of efficiency by having everybody stop at the door of the bus [to pay]. Agencies continue to do that because they're concerned that there won't be sufficient enforcement and there'll be too much stealing. It's just an old way of thinking – many operators are somehow not able to get over that hump.'

Rachel Weinberger, Director of Research and Policy Strategy,
Nelson\Nygaard Consulting Associates, New York.

Pre-payment speeds journeys and reduces congestion in stations through reducing bottlenecks. It also offers more strategic benefits through making fares flexible and being able to vary prices through the day to incentivize off-peak journeys. While the flat fare system is easy to understand, it does nothing to spread the number of journeys more evenly through the day.

'...something like a credit card enables the traveler not to worry about the complexity of the overall fare structure... The opportunity exists to have a far more differentiated fare structure and I would hope that in New York over time they'll introduce some variations on their simple theme of flat fares and it will make the system's use more efficient, filling seats in the off-peak when they're largely empty and perhaps empty them a bit during the peaks... You can manage the system more efficiently if you use fares to affect people's travel choices. In so many cities we've adopted sophisticated technological devices for charging fares and collecting revenue, but haven't taken advantage of the opportunities to manage the system more effectively by employing a more highly-differentiated fare structure.'

Martin Wachs, Distinguished Professor Emeritus,
Urban Planning, University of California, Los Angeles.

A third of our international sample is interested in a mobility service that offers different prices based on the time of day.



The consequences of easier ticketing

mPayments and the rise of 'Be-in Be-out' (BiBo) ticketing systems mean that future travelers needn't even tap in and out of transit systems, instead their presence is detected via wifi, picocells or another short-range technology.¹⁵

The consequence of these types of ticketing systems is that:

'...more people will travel at short notice and on the spur of the moment.'

Martin Wachs, Distinguished Professor Emeritus, Urban Planning, University of California, Los Angeles.

For international visitors the potential of cities can be realised. As payments and navigation become much easier so mobility can become less stressful and more impulsive. Less precious time is wasted in fumbling for foreign currency.

The benefits of this type of new generation ticketing is perhaps most vivid among business users – who can travel with greater confidence. They can also be encouraged out of expensive taxis. Smarter ticketing would also allow users to keep tabs on spending while collecting receipts for expenses claims automatically.

Converged payments for public and private transport

'...in the future I would see a convergence of how we pay for things so that we're not carrying around 20 different smartcards or toll tags or whatever... I think these convergences are going to happen.'

Robert Bertini, Professor of Civil and Environmental Engineering, Portland State University.

'I can't think of any good reason why a service provider like a credit card company couldn't integrate my capacity as a traveler to pay for my road use and my transit use through one financial mechanism.'

Martin Wachs, Distinguished Professor Emeritus, Urban Planning, University of California, Los Angeles.

There are two important convergences in how we pay for travel. The first is the combination of travel information and payments, allowing the traveler to make smart journeys that are both time and cost efficient, and being able to pay for them immediately without any time-consuming ticket purchase.

The second convergence is around a single means of paying for both public and private transportation – tolls on roads and rides in trains, metros or buses. This would put consumers in control of their spending by bringing all transportation costs together where they are more readily analyzed and budgeted for.

The payment functionality contained within a car could extend from tolls and road use to other areas of expense such as fuel – our data shows a very high level of interest in such a service. Through a smartphone or other connected device, that payments capability can go with the driver as they leave the vehicle.

Interest in in-car services:

	UK	USA	Sweden	Brazil	South Korea
Pay for petrol automatically after filling up	66%	50%	45%	85%	67%

Effortless payments encourage easy mobility and engender greater confidence in using public transport among visitors in particular. However, there is much more to the city experience than how we pay to travel. What if the city itself could help visitors and locals? What if the city could offer personalized guidance and help people get the full potential?



The emergence of the smart city (1)

City residents and commuters

Smarter cities will offer the capability to help residents and visitors efficiently navigate the complexity of transport systems, suggesting personalized alternatives.

The ability to do this is highly-prized by commuters and visitors and it's something that they'd be prepared to share data for.

