ATG ACCESS

Smart cities:
Turning the dream into a reality

Research by ATG Access, the world's leading innovator of road blockers, bollards and vehicle barrier systems

November 2018

Introduction

Over the years, the world in which we live has become increasingly urbanised. In 1950, just over a quarter (29%) of the population lived in cities and urban areas; a number which has risen to 55% today. By 2050 – just a century after these early figures – it is expected that more than two-thirds (68%) of the world's population will live in cities; an additional 2.5 billion people.

The progressive urbanisation of our society has brought with it a number of challenges, including overcrowding, congestion and increased security risks; both cyber and physical.

In addition, the influence of technology has grown over time and now permeates virtually every aspect of our lives, transforming the way we live and work, as well as our expectations as to how life should be lived. Considering this, it is clear that our cities must be rethought in order to better reflect the demands of modern life, which has in turn given rise to the concept of the "smart city".

But what actually is a smart city? Simply defined, the term here refers to a city which incorporates technology, such as artificial intelligence (AI), GPS tracking and the Internet of Things (IoT), into its physical infrastructure in order to improve public services, make its citizens safer and improve overall quality of life.

However, despite widespread global investment in the digital transformation of public spaces and the smart city concept – global spending on smart city technology is anticipated to hit $80 billion this year – adoption in the UK has thus far been relatively slow.

For example, a recent report from the University of Exeter opined that smart city initiatives in China are "streets ahead" of their UK counterparts, which could be attributed to a lack of citizen awareness and senior buy-in throughout the UK.

Finally, through conversations with industry professionals, we will outline some of the barriers to a wider adoption of smart city concepts, and how these can be overcome to facilitate a smarter, safer future.

“With smart technology advancing rapidly, the possibilities for today’s cities are endless, but how do we cement the reality of the ‘smart city’ concept in the UK?

“In this report, we will focus on how a city’s physical infrastructure can work effectively alongside an intelligent network of connected objects and technology.

“Looking at global frontrunners such as Singapore who are leading the way in adopting these solutions, we’ll highlight the urbanisation problems that could be solved through the adoption of specific concepts, such as traffic, crime and emergency incidents.

“Are consumers truly aware of the smart city concept? And how do they feel about the implementation of such technologies? In this report, we will investigate both consumer demand and industry perception, outlining some of the barriers to a wider adoption of smart city concepts and what steps should be taken to overcome these challenges”.

Gavin Hepburn,
Managing director at ATG Access

About the company

Founded over 25 years ago, ATG Access is the world's leading manufacturer and innovator of road blockers, bollards and vehicle barrier systems (Hostile Vehicle Mitigation products).

Exporting to over 42 countries and manufacturing security products across five different global locations, ATG Access is a British manufacturer with a global reach, delivering state-of-the-art, intelligent security worldwide.

The business already works across the UK to make our cities smarter, safer and more secure, delivering projects in cities such as Glasgow, Liverpool and Stockport. Further afield, the business also works with the likes of Singapore – a leader in the smart city space – to provide top-of-the-line security solutions to the city-state and its people throughout its ongoing digitisation.

ATG has passionately championed the cause of how our increasingly multifunctional cities can be better served and protected, having previously authored a widely-covered thought leadership report around the topic.

For some time, ATG has also furthered the cause of the smart city through its innovative products, including automatic traffic management bollards and responsive road barriers, which respond to data to help control and restrict vehicle access.

The business provides these products to cities across the globe under a "fixed pricing" model, wherein the business charges no more for its smart products than it would for more traditional product lines, in order to encourage more wide-spread adoption.

The business also works to profile the benefits of smart cities by providing a thorough consultation service to governmental bodies, in order to help inform ongoing purchasing decisions.

Executive summary

Consumer awareness of smart cities is low, which may have an impact on widespread adoption

- 68% of people do not know what a ‘smart city’ is.
- Only 24% of people believe the smart city concept would improve overall safety and security in the UK.
- 26% of people find the concept of a smart city worrying, due to a lack of available information on the topic.

