FUTURE CITIES

cityzenith

SmartWorldPro

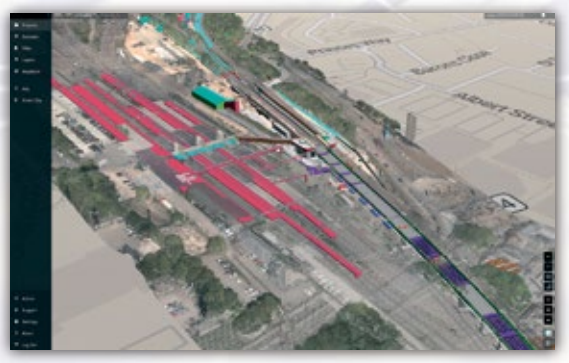
The Platform of Choice for the Future City

There is no single software platform that meets the diverse needs of the global Smart City industry. Architects, planners, property owners, and governments use dozens of disconnected tools. The problem costs the world 100s of billions of £££s every year – we created Smart World Pro to solve it.

The world is building bigger Smart City projects in larger numbers than ever before. The planet must build the equivalent of 10,000 new cities by 2050 just to accommodate the expected population boom. How will the world meet this challenge? The solution lies in a ground-breaking new technology trend called "Digital Twinning".

Digital Twins are 3D virtual replicas of buildings, infrastructure, and other physical assets connected to the data in and around them. Digital Twins are used primarily to optimize performance and predict and visualize future outcomes across functional areas in cities like maintenance, energy consumption, space utilization, traffic management, and public safety.

Cityzenith's revolutionary 3D Digital Twin platform, Smart World Pro, is pioneering the development and implementation of Digital Twins in Smart Cities around the world in the United States, the United Kingdom, the Middle East, and Asia. The platform's unique advantage is that it aggregates more software tools and data than any other platform in the market today, and is the only platform to integrate solutions across the entire life cycle of a city from design and construction through operations and tenancy. Think of it as a vast 3D Digital Legoland for building professionals, where all of the information that you need to design, build, and run a project, at any scale, is right where you want it to be. Digital Twin users include architects, planners, governments, property managers, construction companies, systems integrators, and many more.



Smart World Pro was selected for the development of Amaravati, a new £5.12 billion smart city capital for the State of Andhra Pradesh, India designed by London-based Foster+Partners and Singapore's Surbana Jurong.

Smart World Pro has been used by the East West Rail Alliance to support the coordination of a £1bn+ rail scheme connecting Bicester to Bedford via Aylesbury & Milton Keynes

For more information about Cityzenith, including investment opportunities through the Republic platform, visit www.cityzenith.com

FUTURE CITIES

Distributed in
THE TIMES

Published in association with
EURO CITIES
bee smart city

URBANISATION

Patchy urbanisation reveals urgent demographic challenge

Headline global statistics highlighting growing urban populations mask slowing rates of growth in some developed countries, and many cities remain woefully underprepared for the unprecedented demographic shifts underway

Nick Easen

Our cities matter, they're huge engines of economic power. If Tokyo were a nation it would rank as the 15th largest economy in the world. London's on a par with the Netherlands, while New York is muscling in on Spain and Canada in terms of size. Cities, having powered the global economy for decades, are now facing a fresh challenge: demographics.

Slowing global population growth, falling fertility rates and ageing, as well as diminishing migration from the countryside, mean cities around the globe will struggle to post the kind of growth figures we've seen in the last half century. It's a stark reality.

"We've all grown up with the idea that cities will grow. Yet a third of them could have fewer people in the future," explains Jaana Remes, partner at the McKinsey Global Institute (MGI). "Looking forwards, there will be intense competition among cities to attract people."

The most worrying figure is the drop in young adults, the workhorses of any urban economy. By 2025, more than 60 per cent of large cities in developed countries and 47 per cent in developing ones will have fewer people than today, according to the MGI.

"There maybe one new London created every week, but this isn't evenly distributed. Urban growth isn't everywhere, it's patchy. Most cities in developed countries are growing slowly or shrinking," says Professor Carlo Ratti, director of the Massachusetts Institute of Technology (MIT) Senseable City Lab.

"We're also seeing different challenges in different parts of the world. Building new urban fabric in emerging economies is fine, but we might have too much of it in developed ones."

By 2030, we're likely to have forty-three megacities with more than ten million inhabitants and most will be in emerging economies, according to the United Nations. By this time, India's Delhi will be the world's most populous city. Fast forward to 2050, globally, 68 per cent of us will live in urban areas, up from just over half today. Yet the picture is nuanced.

"On this basis we mustn't overdo the message on urban decline. There will be an evolution in where growth happens. Popular cities such as London or New York, for instance, still have the potential to suck up labour, capital, talent and investment," says Alexander Jan, chief economist at Arup.


Liam Burnett-Blue/Unsplash

"In the future, urban centres that have great infrastructure will be more able to cope with change. Certainly, cities will need to be able to take control of their own destiny, if they're to thrive."

The fact is, like people, cities are extremely complex organisms; dozens of complicated processes are going on simultaneously. Understanding the interplay between housing, workforce, transport networks and technology is an issue. "Whether you want to understand Beijing or Rio, drill down and you find global processes at work," says Terry Clark, professor of sociology at the University of Chicago.

Cities will need to be resilient, agile, innovative and attractive if they're to thrive in the 21st century. But no two cities are the same. "Many urban centres are woefully underprepared for the demographic shifts underway. Cities that fail to adapt risk losing residents, jobs and culture hotspots, all of which make cities amazing places to live," says Steven Charlton, managing director of Perkins+Will, an architecture and design firm.

The old and the very young are cohorts that some cities are now focused on. "American cities are becoming more unfriendly to families and are increasingly dominated by wealthy, childless residents," says Professor Clark. Think San Francisco and Manhattan.

Also take London, older people are the fastest-growing demographic, with the number of over-60s projected to reach two million and 20 per cent of the population by 2035. "Models like inter-generational living are starting to show on the radar now," says Amanda Robinson, head of knowledge at Future of London.

"Talented older workers are leaving, while young people may leave unaffordable cities, taking skills with them. Brain drain is already happening as people in their 20s and 30s relocate to other parts of the country with affordable living costs or more family-friendly lifestyles."

The environment is also increasingly on the agenda, yet cities could provide answers since dense, urban living is more resource efficient. "If we're serious about fighting climate change, a lot more people are going to have to live in urban centres with walkable, bikeable neighbourhoods, good public transport, as well as live in apartments, instead of McMansions," says Professor Richard Florida, co-founder of CityLab at the University of Toronto. "A lot of cities remain addicted to cars, sprawl and conservative politics."

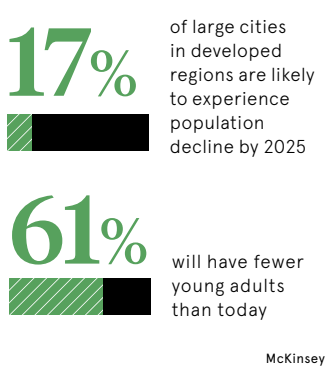
Since there's no silver bullet for tackling these issues, maybe the best thing for central governments to do is give more control to city authorities so they can decide their own fate. Fiscal devolution, where local governments have more autonomy over taxes and what they're spent on, is one answer.

Our cities will certainly need careful curation if they're to thrive, whether it's providing affordable housing for the young or attracting an older, richer cohort with age-friendly facilities and work.