	South Korea	Brazil	USA	Sweden	UK
Willingness to share data for a service choosing the quickest routes	67%	50%	47%	46%	40%
Willingness to share data for a service that recommends the best time of day to travel	58%	52%	49%	46%	51%

These figures are remarkably high given the wariness many people now exhibit in sharing personal data. The benefit these services offer has real value and makes the sharing of data an acceptable trade. In the case of the UK, it's worth noting that the amount of time taken to get from A to B (average trip time) has increased by 11% from 20 minutes to 23 minutes between 1995/97 and 2012.¹⁶ This may explain why a majority of British people would share their data in return for being guided through transport systems at times that will avoid queues and busy periods.

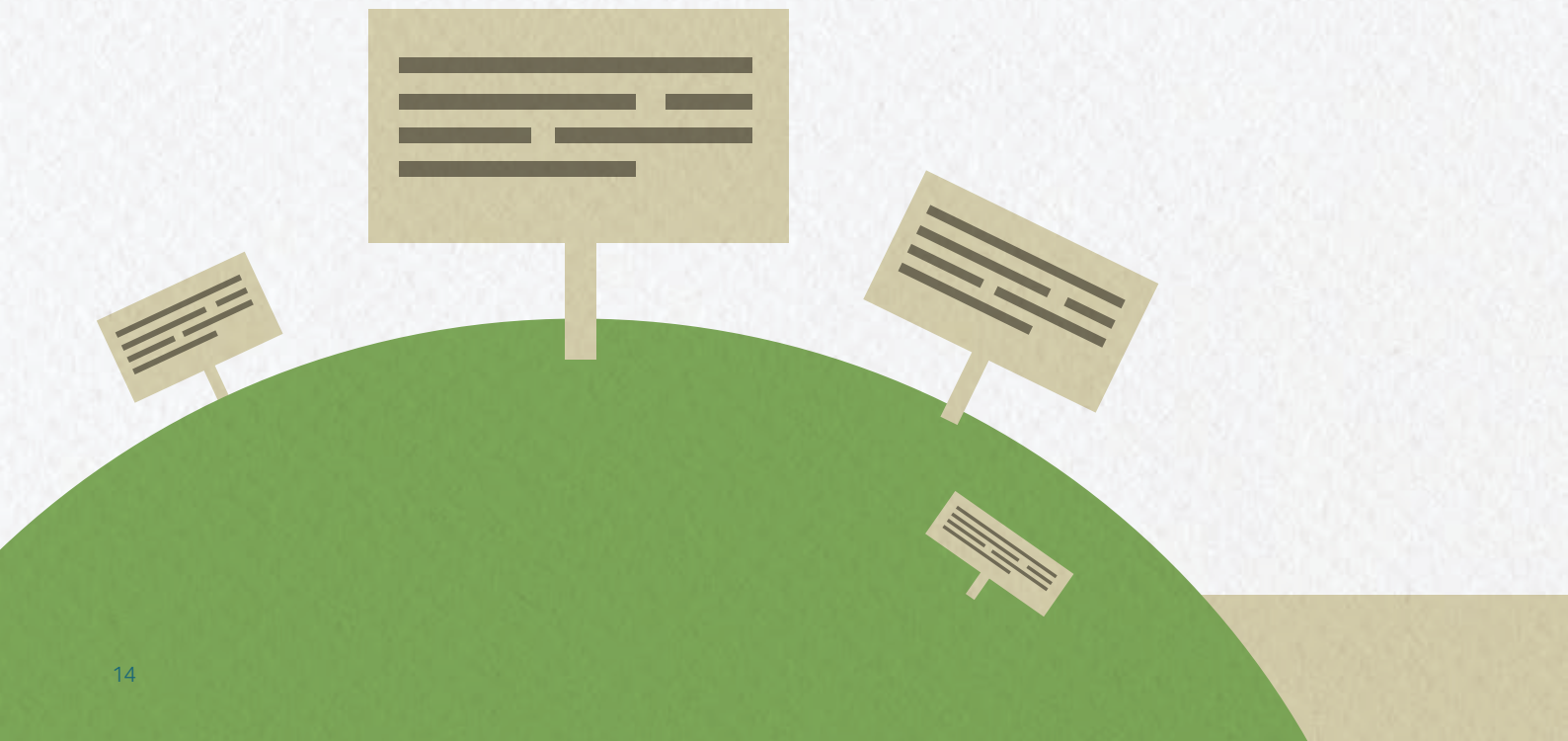
The future is one in which travelers make their own data, preferences work for them and they are increasingly happy to (at the very least) try automated mobility services. The benefit provided is that of speed and convenience, but perhaps more importantly, people will derive satisfaction from knowing that they are making the most efficient journey possible. Automated services take the stress out of mobility and ensure that time is not wasted. These services will ensure that the potential of cities is fully realized.