Consumer safety is a primary driver of smart city adoption

- In an emergency, 35% of people would like to see smart barrier solutions implemented to zone off affected areas where an incident has taken place.
- In the event of a terror attack, 63% of people would like to see improvements to their local road systems to allow the emergency services to reach the incident faster.

Consumers would be happy to fund a smart city through tax contributions

- 24% of people would be happy for a portion of their tax contribution to go towards implementing smart solutions.
- This willingness rises substantially when it comes to measures which affect transport infrastructure, with 57% of people happy for their tax to go towards smart traffic lights, and 44% for smarter signs which give real-time traffic updates.

However, consumers who are aware of smart cities are positive about the effect they could have

- Of the 32% that do know what a smart city is, 74% believe that smart city measures would help improve day-to-day issues, such as congestion.

In-depth look at the findings

Public opinion: How are smart cities perceived by the public and is there a demand?

As technologies such as artificial intelligence and the Internet of Things have become more commonly accepted and used in a mainstream capacity, governments and urban decision-makers are quickly realising the potential to incorporate this technology into creating safer, smarter cities.

Smart technology could be particularly effective when incorporated into existing physical infrastructure to best fit the needs of our multi-functional cities.

Investment in the smart city looks set to grow, with global spending expected to hit $135 billion by 2021. However, uptake in the UK has thus far been relatively slow, despite widespread industry and media discussion around the topic of smart cities.

This lack of uptake can be attributed, at least partially, to a lack of consumer awareness around the concept. Of the 1,000 UK city-dwelling consumers we surveyed as part of the research, more than two-thirds (68%) do not even know what a smart city is.

Furthermore, consumer perceptions of the concept are actually being damaged by this lack of awareness, with 26% of people admitting that they find the prospect of smarter cities “worrying” due to a lack of available information on the topic.

Perhaps unsurprisingly, it is the digitally-native 18-24 age bracket which harbour the least amount of worry in this regard, with just over a third (35%) expressing trepidation, compared to 52% in the 45-54 age bracket.

Of those we surveyed, almost a quarter (24%) of consumers also expressed scepticism as to the safety and security benefits smarter cities would bring, demonstrating a need for greater access to reliable educational resources around the topic, which clearly explain how smarter cities can save consumers time, money and peace of mind.

From our research, it is clear that educating the public on how smart cities can help solve many of the everyday issues inherent to urban life, such as safety risks, traffic congestion and a lack of security, will be key to solving these reservations.

Uptake could also be improved by highlighting UK-based smart city success stories, such as Bristol and London. Further afield, the tremendous strides made in the likes of Singapore – with the aptly-named “Smart Nation” project – are also legitimising the smart city concept on a worldwide scale, providing a shining example for the UK to follow.

The issues and the smart city solutions

Historically, wholesale upgrades to urban infrastructure have come about in response to a recurrent issue, such as poor sanitation or inefficient public transport. With this in mind, in this section we will take a closer look at specific issues created by urbanisation, as well as the smart city solutions that can help alleviate them:

Traffic control:

The UK is among the most congested countries in the world. With a reported 37.5 million vehicles registered for use on UK roads last year, urbanisation – and, more importantly, the associated congestion it causes – impacts upon commuters' quality of life through longer journey times and increased air pollution.

This key problem was highlighted throughout our research, with almost two-thirds (65%) of those we surveyed describing their home city's traffic flow as congested. In fact, it was recently found that UK commuters spend over a full day each year stuck in rush-hour traffic.

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vehicles registered for use on UK roads last year

This indicates a clear need for our urban infrastructure to evolve to better meet the needs of the modern commuter. Smart city concepts such as responsive traffic flow measures – ranging from smart traffic lights, to programmable smart barriers which control traffic – can drive efficiency and drastically cut commuter times. Not only does this have the potential to save the economy £9bn a year, measures such as these can dramatically improve a cities' level of air quality.

Despite an overall lack of awareness surrounding the smart city concept as a whole, our research found a clear public want for smart traffic control measures which could ease their daily commute. Smart traffic lights, which respond to the volume of traffic on the road in real-time, proved most popular, with more than two thirds (67%) of consumers expressing a desire for this feature.

