# Smart Cities: Convergence and collaboration to build communities of the future

HSBC

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# Convergence and collaboration to build communities of the future

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**Cities are getting smarter, and the organisations operating in them must adapt. As new technology gets wired into the city, it's revolutionising urban efficiency and improving the lives of citizens. At the same time, it's set to fundamentally alter business and operating models. The job of the treasurer and the finance function more broadly is to support this change; to create order and clarity.**

So, what is a 'smart city'? It's a city where governments are working to deploy advanced technology to achieve a step change in efficiency with consequent benefits for all citizens. The concept is rippling across many areas – including energy and the environment, buildings, infrastructure, mobility, health and even the governance of the city.

City dwellers can look forward to more convenient, healthy, safe and sustainable lifestyles. The Internet of Things, artificial intelligence, machine learning and distributed ledger technology are some of the innovations enabling an unprecedented level of connectivity and automation. The completely connected, fully intelligent city is still a way off, but urban authorities from London to New York to Singapore are working with business to apply technology with great success.

Just as smart cities will spawn new business models, so too they will streamline public sector operating models. In the automotive sector, connected cars are increasingly communicating with the urban environment, and companies are eagerly exploring new business models and revenue streams. Telecommunications companies hardwire the digital city. But in future will they enable the city's evolution by moving from hardware into software? Turning to the public transport sector, there are opportunities to shorten journey times and enhance personal experiences.

When it comes to turning strategy into reality, it's the treasurer's job to support these new models. New ways of making payments and managing cash are needed. Treasurers must have a different – again technology-enabled – toolset that allows their organisations to adapt and thrive. They also need advice and intelligence about how they can achieve their organisations' goals in the world's diverse cities.

Together with my colleagues at HSBC, I have spoken to many clients all over the world – whether at conferences, in their offices or at the events we host. They tell us that with cities transforming at such a pace, they need banking partners who are committed to supporting them.

I am fortunate to be part of a bank that is investing substantially to help our clients prepare for the future at a time when the rate of change is exponential. As announced, HSBC is investing USD 15-17 billion in growth and technology over the next two years, specifically to help our clients prosper as they take advantage of greater digitisation and automation.

This report offers our insights into how smart cities are likely to change sectors, businesses and the public sector. As a bank with a wide geographical presence and deep sector knowledge, as well as being a driver of new banking technology, we are well placed to advise treasurers on the possibilities available to them.

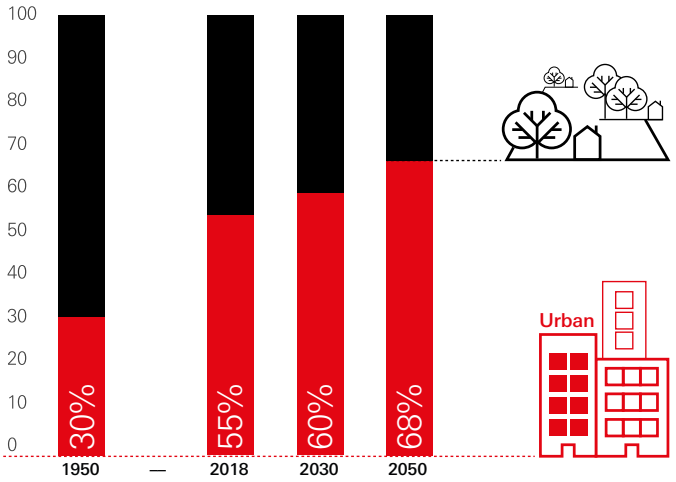
# What is "smart" about a smart city?

**Throughout history, people have flocked to cities in search of new opportunities to improve the quality of their lives. During the first Industrial Revolution, British cities received an influx of people from the countryside, seeking work in new factories. Prior to industrialisation, over 80% of people lived in rural areas.[1] For example, Manchester experienced a six-fold increase in population between 1771 and 1831, while Bradford grew by 50% every ten years from 1811 to 1851.[2] In the United States, the second industrial revolution saw waves of migration to cities between 1870[3] and 1920.**

The trend of urbanisation continues. In 1950, only 29% of the world's population lived in cities. By 2014, this figure almost doubled, with cities hosting 54% of the population.[4] The United Nations estimates that by 2050, 68% of the population will be living in urban areas (see Figure 1).[5] This pattern of migration is expected to be consistent across both developed and developing markets.

The World Bank calculates that over 80% of global economic activity[6] takes place in cities, and it is expected that city-fueled economic growth will continue. After all, cities are the engines of growth, the seat of our governments and home to many of the companies that power the global economy. The complexity of cities requires integrated yet dynamic solutions that enable governments and businesses to support this growth, effectively serve citizens and deliver increasingly better quality of life. These solutions must be relevant, realistic and reliable – while being rooted in cultural understanding. This opportunity to deliver new solutions makes cities viable, vital and attractive places for businesses that wish to participate in this growth by developing products and services that improve the lives of city residents.