"Every city will need to do more with less and be mindful of their demographic prospects. One city's loss could certainly be another's gain," says MGI's Dr Remes. "It's all about trying to create a cool centre whether it's Austin, Texas or Singapore."

We also know that technology is likely to disrupt the demographic profile of our future cities; we just don't know how yet. "We need to make sure that any decline in productivity due to age or shift in demographics is compensated by a larger increase brought about by technology, but it's not an easy task," says Professor Ratti at MIT.

In fact, none of it's easy. Otherwise we would have all moved there by now, to that ideal city.



McKinsey

NET-ZERO BUILDINGS

What the NYC green act means for city planners

Major cities are forging ahead with plans to cut greenhouse gas emissions, but buy-in from key stakeholders is vital to achieve measurable change

Karen Regn

From the neon lights of Broadway to the illuminations of Times Square, New York's spotlight is now falling on greenhouse gas emissions from its buildings.

The city's landmark Climate Mobilization Act is focusing attention on the world's biggest carbon emissions "blind spot".

But opposition from the real estate lobby highlights the need for broader engagement and buy-in from key stakeholders, which will be pivotal in ensuring green commitments are a success.

Worldwide, the buildings sector accounts for 39 per cent of total energy-related CO_2 emissions and 36 per cent of final energy use, according to the Global Alliance for Buildings and Construction.

Global success in limiting temperature rise to 1.5C, set by the United Nations Intergovernmental Panel on Climate Change, demands unprecedented action to transform the built environment and ultimately plan our cities with net-zero carbon skyscrapers.

While national governments may be unwilling or unable to deliver large-scale solutions to align the built environment with net-zero principles, where energy-efficient buildings are fully powered from on-site and/or off-site renewable energy sources, some city administrations are blazing a trail.

They are using their autonomy to forge ambitious plans for decarbonisation, developed according to their unique building composition, advantages and challenges.

In the United States, buildings alone are responsible for more CO_2 emissions annually than those of any other country except China, according to the US Green Building Council.

Recently, New York City Council passed new legislation requiring the city's largest buildings to slash their greenhouse gas emissions by 40 per cent over the next decade.

Passed with a 45 to 2 vote majority, the Climate Mobilization Act represented a reincarnation of the Green New Deal spearheaded by Democratic New York Representative Alexandria Ocasio-Cortez. But the national plan, calling for the energy-efficiency retrofitting of buildings within ten years, failed to gain Senate support in Washington.

Under New York's new regulations, buildings of 25,000 square feet or more are required to comply, translating into an operational overhaul and likely retrofit for more than 50,000 of the city's one million existing structures, which contribute some 30 per cent of New York's greenhouse gas emissions.

"The idea was to come to a number where most of the players above were organisations with resources," explains Steven Cohen, former executive director of Columbia University's Earth Institute and a professor in the practice of public affairs at the university's School of International and Public Affairs. "Anything that's been built by commercial developments, run by real estate management companies, say like the Trumps, will all be well in excess of 25,000 square feet.

> **If consumers get to understand these buildings also deliver benefits to their health, and improve the quality of the air they breathe... that's going to be a game-changer**

"If you're in a place where there's a lot of old buildings, like Paris, London and New York, you have to focus on retrofitting the existing buildings, particularly large ones where you can have a lot of impact very quickly."

However, while there are exemptions in place to avoid an overly large burden on rent-regulated unit and multi-family buildings, the legislation incurred vocal opposition from the Real Estate Board of New York, which argued the measures will not guarantee the city meets its emissions targets within the next decade and unfairly rests responsibility on the shoulders of a limited number of building owners.

Critics' consternation stems at least in part from previous participation in a working group focused on helping to craft emissions regulations, whose recommendations were then changed by the city council in the final legislation.

The act, which determines how much carbon a structure may emit and how much electricity it may pull from the grid, stands to penalise even some LEED-certified (Leadership in Energy and Environmental Design) buildings and a number that have already installed eco-friendly features.

Other advocacy groups worry the legislation is incomplete. They claim its long list of exemptions and more lenient limits for certain complexes threaten to exacerbate the housing quality deficit in the long term for ethnic minority communities and low-income residents.

Roof of the Hamdan al-Qara mosque in southern Amman, equipped with 140 solar panels

KHALIL MAZRAAWI/AFP/Getty Images

Net-zero carbon places of worship

In a country where renewable energy is far from the norm, solar panels installed on Jordan's mosques are chipping away at a national dependence on imported fossil fuels.

Since 2014 there has been a push to make mosques throughout the country greener and now almost all Jordan's mosques cover 100 per cent of their energy needs through solar power.

Backed by the Ministry of Religious Affairs, the mosques' adoption of clean energy is in agreement with wider religious values, since Islam urges conservation of nature's resources and eschews excess.

Jordan relies heavily on imported natural gas, which contributes to the production of 93 per cent of the electricity generated, while renewable energy makes up the remaining 7 per cent, according to the National Electric Power Company.

The enormous scope of the climate challenge means it must be tackled on several fronts at once, argues Cristina Gamboa, chief executive of the World Green Building Council. The organisation's global Advancing Net Zero project aims to promote and support the acceleration of net-zero carbon buildings to 100 per cent by 2050.

In May, it announced 50 signatories to its Net-Zero Carbon Buildings Commitment, which calls on businesses, organisations, cities, states and regions to reach net-zero carbon operating emissions within their portfolios by 2030, and to advocate for all buildings to be net-zero carbon in operation by 2050.

"If you look at statistics from the construction industry, the floor space is going to double by 2050 because of population growth and rapid urbanisation trends in the developing world, in particular in Asia, Africa and Latin America," says Ms Gamboa. "If we don't leapfrog now and strive for low carbon and green growth in those geographies, we're going to be locking in loads of inefficiencies which will not put us in a good place to meet the goals of the Paris Agreement [limiting temperature increase]."

While European Union-backed renovation strategy projects are being supported in cities such as Dublin, Madrid and Leeds, other global cities are using net-zero development schemes as a driver towards eventual carbon-neutral status.

Vancouver, for example, a city already heavily invested in hydrogen power, has adopted a robust agenda, implementing a phased approach for incrementally stepping down emissions, while creating ways of sharing innovation and best practice.

An autonomy unique within Canadian cities has enabled the local administration to mobilise relatively quickly and develop its own framework for measuring performance.

Christian Cianfrone, executive director of Zero Emissions Building Exchange, or ZEBx, an innovation platform focused on Vancouver and British Columbia, says minimal opposition to decarbonisation action was the result of early engagement with supply chain stakeholders and an engaged results-focused approach.

"It was non-negotiable about where we were headed, but in terms of what the process or the solution or the framework was going to be, that was very much an inclusive process with industry. So when it was finally done, it had a lot of buy-in from stakeholders. It's been quite successful in how it's been implemented because it was quite transparent," he says.

In addition to communicating a new market signal, municipal bodies can direct construction industry players to better information on the social imperative and commercial benefits of delivering low-carbon growth.