For business travelers the benefits of automating mobility are even more obvious.

Interest in an automatic booking service based on previous travel purchases for business travel (domestic or international).

	UK	USA	Sweden	Brazil	South Korea
Very and Quite interested	49%	60%	29%	74%	73%

An additional benefit of automated business travel is the opportunity to reduce the leading source of frustration on business trips – namely not being able to experience enough of the destination. Freeing up time from organizing and booking travel will allow the 'accidental tourist' more time to explore business destinations, making business travel a more relaxing and less stressful experience. It also makes trips faster and smoother. The prime benefit for employers is time saving.



The emergence of the smart city (2)

International travelers

The desire to eliminate risk provides an opportunity for smart travel agents who can use a traveler's own history to automatically create personalized itineraries.

“How interested would you be in a service that books your trip automatically based on a set of preferences you have provided?”

	UK	USA	Sweden	Brazil	South Korea
Leisure travel	39%	45%	26%	74%	75%
Business travel	52%	72%	34%	79%	79%

Consumers are increasingly aware of the value of their data and are only willing to provide it to a brand if they feel that they will get something worthwhile in return. As our data shows, minimizing the risk in holidays and mobility is something that people would want to trade their data and travel history for. Our own data shows that – across the sample – 52% of consumers would be willing to provide their data in return for a tailored travel advisory service.

The desire for these types of services creates a significant opportunity for the travel industry – which can now reinvent package holidays based on consumer personalization rather than tour operator choices.

‘I think travel companies are starting to look into how they can provide a more end-to-end journey... [the internet] has given the tour operating industry the chance to actually source more content and source offers from different places to find the best offer. Those who have invested in it are now using it to their advantage.’

Matt Armstrong, Head of Marketing and Distribution, British Airways Holidays.

‘So technology to replace that [conventional travel agents] is just a natural progression I think.’

Rochelle Turner, Head of Research, WTTC.

One of the ways that these automated services will work is through Big Data – the intelligent use of the consumer's data (and that of other, similar, consumers). A traveler will be recommended services based on people like them and they can take comfort from the fact that an itinerary that has worked for others is likely to work for them.

‘TripAdvisor is a hugely trusted source and most people use it to ensure they haven't made a bad decision. The problem is that it is often hard to know whether the reviewer is 'like me'. I think the future is about finding reviews by 'someone like me' so that customers feel they are making a more informed choice.’

Matt Armstrong, Head of Marketing and Distribution, British Airways Holidays.

The opportunity that this application of Big Data brings is in brands being able to supply high-quality personalized advice to consumers. There are mutual advantages – the benefit to the brand is in having a higher-quality conversation with consumers and building both engagement and trust.

‘Customers definitely appreciate things being made easier and a sense of it being personalized for them. It's a fine line between understanding what the customer wants and using the knowledge to achieve your business objectives; ultimately you need to add value for the customer and enable them to make the right choice.’

Matt Armstrong, Head of Marketing and Distribution, British Airways Holidays.

Personalization applies not only at the planning stage but also when people reach their destination. Innovations like Google's Field Trip allow the smartphone to become a guide to the city, alerting users to shops or services that are likely to interest them. It can also be used to alert people to promotional offers in shops that are close to them at any given time. This allows people to get much more from their travels and helps realize the potential of the city.

The impact of this technology will be sizeable – already, among the online population, 44% of urban Chinese use mapping apps (up from 33% four years ago). Among Chinese aged between 16 and 24 the proportion soars to two thirds. Elsewhere significant minorities of people are using these apps – 46% in Mexico, 41% in Russia, 38% in India, 36% in Brazil and 34% in Argentina.¹⁷ The trend towards using locational services provided by smartphones is driven by the need to make optimized choices and to minimize wasted effort. It will enable travelers to be more spontaneous and to enjoy their trips more. It's also highly likely that location-based services will increase visitor spending in cities.