**Figure 1: Growth of the urban population**




**Source:** United Nations Department of Economic and Social Affairs, 2018[7]

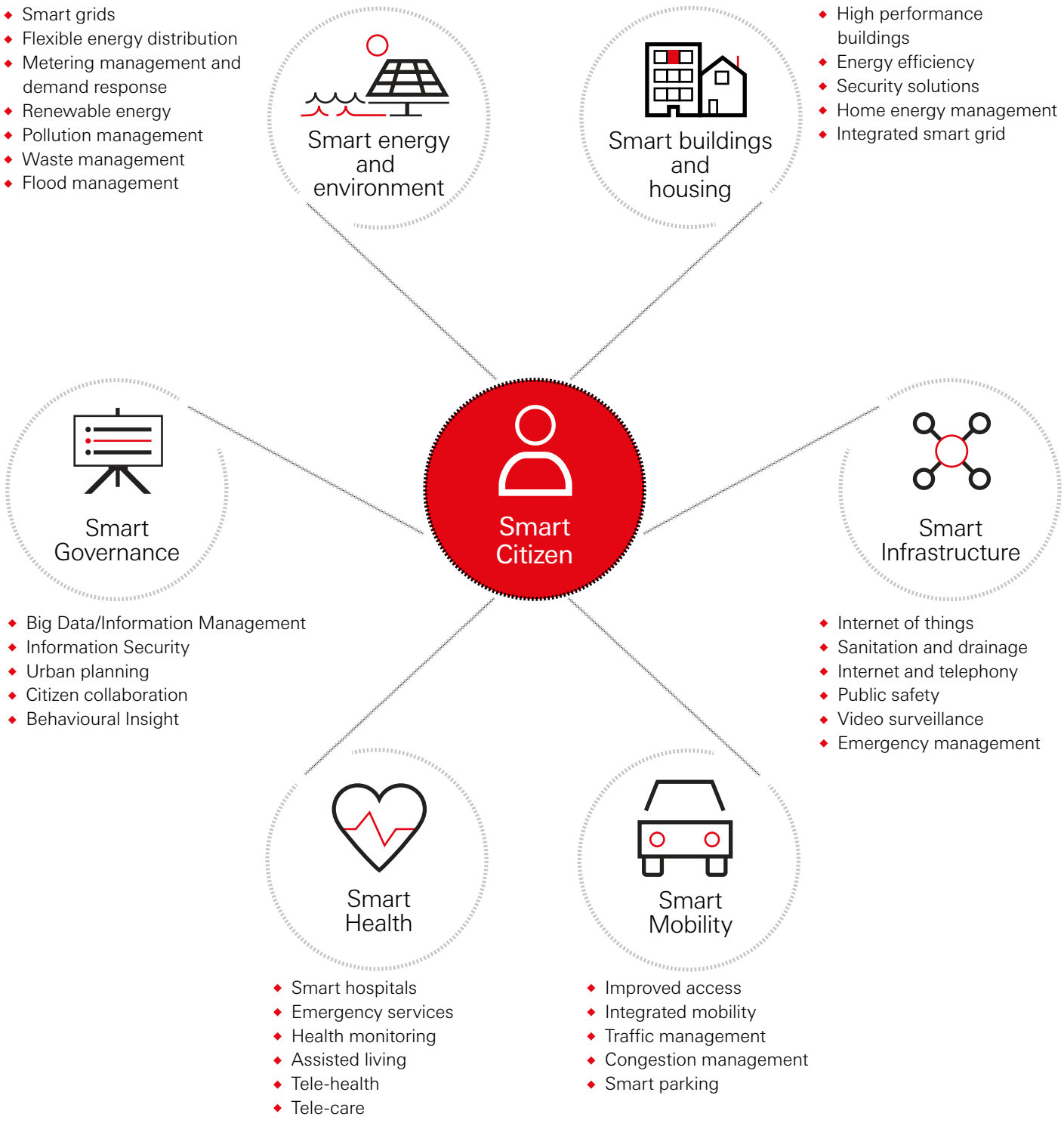
It is therefore not surprising that the growth of city dwellers has been paralleled by the growth of technology. Today, as the much-discussed "fourth industrial revolution" takes hold, businesses from different sectors are investing in innovation that will allow them to leverage technology to improve life in communities. With technology developing at an unprecedented rate, the commercial opportunities for companies to harness their potential to deliver on the changing needs and demands of communities and improve standards of living, has given rise to the concept of "smart cities".[8]