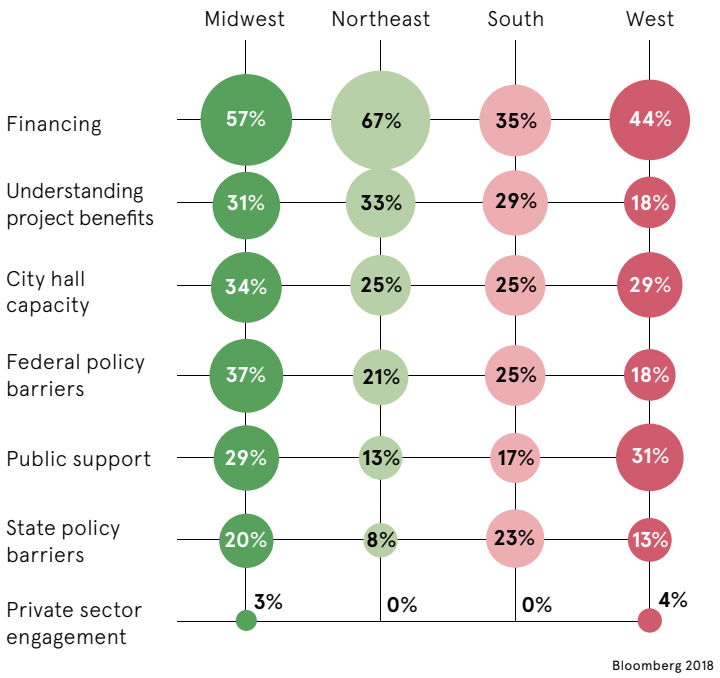
Victoria Burrows, who leads the Advancing Net Zero project, says signatories to the Net Zero Carbon Building Commitment "see a value proposition for protecting their business in the future, for resilience against changes in regulation and climate effects, and making sure they attract and retain talent to deliver whatever their core business objectives may be".

In a study published last year in *Philosophical Transactions of the Royal Society A*, researchers decried a reliance on technology to bring about decarbonisation, urging reconsideration of the inclusion of human motivation and behaviour in the process. The study argues that public acceptance of changes to their immediate environment and lifestyle is integral to plan viability in making low-carbon transitions.

With its own green new deal, New York City is making a statement about the need for transparency and clarity around performance data, says Ms Gamboa. She concludes: "Eventually this information will empower consumers to make better decisions, and if they get to understand these buildings also deliver benefits to their health, and improve the quality of the air they breathe, because they have green building solutions beyond net zero, that's going to be a game-changer."

BARRIERS TO EFFECTIVE US CITY ACTION ON CLIMATE CHANGE

Percentage of mayors and city managers from over 150 US cities who rated the following as a barrier



Bloomberg 2018

Commercial feature

Energy sector is crying out for new technology

Energy is vital to our everyday lives and is the fuel which drives industry, whether a business is a multinational or emerging startup

Gone are the days of energy being a mere commodity, when there was little thought to production, distribution or the power's provenance. Climate change and rising power prices mean we are more aware of the way we generate and consume energy than ever before. The simple act of switching on a light has never impacted on our consciousness so much.

The vertically integrated energy utility companies of old are fragmenting. With the rise of renewable energy, distributed energy and micro-generation, their millions of former customers are becoming the new power producers.

How should industry navigate these changes? With pressure to cut carbon emissions yet drive production forwards, we're at a crucial point in industrial energy consumption. Businesses simply can't afford to ignore the cost of failing to invest in their energy strategy.

For those in energy-intensive industry, energy will always make up the bulk of their costs. Alongside industry taxes, this has a major impact on the bottom line. In some cases, up to 45 per cent of manufacturing costs of intensive-energy enterprises can be attributed to energy. Industry needs power to grow, but with costs expected to rise over the coming years, the challenges to businesses will become even greater.

Companies need cheaper, cleaner, more efficient ways to manage their energy. Just as technology has revolutionised other industry verticals, such as retail, gaming and finance, digital innovations could transform the energy industry. The next iterations of energy technology are about producing, using and selling energy in a smart, real-time, ultra-responsive way.

The approach of 5G networks and the internet of things (IoT) have the potential to pave the way for revolutionising energy use. The emergence of digitalised, interconnected individual assets could enable the sharing of unprecedented amounts of information. In the future, businesses could be in a position to capture vast amounts of data on their energy use; data which could then be analysed to make instant, automated adjustments to power consumption and deliver quick fixes to problems.

This data has the potential to be fed into smart grids, helping to smooth out peaks and troughs in power demand, and balance the load on the grid as a result. The IoT would enable energy use to be more accurately forecasted, both for users and for the grid at large, allowing for smart electricity tariffs and reduced bills.

As businesses and individuals increasingly create their own forms of power, from rooftop solar panels to on-site energy-from-waste facilities, we see the emergence of micro-grids to sell and share their energy. Blockchain technology may facilitate the growth of these localised networks by offering greater security, speed and transparency when trading power, and opening up energy trading and investment to a wider pool of participants.

The rise of electric vehicles, besides driving down carbon emissions, enables the introduction of portable power storage in the form of millions of battery packs on the roads. Industrial vehicles, from Uber cars to delivery vans, may provide options for power supply to the grid when required or charge from the grid to store energy when power is overproduced. Battery efficiency and capacity is evolving too, with graphene technology hoped to represent the next frontier of development.

According to Northern Gas and Power director Andrew Laird: "We stand on the edge of a period of significant change, heralding ideas and innovations that will completely transform the way energy is interacted with for future generations.

We know businesses are willing to evolve and adapt. People want to change their behaviour with energy. But access to technology which can enable this has been limited. The opportunity that technology presents, if embraced, could help drive global industry to great new heights."

2018 contracted over

5.1 TWh

(5,100,000,000 Kilowatt-hours)

— more than the consumption of Tanzania, the 121st biggest energy-consuming country in the world

550

employees across three continents (Americas, Asia, and Europe)

For more information please call 0845 643 5432

NORTHERN GAS AND POWER
THE SMARTER ENERGY CHOICE

CITY DATA

How city data is transforming the way we live

Eight cities are using data and artificial intelligence in innovative ways to reshape public services

Gabriella Griffith

1 Amsterdam

3D-printed smart bridge

With its network of canals, Amsterdam has more bridges than almost any other city in the world, around 1,800 in total. But what if those bridges could talk to other infrastructure to optimise travel around the city? The MX3D bridge is the world's first 3D-printed steel bridge, designed by Joris Laarman Lab in collaboration with Arup and supported by Autodesk and other partners.

Dutch firm MX3D is using industrial six-axis robots, proprietary software and welding machines that deposit stainless steel from thin, molten wire to build the 40-foot-long smart pedestrian bridge spanning the Oudezijds Achterburgwal, one of the oldest canals in Amsterdam.

Equipped with sensors, the bridge streams data to the cloud where it is then processed and interpreted to visualise intelligence about bridge traffic, structural integrity, and the surrounding neighbourhood and environment. The bridge can send alerts when it needs maintenance and can even talk to roadways to time the lights better to reduce congestion at busy times.

2 Seoul

Smart waste solutions

With almost ten million people living in Seoul, South Korea's capital city, waste management has become an area of focus and, as one of the most high-tech cities in the world, it's no surprise that big data and IoT have become part of the solution.

"Ecube Labs was founded in Seoul when the first smart city projects started to emerge in Korea," explains Guillaume Weill, project director at Intralink. "The company's focus is on four main products, which have now been installed in more than 150 locations in Seoul, from parks to department stores, leisure venues and tourist districts."

> **The bridge can send alerts when it needs maintenance and can even talk to roadways to time the lights better to reduce congestion**

These include solar-powered waste bins which compact rubbish, fill-level sensors monitoring the quantity of waste in each bin, a big data platform gathering the information from the bins and a platform that automatically refines manual collection routes based on machine-learning algorithms, bringing huge cost-savings and a cleaner city.