Nearly half (45%) of people would also like to see a system that imposes additional traffic flow measures, such as through opening and closing lanes as needed, using traffic data to control physical signage or barriers. Real-time smart traffic control measures could greatly improve traffic flow. Better traffic light control during peak hours was the most popular option consumers would like to see, with 67% of consumers expressing a desire to see this measure implemented.

For example, traffic light patterns could be adapted according to the presence of vehicles on certain roads; if minor roads are clear, traffic lights on main roads would remain green, saving time and fuel, however if traffic was busy it would trigger a red light on main roads when needed.

45%

of people would also like to see a system that imposes additional traffic flow measures

67%

of consumers expressing a desire to see better light control measures implemented

Safety:

Pedestrian safety is of the utmost importance to urban planning and transport departments. This is particularly true in our increasingly urbanised communities, wherein casualties are naturally made more likely by the high volume of traffic and pedestrians in a confined area.

As Britain's roads become further congested, boundaries between car and cycling lanes have also in turn become blurred, putting cyclists at risk. Indeed, 100 cyclists are killed on the roads annually.

Unsurprisingly, road safety for more vulnerable users, such as cyclists and pedestrians, was a key consideration for the participants in our survey.

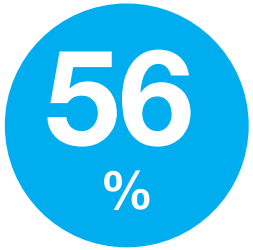
More than half (56%) of people believe smart city measures would make the road safer for cyclists, and this number rises for pedestrians. Two thirds (66%) of those we surveyed believe that pedestrian safety and security would be improved by smart city measures being implemented in their local area.

In the course of our research, we found that the public would be open to a number of smart city measures to better enable public safety. 40% of consumers would like dedicated bus and cycle lanes in busy periods, which could be enabled by smart barriers that extend and retract according to traffic density.

Smart road sensors strategically placed across cities proved even more popular, with nearly half (47%) of respondents expressing a desire for these to be implemented. Smart sensors can drastically increase driver safety on Britain's roads through real-time monitoring of traffic congestion and the ability to detect and flag accidents as and when they occur.

These sensors can also protect road users against natural hazards such as ice forming on the roads, by detecting the hazard and alerting drivers ahead of time in order to avoid accidents.

However, a balance must also be struck between visible pedestrian safety measures – such as barriers and bollards – and ensuring that our town centres remain aesthetically pleasing and busy. Smart cities can offer a solution to this through measures such as smart barriers, which extend and retract dynamically as needed.



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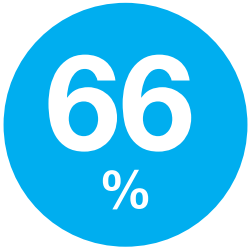

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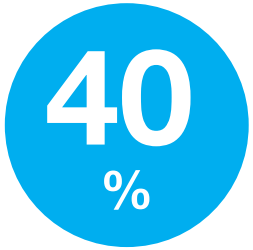

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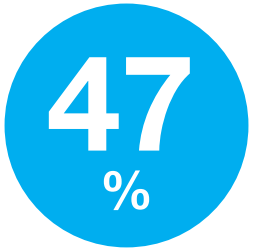

of respondents expressied a desire for smart sensors to be implemented

Security:

Despite heavy investment in measures designed to make the public feel safer, a worrying amount of UK residents simply do not feel safe where they live. When asked about this as part of our research, only 54% of consumers reported feeling fully safe where they live, and 5% of respondents admitted to never feeling safe, with elements of fear and trepidation clouding their lives on an everyday basis.

Therefore, if smart cities could be clearly demonstrated as a means to improve public safety, consumers are likely to be a great deal more receptive to the concept. This sentiment is echoed within a report from Smart Cities World, wherein more than half (51%) of respondents identified security as an essential part of any smart city.

Recent research by McKinsey Global Institute found that the application of smart technologies within urban environments could drastically increase public safety, potentially reducing fatalities from homicide, road traffic and fires by up to 10%. Incidents of assault, robbery and auto theft could be further transformed, with rates dropping by as much as 40%.