The emergence of advanced technologies such as the Internet of Things (IoT), artificial intelligence (AI) machine learning (ML), and distributed ledger technology (DLT), among others, provides a previously unseen degree of connectivity and depth of data that can be harnessed by both businesses and governments for swift decision-making and strategic longer-term planning. By utilising comprehensive, real-time data, government agencies and private sector institutions are able to better understand citizen demand patterns – and are thus able to respond more quickly and cost-effectively.[9]

A completely connected, fully intelligent city is still a way away, but governments are working with businesses to apply technology with great success in many cities. The longer-term vision is for smart cities to positively impact all elements of citizens' daily lives. The United Kingdom's Department for Business, Innovation and Skills (BIS) considers the establishment of smart cities to be a process, rather than a static outcome, in which increased citizen engagement, hard infrastructure, social capital and digital technologies make cities more livable, resilient and better able to respond to challenges.[10] The UK's Department for International Trade (formerly UK Trade and Investment) illustrates how the smart city puts different systems at the service, and under the control of, the "smart", engaged citizen (see Figure 2).

1 https://webs.bcp.org/sites/vcleary/modernworldhistorytextbook/industrialrevolution/ireffects.html#Urbanization
2 https://www.historylearningsite.co.uk/britain-1700-to-1900/industrial-revolution/life-in-industrial-towns/
3 https://www.khanacademy.org/humanities/us-history/the-gilded-age/gilded-age/a/america-moves-to-the-city
4 https://www.rcrwireless.com/20160701/internet-of-things/smart-city-drivers-tag28
5 https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html
6 http://www.worldbank.org/en/topic/urbandevelopment/overview
7 United Nations Department of Economic and Social Affairs, World Urbanization Prospects 2018 – Our future is urban
8 https://www.rcrwireless.com/20160701/internet-of-things/smart-city-drivers-tag28
9 McKinsey, Smart Cities: Digital solutions for a more livable future, June 2018
10 Smart Cities Background Paper, London: Department for Business Innovation and Skills

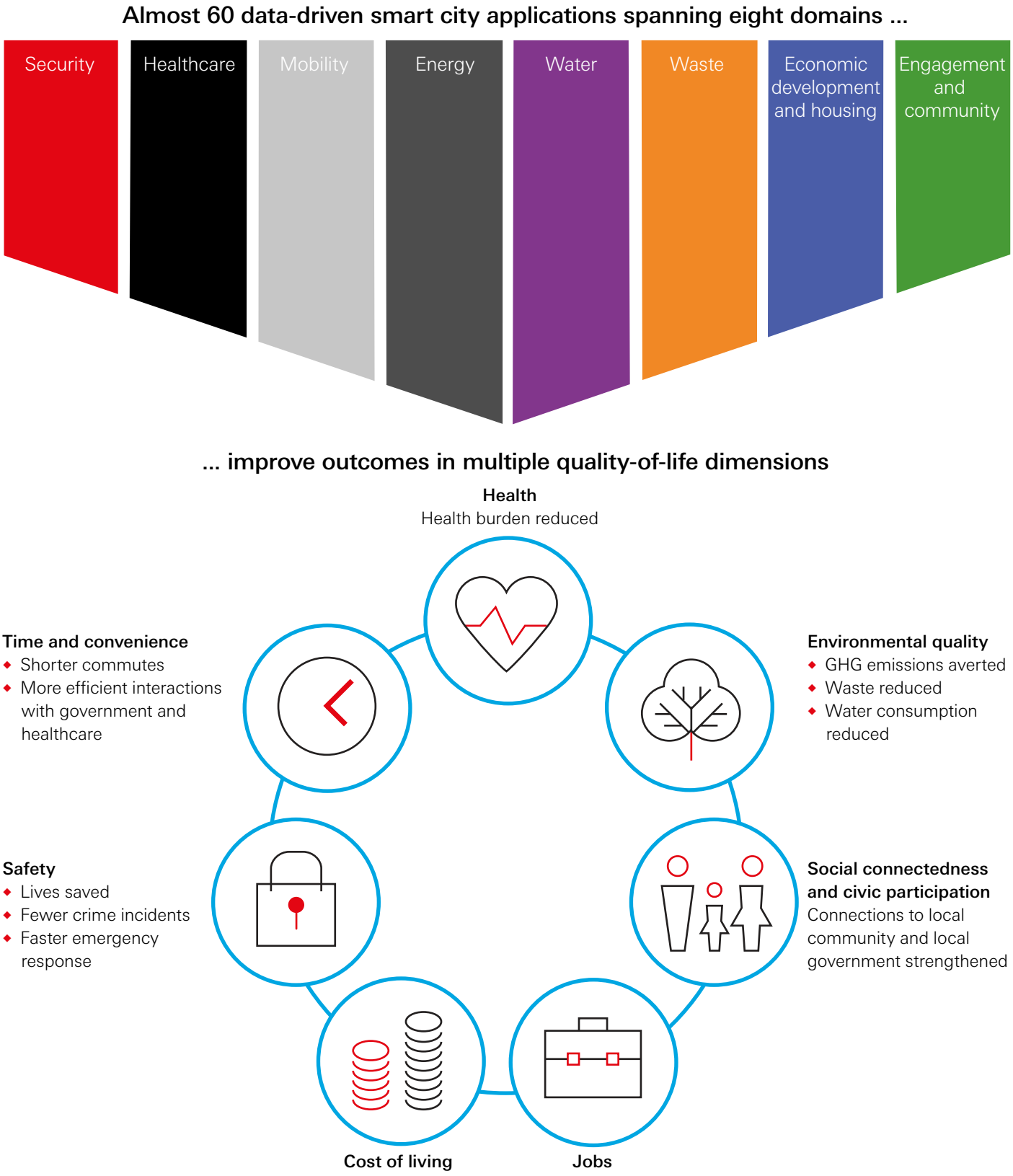
**Figure 2: Putting the smart citizen in control**