3 Las Vegas

Live data

Bold, brash and operating 24-hours a day, Las Vegas is a city like no other, attracting millions of visitors a year to its bustling casinos. But as well as hosting 43 million tourists each year, the city is home to almost 650,000 residents who need services including public safety, transportation and utilities. City officials recently turned to smart city data management to ease the pressure.

They used Hitachi's Smart Spaces and Video Intelligence solution, which is a combination of hardware and software that leverages intelligent video and other internet of things (IoT) data to provide a single view of activity, operations, and safety issues with intelligence for real-time data and analysis, deploying resources more efficiently.

4 San Francisco

Smart cycles

For example, the city can produce heat maps of streets that can indicate if a pothole is likely to develop in a given location and take steps to fix the issue before it starts to damage vehicles. Elsewhere, rubbish collection routes have been reduced from ten hours to four, redeploying employees to help with other services.

One of the strategic goals of the San Francisco Municipal Transportation Agency (SFMTA) is to prioritise transport that doesn't involve a car. Part of its vision for a sustainable transportation system includes a safe network of bicycle-friendly streets so people of all ages and ability can feel confident travelling on two wheels.

The SFMTA uses automated counters to monitor key bicycle data, which it analyses annually to get an idea of cycle use in the city. Using the information provided by these smart monitors, the SFMTA added ten miles to the bikeway network and created thirty new intersections. Of those new miles, 5.5 received physical protection from passing traffic.

More than eight million bikes were counted at forty locations in 2018, but the data showed 63 per cent of the weekly ridership was occurring in just seventeen of the fifty-one reporting counters. This information enables the city to focus its improvement efforts where they are needed most.

5 Stratford, Ontario

Perfect parking

Parking in cities is often frustrating and time consuming. But with the help of smart city data management, it can become a much simpler affair. Seeing the opportunity, the City of Stratford in Ontario, Canada, has invested in smart technology so visitors can spend less time trawling for a space and more time spending money in local businesses.

The city has installed 78 IoT sensors that merge information with global positioning system, or GPS, data and relay whether a parking spot is free or empty, with updates provided every half an hour to an Amazon Web Services MQTT Broker, which relays the update to the Information Builders WebFOCUS data analytics

The MX3D bridge is the world's first 3D-printed steel bridge, designed by Joris Laarman Lab

platform. WebFOCUS then creates easily read visualisations, which convey which spaces are free where, when the busiest parking periods are, and which are the preferred car parks, levels and spaces used by residents and visitors.

Stratford also embraces open data, providing parking sensor information to local entrepreneurs and developers, so they can develop apps such as directions from your car to their restaurant, with discounts to incentivise visitors.

6 The Hague
Lighting up the streets

With its cosy old streets and charming views, Scheveningen, a residential district in The Hague, is a popular tourist destination. The Municipality of The Hague was keen to explore lighting options for the area, not simply using aesthetically pleasing street lights, but dynamic ones that could be used to improve energy performance and be controlled remotely in real time.

To address the challenge, DE NOOD, a leading provider of classic streetlight design in the Netherlands, teamed up with intelligent lighting company Tvilight. Together, these companies have installed lighting that respects the look and feel of the area, but uses cutting-edge smart cities technology to provide better control.

The integrated motion sensors enable the lamps to adjust their brightness automatically based on real-time human presence. If there's no one there, energy savings can kick in, cutting the city's electricity use and maintenance costs. A platform called CityManager also enables the municipality to monitor the entire lighting network remotely.

7 Copenhagen
Energy saving

With dwindling global energy supplies and the environmental impact of certain types of energy, cities must look carefully at their use. It's unsurprising then that energy use is a huge consideration when it comes to smart cities using big data.

Frederiksberg Forsyning, a publicly owned utility company in Copenhagen, aimed to create a smart energy supply solution that would optimise their supply network and create efficiency savings. One of the issues with doing this is the reliability of data, with utility companies often reliant on customers for monthly or yearly meter readings.

To tackle this, the company created a connectivity network across the municipality and then installed sensors in their pipelines to measure usage from the point of production to the substation and on to the end-customer. They went from getting infrequent customer readings to 700 data points a second, seeing savings on water loss and energy use.

8 Brussels
Smart transport tech

The Belgian capital city of Brussels relies on four metro train lines, seventeen tram lines and fifty bus lines to get its residents where they need to go. STIB–MIVB, the company that runs these services tracks 401 million journeys a year and 1,200 vehicles. To handle the stream of big data, it partnered with SAP and Cubis to access the analytics needed to improve customer service and run the system more efficiently.

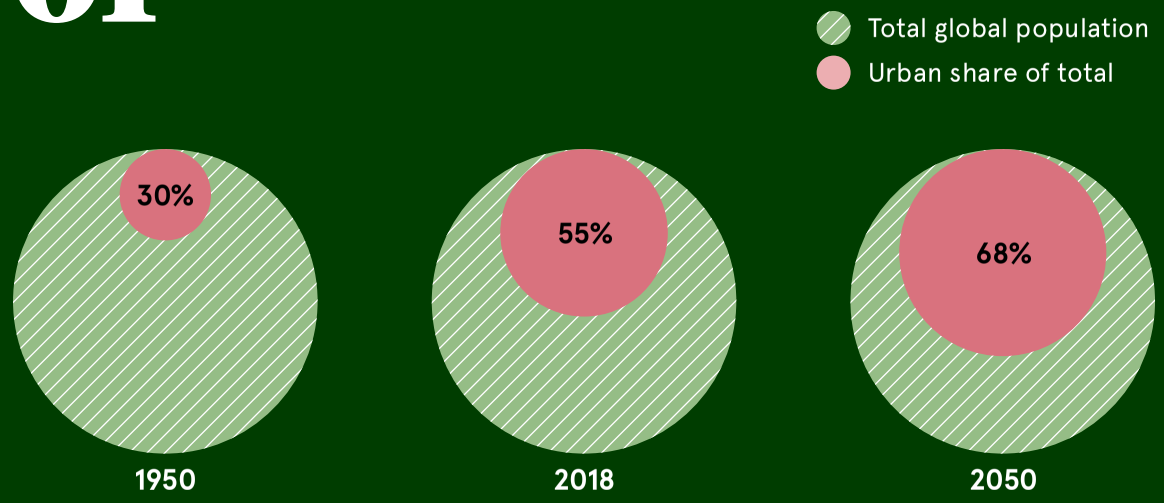
As well as improving the experience of commuters and visitors, the partnership has enabled more proactive vehicle maintenance, greater transparency when it comes to use of public funds, the ability to cater for passengers with disabilities and reduced environmental impact.

"Cities are full of data that can help us better understand travel times, routes and crunch points on a network," says Brian Duffy, SAP's Europe, Middle East and Africa north regional president. "If used in the right way, data insights can help people get to where they are going faster, more efficiently and more reliably."