The emergence of the smart city (2) continued

Our global research shows a very high level of interest in location-based services.

Interest in a “service/device that detected your location and suggested interesting things to spontaneously see and do in the nearby area”¹⁸

USA	Argentina	Brazil	India	China	Japan	Germany
41%	58%	60%	76%	69%	51%	29%

If mobility without friction is to be fully realized, it will require the integration of many disparate players.

‘Well [automated travel] is very much a utopia... there is still a long way to go because the tourism industry is mainly comprised of SMEs (small and medium sized enterprises). So there are still many disruptions across the world for a complete seamless integration.’

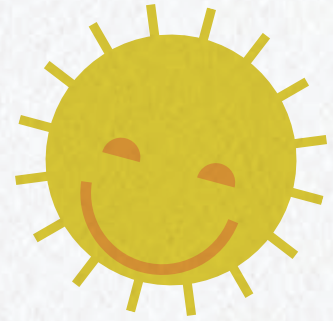
Ian Yeoman, Associate Professor,
Victoria University of Wellington.

Given the size of the prize, there’s no doubt that the commercial will exist to create seamless mobility and in the first instance standardization of processes will bring it about. International brands have a key role to play.

‘I think the growth of world travel brands will become more important because of the consistency in quality. So the Hiltons, the Holiday Inns, the Sofitels – they all become very, very important.’

Ian Yeoman, Associate Professor,
Victoria University of Wellington.

The smartphone is the enabler in the process of creating smart cities. Freedom to use these devices abroad is critical if the smart city is to develop, but currently the process is inhibited by fear of high charges for mobile internet.



Data roaming: the missing link in enabling smart cities

While technology of all types can tackle some of the problems of mobility, it's mobile technology which offers the greatest opportunity to help travelers make smarter and more efficient journeys.

Clearly the impact of the mobile, connected device is virtually limitless in mobility. It can help guide travelers through less congested routes, it can optimize journeys in terms of cost and time and it can enhance the experience through recommending nearby attractions and shops. So why isn't it making a greater impact on international travel today?

“Does the cost of data roaming deter your from using your mobile phone when abroad?”