**Source:** UK Trade and Investment, Smart Cities Pitchbook, March 2016

In a more recent report, McKinsey explains how data-driven smart city applications can impact quality of life across multiple dimensions – from making life more convenient, to generating jobs and bringing down the cost of living, enabling people to generally live healthier, safer and richer lives (see Figure 3).

**Figure 3: The impact of smart city applications on quality of life**




**Source:** McKinsey, Smart Cities: Digital solutions for a more livable future, June 2018

# Smart cities open up a range of benefits for citizens

**By effectively employing technology, smart cities can develop new systems and processes that can not only improve the lives of citizens, but also create new commercial opportunities for businesses. Citizens can look forward to more convenient and efficient lifestyles, encompassing almost every aspect of day-to-day life – from ease of moving about, to better public services, and better utilisation of resources. Some potential benefits include:**

**Improved efficiency and mobility**
McKinsey estimates that smart mobility can create better transportation systems, cutting commute times by as much as 15-20%.[11] Smart street parking and traffic management systems can create better flows and road utilisation, and the longer-term vision for autonomous vehicles could improve public transport provision.

Energy consumption can also be made more efficient. For example, the use of smart meters (meters that measure energy consumption accurately and send the data on to an energy supplier) on a consumer level already enables better insight into – and control over – energy consumption; 55% of early adopters in the UK report positive behavioural change towards energy use following installation of a smart meter[12].

Smart grids improve transmission of energy data and enable better management of energy supply and demand.[13] They also support the supply of renewable energy, such as solar and wind, integrating these intermittent renewables and enabling distribution systems to keep pace.[14] [15] With smart grids, energy distribution can be optimised, reducing peak demand and need for bigger grid infrastructure. Public street lighting is also becoming more efficient. A number of cities are replacing street lights with more efficient LED bulbs that are equipped with sensors that adjust the lighting level depending on whether there is anyone on the street or not.[16]

These are just some examples of applications that drive energy efficiency and deliver sustainability benefits.

**Sustainability**
In addition to the energy efficiency potential, smart cities can have other positive environmental impacts. Smart cities are better able to utilise and optimise available resources, leveraging insights from data and information. From sensors in waste containers driving more efficient refuse collection, to connected, responsive home appliances that reduce energy consumption, building automation systems that reduce emissions, and water consumption tracking that encourages conservation, there are a multitude of potential environmental benefits that can be realised. McKinsey estimates that by "deploying a range of applications to the best reasonable extent, smart cities could cut emissions by 10-15%, lower water consumption by 20-30% and reduce the volume of solid waste per capita by 10-20%." [17]

11 McKinsey, Smart Cities: Digital solutions for a more livable future, June 2018
12 Early consumer experiences of smart meters 2018, www.tech.org, 20 July 2018
13 Smart Grid solutions to watch 2018, www.disruptordaily.com, 3 March 2018
14/15 https://www.smartcity.press/smart-city-strategies-for-global-warming, 2 January 2018
16 Smart cities: redefining urban energy, www.power-technology.com, 8 February 2018
17 McKinsey, Smart Cities: Digital solutions for a more livable future, June 2018

**Safer communities**
Crime and public safety are key concerns for local communities the world over. Safety and security benefits can be gained through improved personal and home security, better policing and real-time crime monitoring. For example, Shotspotter, an advanced surveillance technology start-up, uses AI to alert authorities within 45 seconds of a gun being fired, enabling swift and targeted response times. It has been deployed in around 90 cities, including Chicago, New York and San Francisco. Additionally, emergency response times could also be improved through optimised dispatching and synchronised traffic lights.[18]

**Improved healthcare**
At the individual level, digital and mobile devices and the Internet of Things (IoT) enable preventive health tracking, as well as actual treatment of illness. Sensors allow medical professionals to collect patient data remotely, resulting in faster and more personalised treatments. Other developments such as 3D printed pills, first approved by the US Food and Drug Administration in 2015, facilitate not just the dispensing of precise dosages, but also enable medication to be highly customised and produced near patients.[19]