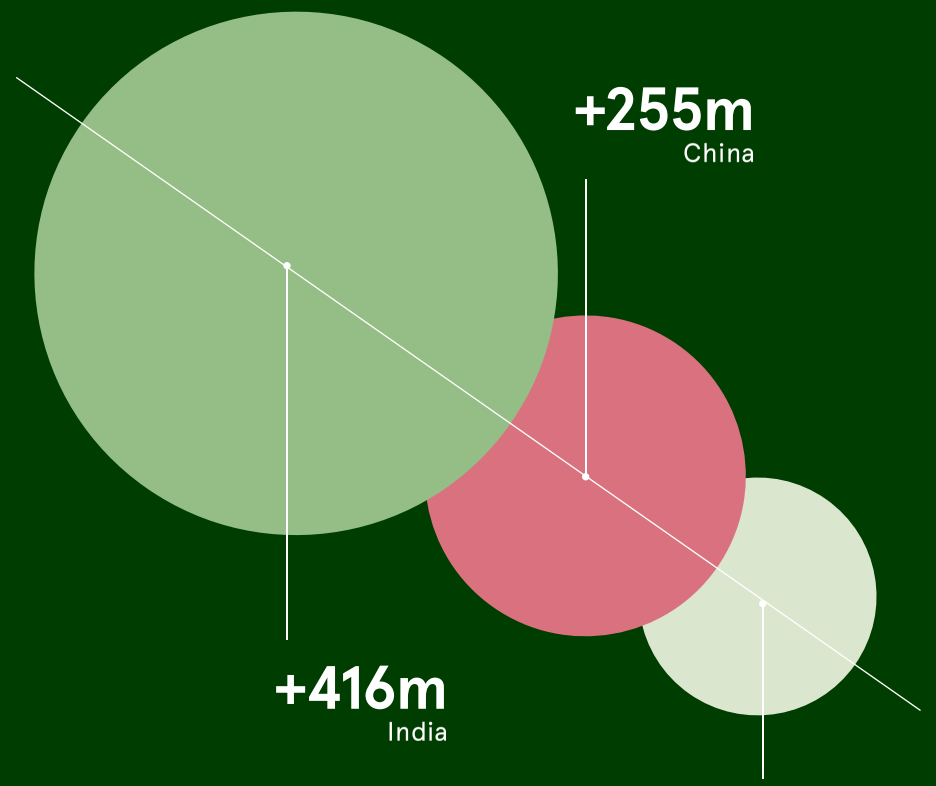
8 WAYS URBAN DEMOGRAPHICS ARE CHANGING

More than two thirds of the global population will live in urban areas by 2050, as the number of people in rural areas falls. The impact this will have on city demographics will be profound, but will vary wildly depending on where you live in the world, as data from the United Nations shows...

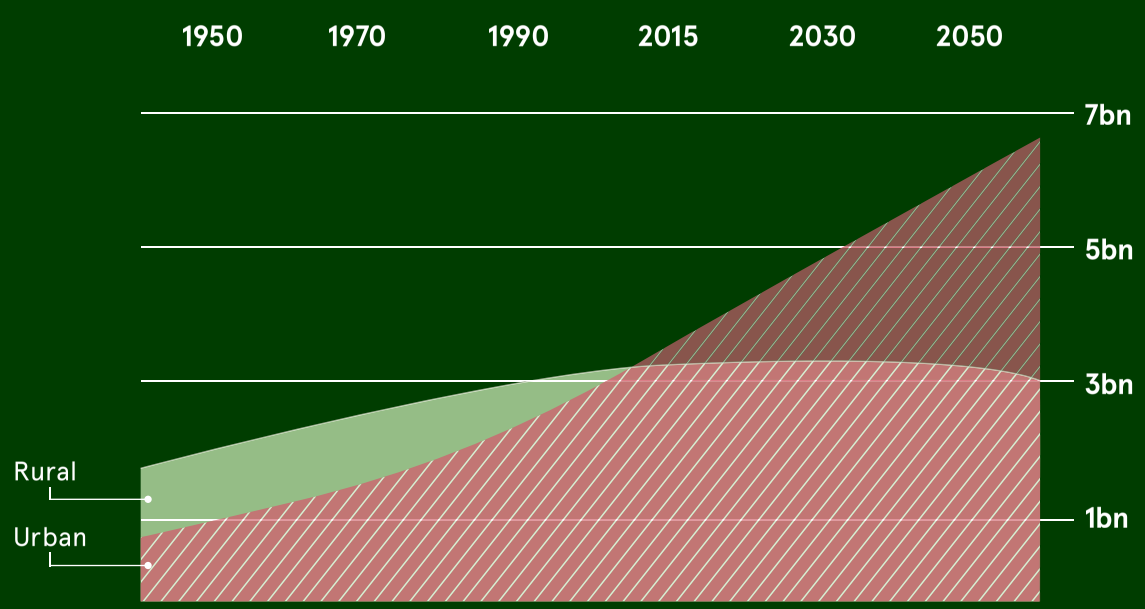
01 TWO THIRDS OF THE WORLD WILL LIVE IN URBAN AREAS BY 2050



02 URBAN POPULATION GROWTH WILL BE DRIVEN BY JUST THREE COUNTRIES



03 RURAL POPULATIONS WILL SOON PEAK

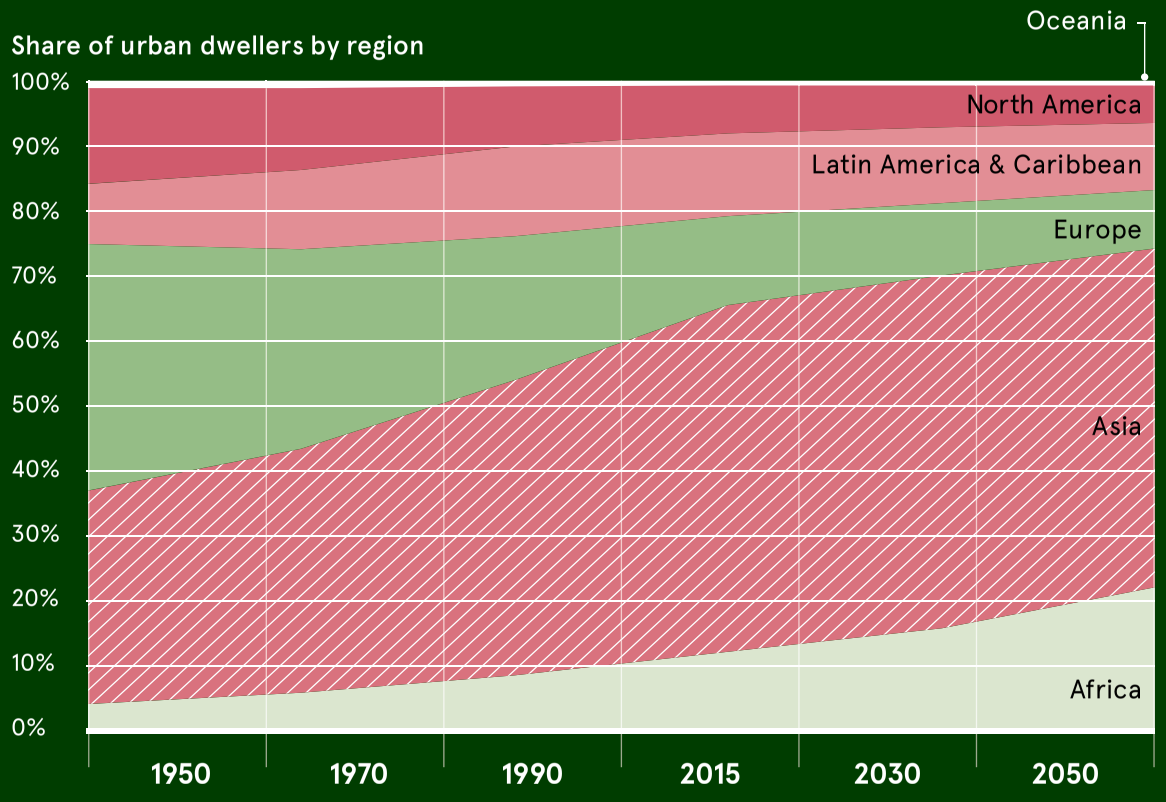


35% of the world's urban population growth between 2018 and 2050 will come from India, China and Nigeria