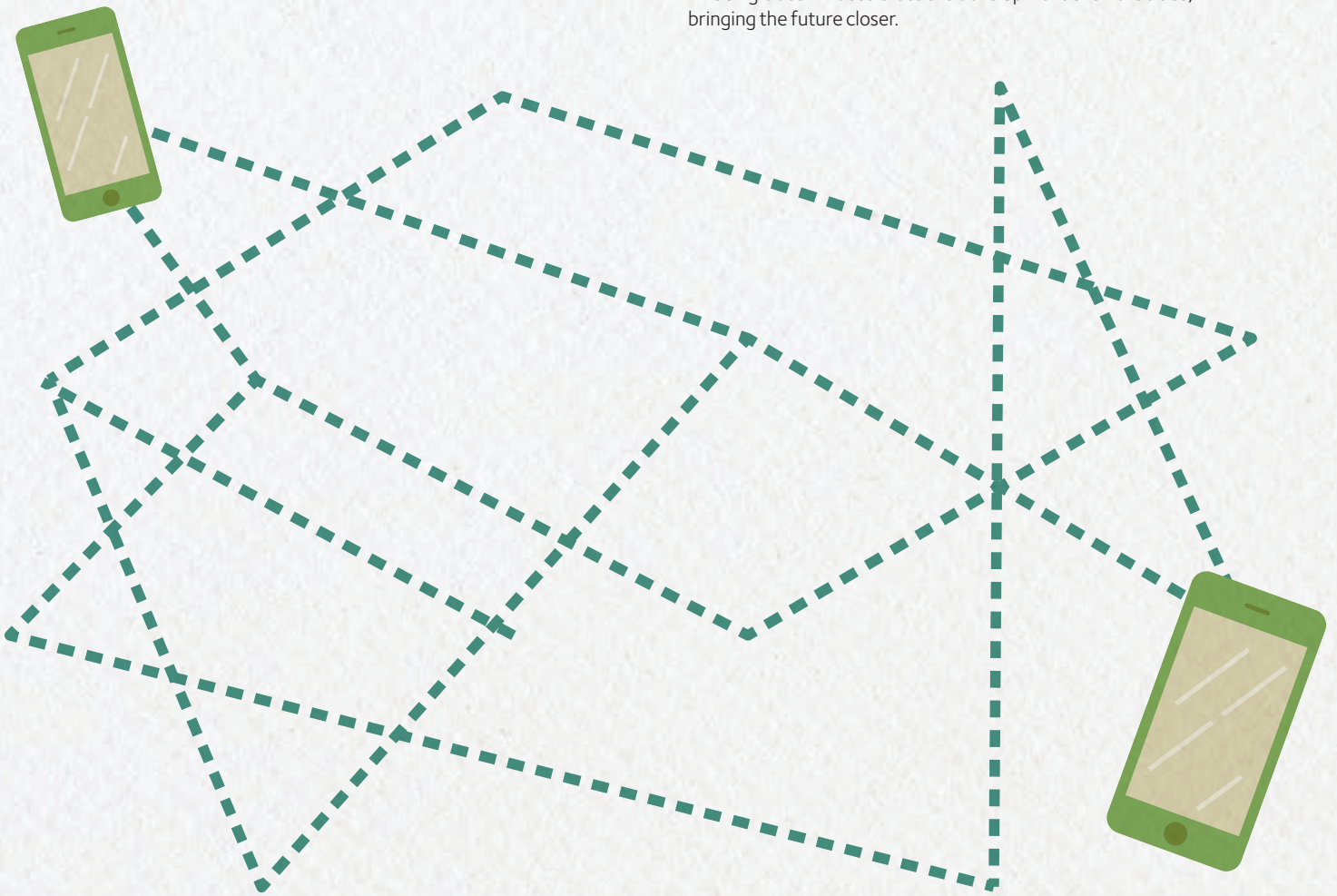
	UK	USA	Sweden	Brazil	South Korea
Yes	81%	56%	78%	74%	75%

Currently, international travelers feel inhibited in using their mobile device due to the cost of data roaming.

Having said that, there are some very strong signs that roaming charges will come down. MasterCard and Syniverse have recently joined forces to enable mobile users to choose between different prepaid roaming packages when they arrive in a new geography, while in the United States, T-Mobile US has introduced a 'Simple Choice' plan which drastically cuts the price of using a mobile abroad.

Competitors may be forced to follow suit – not least because of new innovations such as Uros's Goodspeed, which is effectively a device that provides a mobile wifi hotspot. Appealing most to frequent travelers, its initial cost can quickly be recouped. The service is available across 56 countries, including the US, Canada, Latin America, Russia, China and Europe.

In April 2014, the European Parliament voted to abolish roaming charges from December 2015. Operators will no longer be able to charge travelers to the European Union's 28 member states for internet use. This outcome is significant for consumers, meaning that it will be no more expensive to use internet abroad than it is at home. This is likely to significantly boost the use of mobile devices in Europe with smartphones becoming a key navigation device in journeys. This single act will accelerate the development of smart cities, bringing the future closer.



Designing new cities

The most fundamental approach to improving mobility is to change how cities are created. In China, more advanced thinking about how people live is shaping how people will travel. Many cities are now building transport infrastructure into land development patterns:

'A lot of the work that's going on in China, for example, is now trying to focus on second tier cities which are gigantic by everybody else's standards (four to six million population). I think that in particular in Shanghai there has been a concerted effort by city government to go back into places like Pudong and rethink how they are developing the city... and they essentially re-plan it.'

Professor Elizabeth Deakin,
University of California at Berkeley.

Professor Martin Wachs agrees that transport is being integrated into the planning of new cities in a new era of 'smart growth':

'...it's not just density that's the issue, although that's part of it, it's more about the distribution of activities and space, the concentration of destination opportunities near residential locations as well as along transit lines. So it [smart growth] refers to what planners call 'mixed use' as opposed to 'uniform' land use... Mixed growth is a more blended approach and smart growth usually means walking, cycling and transit orientation, and that usually means both increased density and a mixture of activities at different locations.'