At the national level, unified health databases that connect all hospitals and clinics allow patients to receive diagnosis and treatment across multiple institutions, and enhance data consolidation for research and collaboration by healthcare professionals. Better healthcare systems also have implications on resource and inventory management for healthcare institutions, and databases of comprehensive medical records help save costs for insurance companies.[20]

**Better governance**
City governments tasked with delivering better services to constituencies can look to new channels that enable better communication with their publics. From social media channels to personalised digital platforms for service delivery, data collection, or consultation and opinion polling, city governments can enhance citizens' experience and engagement, help officials develop a better understanding of public needs to make better decisions, and improve public servants' responsiveness.

In Santander, Spain, 20,000 sensors were installed around the city to gather data to help officials make decisions on issues like frequency of waste collection, energy utilisation, park maintenance and the like. In addition, citizens were encouraged to turn their personal smartphones into sensors by downloading the "Pulse of the City" app. Through the application, the public became intelligent mobile sensors for the city, contributing to the flow of information into the city's data stream. Beyond the government's use of the information, citizens could also access the application for day-to-day tasks such as managing their commute, or looking into environmental hazards like pollution levels, and other public services.[21]

Amman in Jordan has a data-driven approach for streamlining waste management, monitoring various factors – from volume of waste, to truck locations and number of complaints. This enables them to redirect trucks to areas where other trucks were too full to complete waste collection.[22]

Other countries are also making government information accessible via digital platforms. In India, to enable citizens to exercise their right to information (RTI) and gain greater transparency into government workings, the state launched the RTIonline service, allowing citizens to file RTI applications and participate in forums to share ideas and suggestions and query the status of applications online.[23]

These are but a few examples of how the integration of technology such as AI, machine learning, and IoT, can generate data and enhance the quality of life of citizens in smart cities.

18 McKinsey, Smart Cities: Digital solutions for a more livable future, June 2018
19 Smart Healthcare Solutions for Smart Cities, www.smartcity.press, 5 August 2017
20 Smart Healthcare Solutions for Smart Cities, www.smartcity.press, 5 August 2017
21 Forces of change: Smart cities, Deloitte, 22 March 2018
22 Forces of change: Smart cities, Deloitte, 22 March 2018
23 Smart Governance for Smart Cities, www.smartcity.press, 21 August 2017

# Commercial opportunities: Businesses across sectors are positioning for growth

**Clearly, the technology sector has been, and will continue to be, one of the key enablers for the development and delivery of smart city initiatives. By integrating smart technologies into their current product offerings, adapting their business models, and collaborating with both private and public sector institutions, firms from different sectors can contribute to – and benefit from – the building of smart cities.**

**Automotives**

The automotive sector is one of the main contributors to smart city development. Smart mobility solutions are transforming how people and goods are transported, thus stimulating economic activity and growth. Automotive companies are exploring how increasingly connected vehicles, with the ability to communicate with other elements in an urban environment – parking bays, tolls, retailers, and other vehicles – are creating new business models and opportunities for new revenue streams.

Today's automobiles are already intelligently connected, with built-in cameras and sensors among other enhancements. As further applications develop, they are expected to produce a wealth of data that will need to be transferred, processed and analysed. This data can not only feed into automotive firms' own service development, it can also be used by other players in the ecosystem, such as infrastructure companies operating smart roads under build-operate-transfer arrangements, traffic agencies and environmental impact agencies to name a few..

There are many potential applications. For example;; a number of cities are already implementing and reaping the benefits of improved traffic management utilising smart traffic solutions. Singapore, named the top performing smart city of 2017 in the Global Smart City Performance Index[24], has successfully applied connected traffic solutions in conjunction with strict policies curtailing car ownership, in an effort to reduce road congestion. The city-state has also installed traffic sensors and surveillance cameras that transmit traffic data that serves as the basis for information on gridlocks, travel time, road accidents, parking availability and so on. Other cities, such as San Francisco and London, have also applied their own traffic calming technology solutions, in support of long-term visions for transformative transportation paradigms in the form of Mobility as a Service (MaaS) and Autonomous Vehicles.

Autonomous vehicles also open up a range of possibilities for smart mobility. An autonomous vehicle is capable of sensing its environment and navigating without human input instead, they use a variety of techniques to detect their surroundings, employing technologies such as radar, laser light, GPS, odometry, and computer vision. Autonomous vehicles rely on data from this array of sensors, which is then analysed in order to help the vehicle determine where to drive, how fast to go, and when to stop. If autonomous vehicles become mainstream, and their data dependency escalates, infrastructure capable of handling huge amounts of data will need to be made available. Automotive companies will need to work in tandem with telecommunications companies, internet providers, infrastructure companies and governments to ensure that the right infrastructure is put in place for their vision and innovations to come to fruition. For example, roads will need to be equipped with data networks with sufficient bandwidth and speed to accommodate feeds from all vehicles, and transportation authorities will need to explore how road provision can make way for mass transit solutions.