While preventative security measures, such as visible bollards, barriers and an increase in CCTV cameras, are popular amongst consumers, the majority of consumers also recognise that prompt, effective action post-incident is crucial. This is evidenced by nearly two thirds (63%) of consumers expressing a desire for measures which allow quick, easy access for emergency service vehicles in the event of an incident.

An unfortunate side-effect of security incidents is the sheer scale of disruption they can cause. Despite the best efforts of the relevant authorities, traffic accidents can cause delays for hours, and the effects of a terror-related incident can often be felt for days or weeks at a time.

Should a security issue occur in a smart city, responsive smart barriers and traffic light control can minimise the associated chaos and disruption by managing the flow of cars, cyclists and pedestrians throughout the event, to allow better access for the emergency services. This need is clearly recognised by the public, with more than a third (39%) expressing a desire to see barriers that respond in real-time to cordon off areas surrounding an incident.

The past couple of years have also seen a sharp rise in the amount of vehicle ramming attacks across the UK, due to the large amount of damage a vehicle can cause in a short amount of time (such as by an individual or group intending to commit a terrorist act).

Naturally, these attacks have led to an accompanying demand from the UK public for measures which can help better protect them. A key example of such a measure are smart barriers – a key priority for more than a third (35%) of the public - which respond to data in real time and can be raised and lowered to zone off affected areas.

Considering the clear impact smart cities can have on security and post-incident response, it is perhaps surprising that only 24% of people believe the smart city concept would improve overall safety and security in the UK. This indicates a need for businesses and public sector organisations to place a greater emphasis on educating consumers, as well as clearly highlighting the potential benefits of smart city concepts, particularly when it comes to safety and security.

"Key to the British public accepting the smart city will be proving that smart cities could provide a concrete, noticeable improvement to the way they live.

The issues identified by our respondents throughout our research were reflective of the problems which – unfortunately – have become an accepted part of everyday city life, such as congestion, security and overall safety – or lack thereof.

"Luckily, it is exactly these issues to which smart cities could provide a solution. Incorporating data into city staples such as traffic lights and physical security barriers is the natural next step forwards for our urban infrastructure, making our public spaces smarter, safer and more secure."

Gavin Hepburn,
Managing director at ATG Access

Singapore case study

Singapore is perhaps the most famous example of a smart city success story. Visitors to the city-state have often reported that they feel like they're "living in the future" due to the widely-modernised public services – such as seamless, contactless public transport payment, and demand-driven transportation. This view has been echoed by the Wall Street Journal, which identified Singapore as the example to follow when it comes to smart cities.

Key to this early success has been the high amount of senior buy-in, taking the form of Singapore's government-backed "Smart Nation" project; an ongoing initiative which focuses on leveraging smart city solutions to urbanisation issues such as pollution, congestion and over-subscription to public services. The city has seen particular success with its range of smart, connected traffic control solutions.

This includes an improved Electronic Road Pricing (ERP) system, GPS-enabled taxis which deliver real-time traffic information, and an open-data augmented public transportation system.

For example, toll fees are charged by letting car sensors automatically compute distances, government centres can use vehicle data to monitor mobility and improve traffic schemes to reduce congestion, and traffic managers can also incentivise the use of less-congested roads by reducing toll fees.

In terms of deliverables, embracing smart city concepts has led to Singapore enjoying congestion rates which are among the lowest in the world proportionally, as well as accreditation as the "greenest city in Asia" due to the associated improvements in air pollution.

Smart Nation SINGAPORE

Overcoming industry scepticism and barriers to uptake in the UK:

As with much emerging technology, there is naturally a degree of scepticism around the introduction of smart cities, with some detractors writing the concept off as anexpensive gimmick.

Given the culture shift smart cities could potentially be, as well as how many fundamental everyday products and services would be transformed in the transition, a certain level of uncertainty is only to be expected initially.

While associated technologies and terminology, such as the Internet of Things, are certainly interesting to certain niche audiences, they do not mean a great deal to the average city-dweller or boardroom decision maker unless their benefits in an everyday context can be clearly articulated and measured.