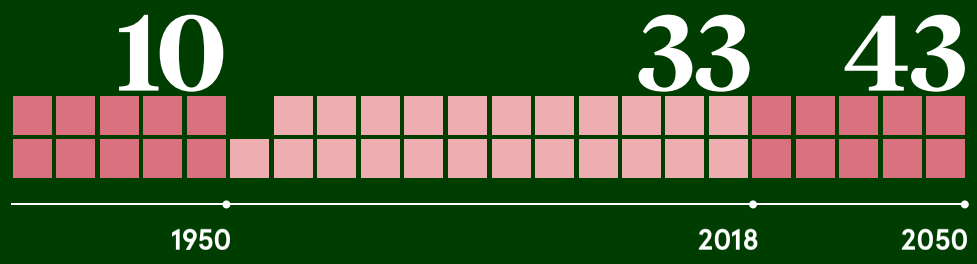
04 RISE OF THE MEGACITIES

Number of megacities in the world, which are home

05 AFRICA AND ASIA WILL DRIVE URBAN POPULATION GROWTH



Number of megacities in the world, which are home to 10 million inhabitants or more



06 DE-URBANISATION IS A FORGOTTEN PROBLEM

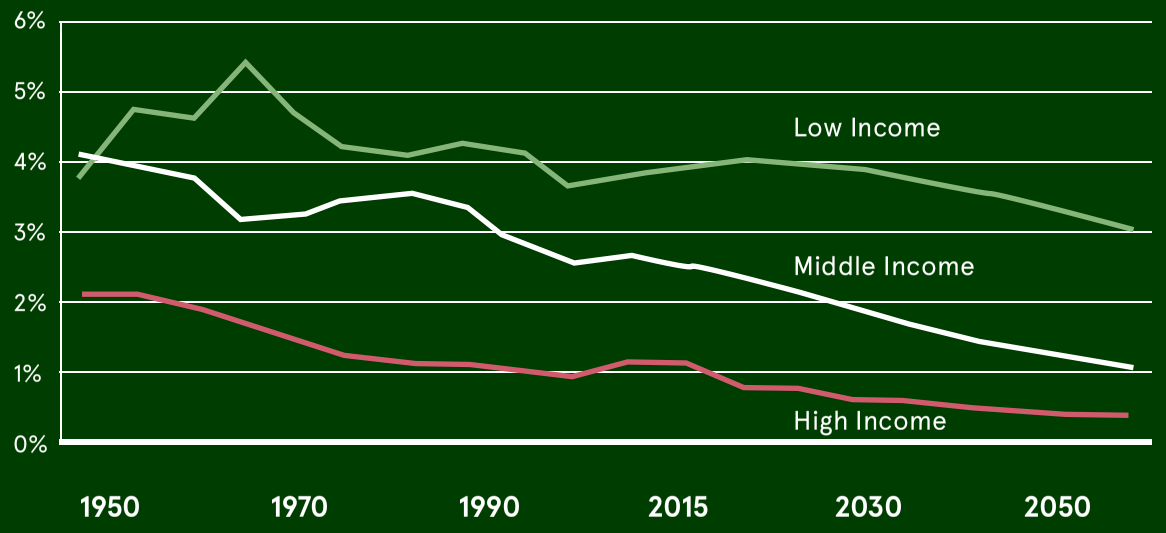
While much of the future cities narrative is focused on rapid rates of urbanisation in developing nations, less is spoken about de-urbanisation or urban de-population. Falling fertility rates, economic contraction and natural disasters all are contributing factors in shrinking urban populations.

17% of large cities in developed regions are predicted to experience falls in their population between 2015 and 2025, according to McKinsey

37m Tokyo, the world's largest city with 37 million inhabitants, is expected to see its population start to decline from 2020

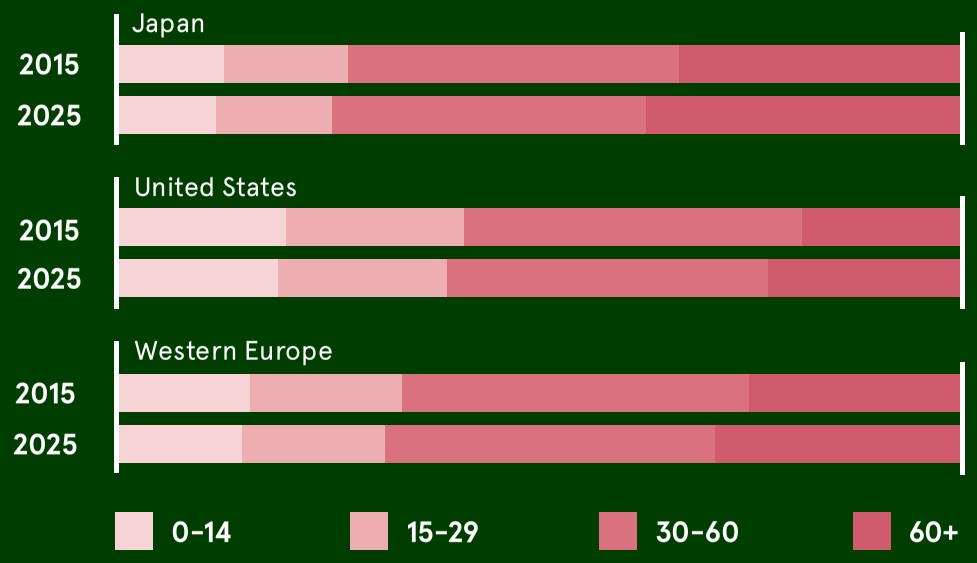
07 URBANISATION RATES VARY IN DEVELOPING AND DEVELOPED COUNTRIES

Average annual rate of change in urban population



08 AVERAGE AGES ACROSS CITIES WILL BEGIN TO RISE

Age distribution for large cities in:



All stats are from the United Nations unless otherwise stated

SMART BUILDINGS

Redesigning where and how you work

Yes, smart buildings can cut your energy bills, but the practical impact they have on productivity, engagement and wellbeing can be much more valuable to business leaders

Mark Wilding

When Microsoft embarked on a renovation of its Amsterdam headquarters, the software giant adopted a data-driven approach. Over six months, smart building sensors revealed how desks, meeting rooms and communal areas were being used.

"Once you start building up weeks and months of data, you can analyse movements around the office," says David Williams, an innovation architect at the company. "You can start making decisions about what spaces you need."

Microsoft opened its renovated Outlook building last October. Data gathered before the renovation led to a 25 per cent reduction in the amount of space required and one-and-a-half newly available floors of the building were let to a co-working operator.

Employees now use an app to locate colleagues and book a wide range of workspaces, including concentration rooms, relaxation areas, informal meeting rooms and silent zones. Sensors measure occupancy, temperature, humidity, light and noise levels. Mr Williams says: "We've completely redesigned the way we work."

Digital sensors and management systems make it easy to monitor disparate systems, such as heating, lighting and ventilation, drawing all this information together to optimise a building's performance.

From a business perspective, that's appealing: who wouldn't want to cut their energy bills in half? But the most intelligent buildings go beyond this into the realms of productivity, engagement and wellbeing. Offices such as Microsoft's Amsterdam headquarters aspire to optimise not just energy efficiency, but our working lives.