As automobiles become increasingly connected, there are opportunities for companies in the industry to create new revenue streams by offering new services in-vehicle, or services related to mobility. Examples include partnerships with parking operators to enable smart parking with in-car payments, in-car fuel or toll payments, or even real-time speeding ticket issuance and collection. Use cases are already in play, with Visa partnering with Honda and ParkWhiz, integrating fuel and parking payments into the connected vehicle. It is anticipated that other use cases can be added in the future, including road tolling or usage-based insurance.[25] As more applications involving automated in-car payments – both micropayments, as in the case of parking and fuel payments, and larger, more occasional payments, such as

24 Singapore pips London, New York to top global smart city ranking, www.straitstimes.com, 13 March 2018

25 Disruption in the automotive industry: Enhancing the customer experience through connectivity; Deloitte 2018

insurance or maintenance and repair fees – become the norm, treasurers in automotive companies may need to manage an increased volume of transaction flows to and from a wider variety of partners and providers.

**Telecommunications**

The services delivered by telecommunications providers are fundamental to the delivery of smart city applications and solutions. The sector provides the interconnectivity for the convergence of all other players in the ecosystem, enabling them to connect and communicate, offering access to the all-important data that is the lifeblood of a smart city. Perhaps a reflection of this is Navigant Research's estimate that the global communications market will more than double – from USD 5.5 billion in 2018, to USD 13.4 billion in 2019.[26]

As smart city applications mature, there will be even greater dependency on telco networks to reliably and securely connect the various sensors, radars, cameras, controllers and other hardware in the city environment, in order to capture and communicate the data they deliver. Cognisant of their role in connecting smart cities and the new opportunities opening up, telco companies have been investing in their networks – from fibre-to-the-home, small cell and Wi-Fi hotspot initiatives, to powerful 5G connectivity that is expected to be transformative because of its capability to handle the large volumes of data generated in smart cities.[27]

Despite this ongoing investment, Navigant Research suggests that the smart city communications market remains highly fragmented, driven by the wide range of smart city applications and use cases, each with unique connectivity requirements. Telco operators' ability to bring convergence across the silos will be critical to creating networks that seamlessly deliver the integration and connectivity required to fully realise smart city benefits.

As telecommunications solutions become further embedded into IoT and smart connectivity applications, firms may wish to consider pivoting their business models to grow beyond provision of physical infrastructure, to become digital businesses. This could mean providing not just the "rails" but also the software, analysis and perhaps even the business tools and consulting services to companies from other sectors who will be the main beneficiaries and users of the intelligence and insights gathered.

26 Smart City Communication Networks Market Overview 1Q 2018; www.navigantresearch.com; accessed 13 August 2018

27 Get smart; Ford, Georgina; CommsMEA; 21 June 2018

Finally, mobile operators have been playing a key role in facilitating micropayments in cities. Mobile wallets are becoming an increasingly popular means of paying for small purchases and services. The use of mobile payments on public transport for example, not only speeds up the flow of people, but also gives transportation companies better insight into individuals' travel behaviours, and opens up the possibility for developing further services such as real-time alerts, tracking and updates. Elsewhere, mobile retail transactions are transforming the shopping experience, introducing convenience, hyper-personalisation, and service optimisation.

As mobile operators and banks continue to collaborate in this space, there is the potential to further improve digital identification systems and transaction security, which will drive greater adoption of mobile payments.

**Infrastructure**

The infrastructure sector is beginning to leverage smart technologies to create efficiencies in the way they operate their assets. By drawing on data on current usage patterns, providers can strategically map out the best ways to maintain and operate existing infrastructure, minimising wear and tear and conducting pre-emptive maintenance. This could help extend the life of properties, reducing the need for new construction and the related capital expense. Usage pattern data also informs customer experience design, giving managers information on how infrastructure is used.

For example, WeWork is an office space provider whose "space as a service" offering employs a new leasing model that provides space as and when firms need it, disrupting the standard annual or multiyear leasing system. Sensors provide WeWork building managers information on how users interact with the different areas, enabling them to make better decisions on how to maximise over-all use of space.[28] Data on space utilisation can help infrastructure operators create new pricing models and revenue streams, as well as drive cost and operational efficiency.