So, who needs to be convinced if the smart city is to be a success?

Much of the decision-making power lies with local authority bodies, which largely have the responsibility for identifying and deciding upon which services and solutions will be of the most benefit for their cities. These bodies therefore hold a tremendous amount of sway as to which smart city concepts are picked up.

However, smart cities are expensive - with project costs often running into the billions – and such a costly investment may simply not be viewed as a priority. Public funding is by no means infinite, particularly outside London, which tends to attract the most investment.

Local authority bodies may therefore prefer to divert what funds they have towards shorter-term core strategic initiatives, which are perhaps viewed as more “urgent” than long-term smart city projects.

Another barrier to uptake is the need to find a balance between personalisation and wider cohesion. Every city is unique – in areas such as infrastructure, layout and relative levels of congestion – with each city’s varying stakeholder groups therefore having different requirements for what a smart city needs to offer. This in turn necessitates a bespoke approach for each smart city project, taking into account the unique need of each city and its inhabitants.

At the same time, however, smart, connected cities can also only reach their full potential if all cities are at approximately the same level of buy-in and uptake. This is to avoid a “two-tiered” solution wherein certain cities receive the lion’s share of funding and the others, which have been slower to come around, are digitally excluded, meaning that a balance must be struck.

Finally Brexit, as with so many other industries, could also act as a barrier to long-term smart city initiatives. A significant portion of the funding for smart city initiatives to date has come from the EU-backed European Investment Bank and the associated Horizon 2020 project, however in 2019 – particularly in the event of a “no-deal” Brexit – this is likely to change.

The government has already warned that UK organisations looking for Horizon 2020 project funding may be adversely affected by a no-deal Brexit, meaning that alternative funding sources may need to be found.

Commenting on the smart city concept in the UK, a top security designer from a world leading, international engineering professional services firm, said:

"The smart city concept aims to deal with increasing population numbers and the migration of the population to more urban areas. This in turn requires revolutions in transportation networks, sanitation, autonomy, the 'internet of things', interconnectivity and finally a more robust and efficient network to support the running of day-to-day life.

If executed correctly living standards would be enhanced, travel would be virtually automated, people and environments would be safer and more environmentally friendly, as there would be improved air quality and reduced pollution. The threat from vehicles would also be reduced.

"While we do not see a great deal of smart city projects or any conclusive leadership on the concept in the UK at the moment; some side projects which tie in with the wider 'smarter city' scheme are starting to emerge.

"To achieve such a concept on a national level would require huge amounts of collaboration between cities and areas, and this would be very difficult to achieve. But it is possible.

"A greater 'interconnectivity' would bring its own vulnerabilities and challenges, such as an increase in cyber-attacks targeting 'smart' infrastructure. The more reliant we become on automated and connected systems – the more we have to lose if these are targeted in any way. For instance, transportation and areas of cities could draw to a halt if targeted. Therefore, security would have to be implemented in a layered approach to try and minimise security breaches.

"The use of 'Big Data' is also of concern – would stakeholders use the data wisely; should there be fines for companies using the data badly in this instance? The law surrounding technologies such as biometrics is not currently clear and there could potentially be large-scale privacy issues if not handled appropriately. Policy will need to come from both local and national government to support the changes and ensure they are implemented responsibly.

"However, it will be the market that will drive forward this transformation. It will not happen all at once but gradually within trial cities and then further afield. I expect it will take around 15-20 years for full implementation."

How can the barriers be overcome?

Far from being a sci-fi pipe dream, smart cities are in fact already having a transformative impact across the globe. So, what can be done to help ensure the UK follows suit?

Key to ensuring uptake lies in finding ways to meet the long-term cost involved with smart cities, with funding being identified as a primary barrier to UK smart city adoption in a report published earlier this year.

While most of the funding for pilot projects – particularly in the research and development stages - comes from government money, the scale and cost of nationwide smart city adoption makes this an unsustainable business model in the long run.

Long-term operational funding, therefore, is likely to come from local authority bodies in each city. As previously highlighted, however, available funds – and the desire to make use of them for smart projects – vary greatly by city, demonstrating the need to explore more sustainable funding models which finance efficient, practical smart city applications.