Chris Moriarty, director of insight at the Institute of Workplace and Facilities Management, says releasing this potential means thinking differently about real estate. "One of the problems we have in our profession is there is a heavy bias towards cost reduction. Organisations will invest loads in R&D, sales, logistics, but they just see the workplace as an overhead," he says. "What is the true benefit of a smart building? Is it to save 5 per cent on your costs or boost the productivity of your people by 5 per cent?"

BAS CZERWINSKI / Contributor/Getty Images

Microsoft chief executive Satya Nadella during the opening of a renovated office of Microsoft Netherlands at Schiphol

SpaceOS, a startup with offices in Warsaw, Dublin and Lisbon, creates apps that serve as a "remote control" for buildings, enabling occupants to find and book workspaces, lodge maintenance requests, and order food and drink.

"What really interests me is connecting the human and the building," says founder Maciej Markowski. "It's ridiculous that it's easier to order from a restaurant across town than it is from the in-house restaurant or easier to find someone on LinkedIn than it is to find someone in the building, or that's it's easier to complain about an Amazon delivery than it is about a printer that doesn't work."

Mr Markowski believes smart buildings should offer resolutions to all these problems. Just as importantly, they should improve performance at an organisational level. With employees' consent, smart building technology can track the extent to which desks, meeting rooms and other spaces are actually used. Apps can make it easier for colleagues to find one another or potentially helpful contacts in other teams.

He says decision-makers can also use this data to identify when interactions aren't taking place when they should. "You might launch a new product and realise that sales and marketing never meet," he adds.

These kinds of insights have the potential to reshape a company's organisation chart radically. Philip Ross, chief executive at workplace consultancy UnWork, says: "We tend to simply put departments near each other. Suddenly this data can look at who's emailing whom within the organisation." Buildings will be able to suggest when colleagues in frequent contact might benefit from being seated together, in a space most suited to their particular task.

Mr Ross says: "People are working in teams as opposed to the old slow process of everyone sitting in their departments and coming to endless meetings."

He says smart buildings can generate savings through reduced energy bills and maintenance costs, but the more radical benefits are in the user experience. Soon enough, the working day will be individually tailored, as smart buildings identify the optimum workspace, colleague interactions and environmental conditions for whatever needs to be done that day.

Mr Ross likens the office of the future to Netflix. "When you watch a movie, it says 'you watched this movie, you might enjoy these three movies'. That will be no different to the smart building," he says. "The personalised workplace is coming."

COMMON PITFALLS TO AVOID WHEN DESIGNING SMART BUILDINGS

1. Spending money on technology/solutions without a clear strategy or benefit
2. Not considering the human needs in the solution
3. Not being able to measure savings
4. Not putting in multipurpose infrastructure
5. Failing to create a comprehensive cyber-physical security system
6. Collecting data without identifying its purpose/ business goal
7. Choosing to focus on energy conservation rather than space conservation
8. Failing to build in flexibility for future technology enhancement

Deloitte 2018

Artificially intelligent buildings

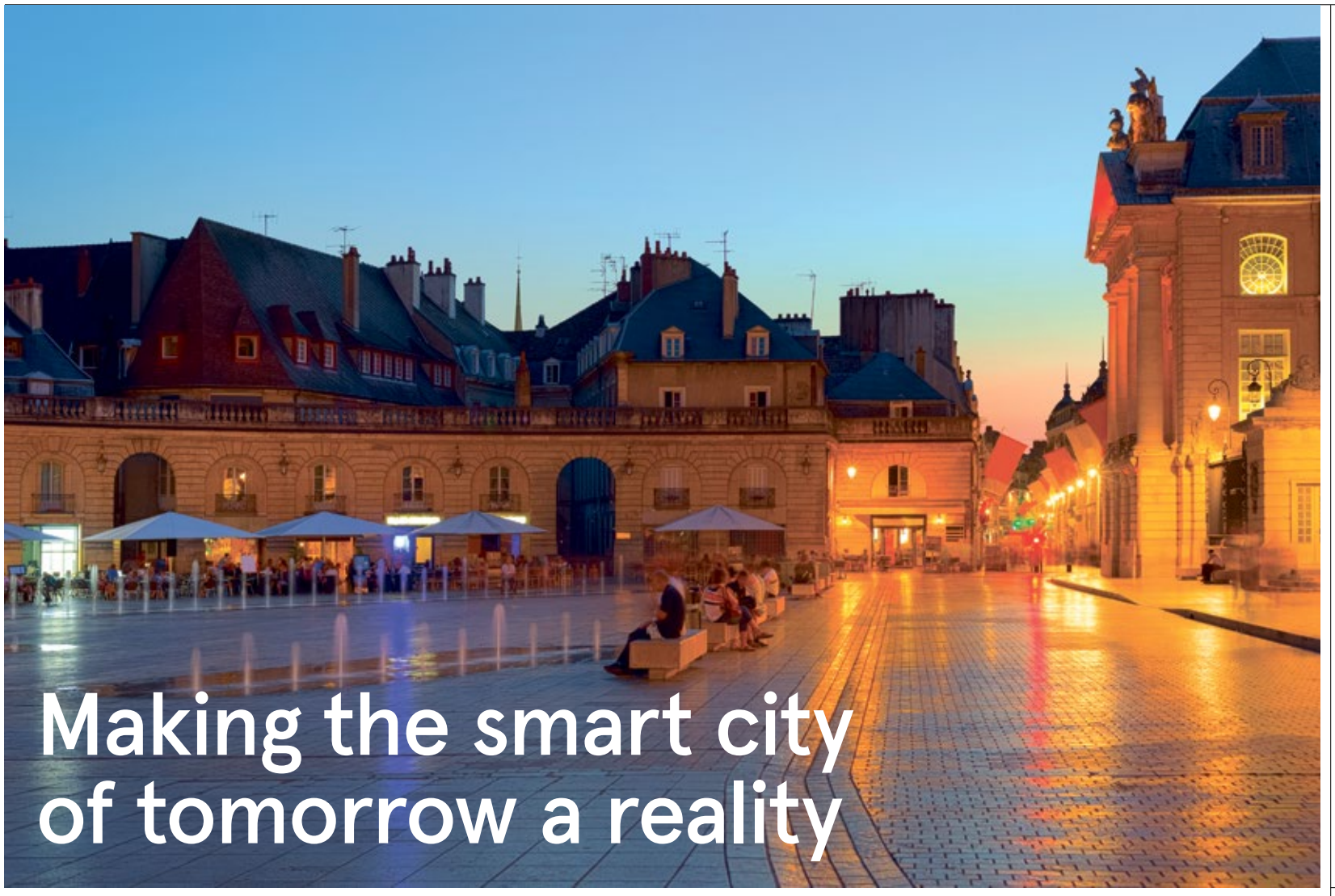
Smart buildings generate a wealth of data. But what use is that data unless it leads to improved performance? Smart buildings are now emerging that can help with that too. A report published by IBM last year outlined how artificial intelligence (AI) can "capture data from day-to-day building operations", enabling them to "'think', engage and learn".

Maciej Markowski, founder at SpaceOS, says: "AI will allow us to design spaces amazingly well", adding that occupancy data combined with AI design tools "can lead to more space efficiency and workplaces which put teams together in the right way". In other words, buildings will be able to design themselves for maximum operational efficiency.