Professor Wachs argues that smart growth now dominates the thinking of planners around the world:

'I would say it's global in appeal and that it's almost a fad – or a current idea – gaining currency among planners all over the world; so the same concepts are being applied in China as Los Angeles.'

The impact of this thinking is becoming profound:

'...at the margins, smart growth is having a dramatic effect... [Smart growth] will have a steady effect over time and will gradually reduce auto dependence.'



Conclusions

What will mobility look like ten years from now?

'I think people will be surprised that everyone – every age group, every demographic – will be using public transportation whereas, certainly in the US, that's not currently the case... The second surprise will be how seamless travel is – the transit vehicle is really an extension of the street. The third thing that is starting to happen is that systems might become more flexible... more customized towards serving people who are either on the vehicle already or demanding to get on the vehicle [resulting in] faster speeds, shorter travel times, more direct services that might be a little more flexible.'

Robert Bertini, Professor of Civil and Environmental Engineering, Portland State University.

'...we need to start thinking about taxis as extensions of the public transit system... I think that we're going to see more bike sharing systems. As I said before, I think cities are going to have to get over this idea of thinking that a bike share system has to be profitable as a fee for service transportation system. They're going to have to figure out ways to finance it... No other transportation sub-system meets that standard... I think we're going to see more bus rapid transit. I have a former student who was looking at the question of regions that are resilient to congestion and his research showed that cities that are investing in bus transit are beating the odds in terms of economic growth once you control for congestion and other factors.'

Rachel Weinberger, Director of Research and Policy Strategy, Nelson\Nygaard Consulting Associates, New York.

Robert Bertini, Martin Wachs, Rachel Weinberger and Elizabeth Deakin all believe that the future of mobility in the West is increasingly about public transport rather than private.

'In the fifties we built a huge highway system for fifty years and now it's fifty years later... and the amount of traffic that we built for has been realized in most places and so there isn't more capacity. Also there isn't any real money to rebuild the infrastructure and I think that people just aren't really that willing, or they've been showing they're not that willing, to do that kind of traveling anymore. Commuting used to be a kind of free time or a joy and now it tends to be much more of a hassle.'

Rachel Weinberger, Director of Research and Policy Strategy, Nelson\Nygaard Consulting Associates, New York.

'I think it used to be a greater status symbol certainly to have the car but I think there's an emerging set for whom the status symbol is not to have a car. A lot of this is driven already by consumer preferences but to some extent it's driven by government policies and I think the politicians are far behind the populous on some of these issues.'

Rachel Weinberger, Director of Research and Policy Strategy, Nelson\Nygaard Consulting Associates, New York.



Conclusions continued

Whilst innovations in connected cars and smart roads will make the use of cars more efficient, the concept of owning one may be less attractive.

Shared car ownership – especially in cities – will become more common.

‘...I would speculate about whether people would actually want to own their own vehicles or there will be more people wanting to have car sharing, bike sharing, and other membership and ownership rights.’

Elizabeth Deakin, Professor of City & Regional Planning and Urban Design, College of Environmental Design, University of California, Berkeley.

The percentage of people who would consider renting a car for a short period of time rather than paying to own one outright.¹⁹

China	Brazil	USA	India	Argentina	Japan	Germany
48%	52%	28%	41%	32%	21%	38%

The Brazilians and the Chinese are much more open to renting cars than in countries like Germany and Japan – perhaps because these are countries with a long heritage of producing cars.

‘We see the big rental car companies are getting into car sharing. We know that car sharing has had the effect of increasing car use for some people but generally speaking the net effect is fewer cars and less vehicle travel per capita. So more intensive use, fewer cars.’

Rachel Weinberger, Director of Research and Policy Strategy, Nelson\Nygaard Consulting Associates, New York.

The car’s primacy in mobility is being challenged and is unlikely to endure in Western cities; something that will be reflected in how cities will be developed. Pressures on private car ownership come from many directions: greater costs, a growing guilt over carbon emissions, curbs on the use of cars within cities, pressure on parking spaces and – perhaps – a waning interest in car ownership among younger people.