This could be started by highlighting overseas best-practice examples such as Singapore, which continues to impress thought leaders the world over with its focus on “simple goals” that provide clear benefit to citizens and local authorities alike, including smart buildings, transport and infrastructure.

Proof of concept could also be established through smaller-scale pilot projects – such as smart traffic barriers to ease congested areas in cities – that clearly demonstrate the long-term benefits and overall ROI of smart city initiatives. Bristol's "Bristol is Open" initiative, having recently overtaken London as the UK's leading smart city, is one such example which could be followed.

Interestingly, our research uncovered another solution to ongoing funding worries; the British public. We found that a high proportion of UK taxpayers (24%) would be more than happy for smart city measures to be funded using part of their own tax contribution. Smart traffic control measures, which would drastically cut down daily commute times, proved particularly popular, with smart traffic lights (57%) and smart traffic update signs (44%) being the measures that consumers would be most willing to contribute towards.

However, the most sustainable solution is likely to come from ongoing collaboration between the public and private sectors. Local councils should work in partnership with like-minded businesses which can supply the solutions required for a smart city that are also tailored to each city's unique needs and fit into increasingly-strained public budgets. For example, ATG operates with a fixed pricing model, wherein the business works with local governments to deliver smart security solutions, such as smart traffic flow systems, at no extra cost to more traditional products.

For smart cities to succeed long-term, these businesses cannot be involved for a quick profit, but rather be doing everything in their power to provide options for long-term growth ambitions. Suppliers must not just be innovative, but also both practical and flexible, so that local authorities across the UK can invest with confidence, knowing that suppliers - and the smart solutions they help provide - will grow and flourish with them long-term.

Conclusion

Simply put, as our cities become more and more congested, it becomes increasingly clear that our current urban infrastructure is no longer fit for purpose. From both our findings and external research, it is clear that smart cities are the clear next step forwards, easing the issues caused by progressive urbanisation - such as congestion, public safety and security – while offering clear cost savings across the country, both now and in the future.

Traffic delays and congestion – an area which could see the most obvious benefits from smart city concepts – have been estimated to cost the UK economy more than £300 billion by 2030, which indicates a clear need for prompt action in this area.

However, despite the obvious benefits of smart cities – which have been found to improve quality of life by up to 30% in some cases – it is clear that there are still some issues to be circumnavigated if the UK smart city is to make the transition from far-flung concept to reality.

In addition to the issues outlined throughout this report, there is of course also the issue of data privacy to consider in our post-GDPR world, particularly considering that public trust in government bodies handling their personal data is already at an all-time low. Recent research found that as few as 37% of consumers would trust government bodies with their data, and private sector organisations score even lower, likely due to the recent spate of high-profile data breaches such as those suffered by Google, British Airways and Ticketmaster.

Concerns over data privacy were also a theme of our own research, with 26% of the UK public believing that smart cities, and the associated sharing of public data, would lead to a “loss of privacy”, pointing to a need for these doubts to be alleviated.

Given this, gaining consumer trust through clearly demonstrating the benefits of data sharing will be key, citing examples of cities such as Copenhagen, which is now reaping the benefits of a data-enabled smarter city infrastructure.

Essentially, however, virtually all of the main arguments against smart cities – such as a lack of consumer awareness, funding uncertainties and stakeholder scepticism – could be solved by demonstrating proof of concept. The solutions are already there; it’s just a case of demonstrating their – potentially transformative – value.

Projects could start on a smaller scale, whether this be pilot projects in individual cities, or even a singular solution, such as smart traffic control or safety measures, rolled out across a range of locations. Such initiatives would go a long way towards clearly proving to consumers, investors and other stakeholders exactly what a smart city can offer.

Not only do we already have real, actionable examples of cities thriving from the smart city concept across the globe, the UK also has the technology, infrastructure and a litany of willing, available suppliers all coming together to create an environment in which the smart city can thrive.

The people want the smart city, the solutions are there, and it is high time we make proper use of them to facilitate a safer, smarter future.

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