Beyond buildings and workspaces, technology is also transforming city infrastructure, such as roads, bridges, and railways. Singapore, as part of its "Smart Nation" initiative, has implemented a series of smart, connected traffic solutions in an effort to reduce the number of vehicles on its roads.[29]

28 Is your company ready for the rise of smart cities?; McKinsey;21 June 2018
29 https://www.channelnewsasia.com/news/singapore/singapore-best-performing-smart-city-globally-study-10038722

**Aviation**

Technology has significantly changed air travel – from the time customers begin planning a trip, to the time they disembark at their destination; just as smart applications are transforming road vehicles, so too are they transforming airline travel by enhancing customer safety and experience.

Airports, already equipped with cameras and sensors, have the opportunity to connect what today are often fragmented systems, enabling them to communicate with one another, with the ultimate goal of improving efficiency and creating a frictionless customer experience.

In the future, when travellers get to the smart airport, smart gates with facial recognition and biometric scanners swiftly check passengers in. Utilisation data gathered by sensors and scanners would give airport operators insight into busy periods when staffing needs to be increased, reducing queues. Geolocation tools already in place would then work over free WiFi and provide personalised directions to passengers to get them to their boarding gates on time.

Additionally, many of the ideals of a smart city are encapsulated and modelled in a micro fashion in a smart airport, making it an accessible opportunity for businesses seeking to implement smart city solutions in a controlled environment.

# The pivotal role of banks

**Cities are challenged to find greater cost and operating efficiency while competitively attracting business and investment to ensure economic security and growth. As cornerstones of economies, banks can act as the financial enablers that facilitate the flows and connectivity among government entities, businesses, and citizens in city ecosystems.**

**Financial flows**

With the advent of open banking, banks are in prime position to work in collaboration with established businesses and fintech firms to facilitate the new payment flows – from B2B, B2C and B2B2C – to new business models. Solutions built on real time payments and open application programming interfaces (APIs) present opportunities for firms to handle increased volumes of microtransactions. For companies traditionally set up to manage occasional, large value payments to a limited number of counterparties, direct to- or from-consumer payments can pose significant operational burden. From firms accepting mobile payments for transportation and infrastructure utilisation, to local government collecting fees and taxes, banks can provide the financial rails that will keep money flowing freely within and between cities. Applications of next generation virtual accounts will not only enable firms to efficiently manage what will be an increased number of counterparties, but also enable businesses to maintain greater visibility and control of their liquidity – not just in individual cities, but across all their global operations.

Banks will also facilitate more streamlined disbursements – regardless of the number and size of counterparties. Whether it is for payroll, individual gig employees in multiple locations, refunds and compensation for failed services, social benefit payments or tax refunds, banks' digital disbursement solutions will enable a cost-effective means of providing instant payments to large numbers of beneficiaries across jurisdictions and currencies.

As business models change and new partnerships develop, firms will continue to require liquidity to finance growth. Banks are evolving their own approaches to financing, leveraging technologies such as artificial intelligence, machine learning and blockchain. With the help of these new technologies, banks are better able to quantify and mitigate risks, and make financing solutions more widely accessible to businesses and individuals. This increased ability to manage risk allows bank to develop more inclusive and responsible financing approaches – from trade finance solutions that go deeper into developing market supply chains to sustainable financing options.

**Singapore's Smart Nation goes cashless**

As part of its national drive towards becoming a Smart Nation, Singapore has ambitions to go cashless. Enabling this goal is PayNow, a peer-to-peer funds transfer service available to retail customers of nine participating banks in Singapore, including HSBC. Launched in July 2017, it allows individuals to send electronic payments to each other.

In August 2018, PayNow Corporate was launched, allowing payments to be made without the need to obtain bank details from beneficiaries. It improves customer experience and minimises a company's data maintenance.

For corporate-to-corporate payments, companies can pay directly and instantly using the Unique Entity Number (UEN) registered with PayNow Corporate. For corporate-to-individual payments, companies can pay instantly using the person's National Registration Identity Card (NRIC) or mobile phone number registered with PayNow.

At the consumer level, customers now have the ability to make a simple instant payment directly to a registered company's UEN when paying for a purchase.

In addition, PayNow Corporate enables companies to utilise Quick Response (QR) codes. Their customers can simply scan, review and click pay using their smartphone. Companies can use the payment details embedded in the QR code to reconcile their receivables.

**Intelligence flows**
Banks' role as the conduit of financial flows also puts them in prime position to collect, analyse and provide intelligence to members of the ecosystem in real-time. As custodians and conduits of identity and transaction data, banks have visibility into relationships and connections among all participants in a city's ecosystem – governments, businesses, and individuals. As more entities connect with banks' systems through APIs to power their own services, the transaction data collected by banks becomes more enriched and the visibility of financial flows becomes more complete. By harnessing and analysing this data – with the relevant permissions in place – through artificial intelligence and machine learning, banks will be able to provide consumable insights and intelligence on an increasingly real-time basis to help inform individuals', companies' and governments' decision-making.