In China there is an opportunity to create transport infrastructure from a clean sheet – an opportunity that has not always been grasped.

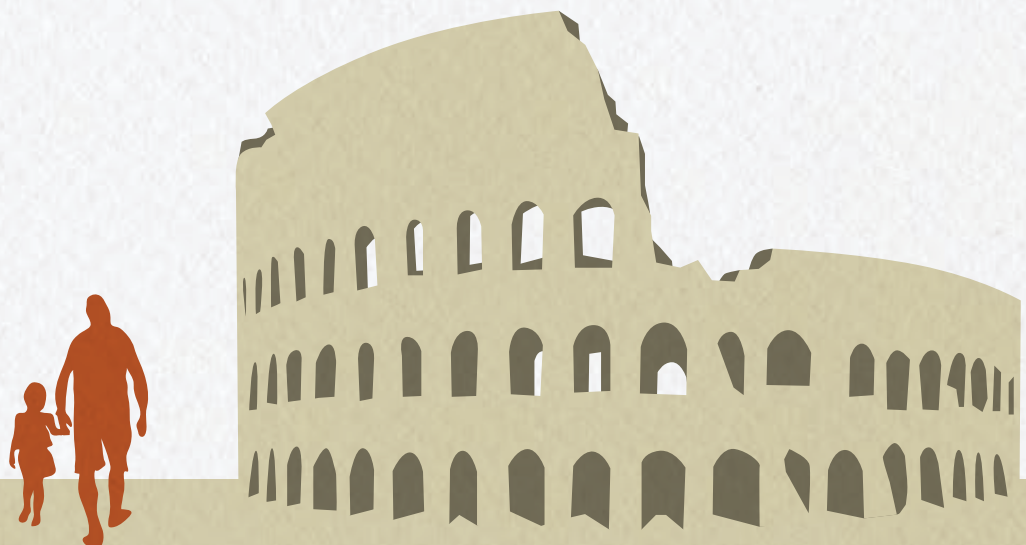
‘If you look at Beijing or Shanghai you can see that there have already been a lot of missed opportunities which make it [modern multi-modal transport] more costly.’

Elizabeth Deakin, Professor of City & Regional Planning and Urban Design, College of Environmental Design, University of California, Berkeley.

In the long term, ‘smart growth’ will deliver a step change in urban living globally. However, in the medium term, cities have to use technology more intelligently to ease the problem of congestion created by ever-growing populations. Whilst m-ticketing and pricing based on the time of day can help manage demand, perhaps the most significant benefit for both travelers and operators is in making mobility effortless through a single payment system.

‘[Contactless payments and m-ticketing] seems like it’s actually a very short leap. Curiously that seems like an easier step than something like fare integration which is potentially much more important in terms of efficiency of use.’

Rachel Weinberger, Director of Research and Policy Strategy, Nelson\Nygaard Consulting Associates, New York.



Cities that are connected globally are the ultimate outcome and are – as yet – an unrealized opportunity.

‘...surely an interchangeable or universal system would make [international travel] much more convenient and convenience is among the factors that would increase the volume of such travel. I have a sense that it’s a business opportunity for organizations like MasterCard and American Express and others, and that planners are not particularly concerned about it because they focus more on local geographies, but they would certainly take advantage of it if it were available.’

Martin Wachs, Distinguished Professor Emeritus, Urban Planning, University of California, Los Angeles.

‘I don’t think that transit operators [are thinking of connected cities], I think transit visionaries are thinking about that kind of stuff [globally interoperable payment systems for transit] and I think some of these technology companies and some of the finance companies are thinking about it, like IBM... You’re thinking about it, I’m thinking about it, but I don’t think there’s any real sense of an organized discussion about that.’

Rachel Weinberger, Director of Research and Policy Strategy, Nelson\Nygaard Consulting Associates, New York.

For the potential of cities to be unlocked, two factors are critical. Firstly, the ease of movement that will be brought about by location-based services providing both information and guidance to the traveler. Secondly, simplifying mobility through the use of a universal means of payment. These twin developments will revolutionize mobility and enrich the travel experience.

Research and expert interviews conducted by the Future Foundation
futurefoundation.net

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