**Interpersonal flows**
Bank branches have traditionally been cornerstones of communities. As banks begin to transform themselves for the digital future, the role of the bank branch will also evolve. Current self-service facilities for basic transactions can be extended with additional digital services such as loading up virtual wallets that support peer-to-peer and mobile payments.

In the future, bank branches could blend digital self-service with in-depth, personalised advice, and even areas for interpersonal socialisation. HSBC Retail Bank and Wealth Management in the US, has been proactively investing in digital branch initiatives that put customer service at the centre, enabling them to seamlessly navigate across channels.

**Case study: Pepper the robot gives a glimpse of retail banking's future**

When it recruited a humanoid robot called Pepper to its New York flagship branch, HSBC became the first US retail bank to deploy a customer-service 'bot. As well as having the important practical purpose of helping HSBC to streamline the branch's activities, Pepper offers Manhattanites a glimpse of their smart city banking future.

For customers entering the branch, Pepper, a robot from Softbank's growing robotics wing, stands ready to answer questions and provide a memorable banking experience.

**More specifically, Pepper's key features include:**

**Notify a banker** – Pepper communicates directly with bank staff based on customers' answers to qualifying questions. The aim is to reduce customer waiting time and free up bank staff to deliver a more personalised service.

**Tutorials and instructions** – Pepper provides information on ATMs, HSBC's mobile banking app, self-service options, customer support and more. Educating and encouraging customers to use the technical tools and platforms HSBC has made available means that bank staff can spend their time on deeper, more valuable conversations with customers.

**Products and services** – Pepper is used to promote HSBC products and services, including special campaigns. Once again, by making customers better informed, Pepper will allow staff to have more productive interactions.

**#PosewithPepper** – HSBC has launched a campaign to encourage customers to visit the Fifth Avenue branch and pose with Pepper for a selfie.

Robots serving customers in bank branches are no longer in the realms of science fiction. Instead, Pepper shows how technology can be used to improve customer experience and branch efficiency in fast-evolving smart cities.

# How can firms prepare to participate?

**As advances in smart city development continue, more and more commercial opportunities become available to firms in a variety of sectors.**

**1. Be prepared to collaborate with firms outside your industry**

Smart cities are delivered by ecosystems of firms collaborating to deliver effective solutions. It is perhaps fitting, then, that many smart city opportunities will require firms to work in partnership with other businesses outside of their traditional supply chain. We are already seeing a number of new alliances and partnerships being struck, with parties involved contributing varying and complementary expertise, perspectives and resources. One such example is the Space Act Agreement signed between Uber Technologies and NASA, where both agreed to further explore urban air mobility (UAM) concepts. Under the agreement, Uber will share its plans for an urban aviation ride-share network, while NASA will provide access to airspace management computer modelling and simulation to assess the impacts of small aircraft (from drones to passenger aircraft capable of vertical take-off and landing) in crowded environments.[31]

In the United States, AT&T has set up an alliance with the likes of Cisco, IBM and Intel. The AT&T Smart Cities Strategic Alliance provides smart city solutions to cities such as Dallas, Portland and Atlanta.

**2. Think holistically**

Firms looking to provide solutions to, or collaborate with, local governments should immerse themselves in understanding the specific city context – their challenges, goals, existing infrastructure, and resources among others. City governments are looking for consultative approaches from partners they can trust. A smart city programme is not a short-term initiative and will require demonstrations of commitment and a partnership approach to developing tailored solutions.

**3. Prepare for new risks**

Every city is different, with different objectives for their smart city programme, and subject to the home country's macroeconomic environment, policies, and local business practices. Firms should look for partners and service providers that have experience, expertise and regulatory relationships in local markets in order to best identify, quantify and mitigate risks.

**4. Adapt your proposition today, with a view to the future**

Businesses are already adapting their product and service offerings to both take advantage of short-term opportunities and lay the groundwork for longer-term visions. Utilities companies for example, have been rolling out smart meters, improving accuracy of billing today, while preparing an infrastructure network that can be leveraged for other applications in the future. Automotive firms have also already begun to incorporate connectivity into their vehicles, enhancing safety and driving experience today, while opening up the possibility of other connected services in the future.

**5. Transform your financial operations to be fit for your new purpose**

As your firm pivots and adapts its proposition to deliver on smart city solutions, work with your transaction bankers to gain an understanding of the potential impact that new business models will have on your financial value chain. Some smart city services may result in a change in your collection volumes and patterns, perhaps requiring you to be able to process and reconcile an increased number of lower value payments from end consumers. You may need to manage payments to new suppliers and partners around the world, or manage liquidity in new or highly regulated markets.

By engaging with an experienced banking partner early in the solution development process, you will be able to strategically assess the treasury operations impact of your smart city propositions or partnerships on your treasury operations.

31 https://www.smartcitiesworld.net/news/news/nasa-and-uber-team-for-urban-air-mobility-2909

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