Philip Ross, chief executive at UnWork, says AI will increasingly be able to suggest new ways of working based on our past behaviour, such as identifying the kind of spaces we favour when faced with particular tasks. A truly smart building could also lead us in new directions. "It might suggest three people to have lunch with today," says Mr Ross. "It begins to create the kind of social networks we all want."

New Lab startup hub at the Brooklyn Navy Yard, where tenants use SpaceOS to interact with the building and one another

SpaceOS



Making the smart city of tomorrow a reality

2%

of the world's surface is occupied by cities

50%

of the population live in this extremely small urban space

75%

of global energy is consumed by cities

80%

of global CO_2 emissions are generated by cities

Some 2 per cent of the world's surface is occupied by cities, 50 per cent of the population live in this extremely small space and generate 80 per cent of global emissions

With rapid urbanisation taking place across the world, along with increasing energy demands, the challenge of reducing carbon will become more pressing. It's therefore vital that cities also work towards reducing greenhouse gas emissions.

"The need to decarbonise our cities is critical," says David Carr, chief executive of Bouygues Energies & Services UK, a leader in energy, digital and industrial transformation. "Questions of how do we actually power the cities of tomorrow without using carbon fuels are going to be a key challenge that most developing regions face."

As opposed to the historical approach of building cities to address urgent issues with short-term solutions, cities of tomorrow are all about how they will be run in the long term. Decision-makers have to also keep in mind one of the main priorities of their citizens: connectivity, both physical and digital.

Local authorities need to make it easy for people to deal with day-to-day activities by deploying intelligent modes of transport and enhancing digital connectivity. Relying on a connected and efficient public infrastructure is therefore critical for cities of tomorrow, so-called smart cities that are on course to place wellbeing and comfort of citizens at the forefront

Urbanisation and decarbonisation are some of the great challenges of the future. Bouygues is tackling these by linking passive buildings, low-carbon energy generation and big data to establish smart management of smart cities.

According to the Existing Homes Alliance, more than 85 per cent of the buildings that will exist in 2050 have already been built, which means retro-fitting current buildings plays a key role in any strategy to reduce carbon.

Schemes such as Refit Programme in London are aiming to address this issue. New buildings using techniques such as Passivehaus contribute to a more sustainable future by becoming carbon positive, through effective use of external shading, night-time cooling, heavy buildings and natural ventilation.

The transition from centralised to decentralised energy systems means connecting local producers of energy with local consumers or prosumers. This will lead to cost efficiencies and improved management of demand. Energy prosumers will reduce reliance on the national grid by feeding smart grids with photovoltaic and battery storage. This will dramatically change how cities are powered, but will require next-generation communication technology.

Mr Carr says: "In the current era of advanced technology, we have information about energy demand and supply in real time. The ability to mine this data, identify patterns and provide high-quality analysis is allowing Bouygues Energies & Services to better use cities' infrastructure networks, electric vehicles charging cycles and battery storage solutions to continuously match demand and supply. As well as providing lower-cost energy to help address fuel poverty."

Yet greater reliance on data requires higher cybersecurity to be addressed at the outset. Also, the energy grid is not the only layer of the city which can use data. CCTV, geolocation services, street lights and public infrastructure generate information that can help cities become more resilient.

In February 2018, a consortium led by Bouygues Energies & Services was awarded a 12-year design-build-operate contract by the Dijon Metropolitan Area, a city of 160,000 inhabitants in eastern France, for the centralised management of public services.

Bouygues Energies & Services' Smart City offer is based on a platform, called an urban hypervisor, that is able to connect up all public infrastructure. This hypervisor provides access to all public amenities and infrastructure in real time.

For example, it can increase or reduce the brightness of street lighting depending on the situation. It is possible to have real-time control over all traffic lights, thus improving traffic in rush-hour periods. It can also control city-centre retractable bollards in real time to facilitate access for emergency services when required. Authorities are quickly able to formulate responses to unforeseen events that would typically bring a large city to a standstill.

> **When it comes to a smart city, there is no one size fits all**

By pooling these different functions and improving the efficiency of public services, we can improve the quality of services delivered to end-users, and thus improve quality of life, energy consumption and economic performance indicators.

Bouygues, which also runs one of the four telephone mobile networks in France, has advanced telecommunications solutions that enable the company to collect and analyse anonymised data. This can be utilised to create a safer, greener and cleaner environment.

"Operating a smart city requires specific knowledge. We acquired it over the years with local authorities by managing their infrastructure." says Mr Carr.

In Kent, Bouygues Energies & Services has been working with the council to transform 120,000 street lights. This is reducing energy consumption by 60 per cent, creating annual savings of around £4 million. What's more, the county will now have smart systems in place to build upon. Smart management of public amenities will enable local authorities to improve their performance, while simultaneously make their local areas more attractive by stimulating the digital economy.

The potential of smart cities to raise living standards for residents is unparalleled. "Citizens want to be involved in the development of their smart city to improve their safety, the quality of the air, the way waste is managed and so on. They want easy access to the spaces they want to visit, be it green spaces, shopping malls, entertainment centres. All these aspects need to be considered when developing a smart city," says Mr Carr.

It requires a collaborative dialogue between all stakeholders in the city, focused on how to bring real day-to-day benefits to all inhabitants.

Smart cities are technology-led developments. They require substantial research and development investments. They also involve partnering with non-traditional supply chains to invent and develop the services of tomorrow.

"Our philosophy is one of shared innovation. We work very closely with start-ups and scale-ups, especially through our Matching Up scheme, an international co-innovation programme which enables us to innovate differently in a more collaborative and agile way," says Mr Carr. One initiative currently being piloted is the Living Lab in Hertfordshire where various connected assets are turned into an intelligent urban network.

Cities are unique. "When it comes to a smart city, there is no one size fits all," says Mr Carr. "Our approach is to work in partnership with each council, select best-fit technologies and deliver optimal solutions in a timely fashion to meet their specific needs."

By heavily investing to ensure smart cities of tomorrow can gain an unparalleled understanding of the infrastructure and services of their cities, Bouygues Energies & Services will facilitate the use of this intelligence to improve the life of their inhabitants.

For more information please visit www.bouygues-es.co.uk or contact us at marketing@bouygues-es.co.uk

BOUYGUES ENERGIES & SERVICES

Pressures on the government to regulate the explosion of e-scooters and dockless bikes in many cities is representative of public-private tensions

Anita Pouchard Serra/Bloomberg via Getty Images

PUBLIC-PRIVATE

Tensions rise with public-private collaboration

Private startups can help governments alleviate the pressures of urbanisation and improve the quality of city life, but partnerships between the two sectors are not always straightforward

Jessica Brown

The rise of smart cities is providing unprecedented opportunities for mutually beneficial public-private partnerships to provide new business opportunities, cost efficiencies, and greater access to specialist skills and expertise.

Deflecting initial costs from the public purse to private investment is significant with just 16 per cent of cities able to self-fund required infrastructure projects, according to research from Deloitte.

Smart city collaboration is a lifeline for startups that need the public sector for their initiatives to come to life, while city governments are increasingly hungry for data to inform approaches on everything from policing, emergency response, waste management and public transport. And dwindling budgets mean there's increasing pressures to use data as efficiently as possible to glean maximum value.

But collaboration isn't always straightforward, and one of the biggest barriers to smart cities being rolled out is the different ways in which the private and public sectors work.

While private companies typically aim to provide solutions that can be easily rolled out across cities worldwide with minimal tweaks, some argue that for smart cities to reach their potential, technology must be tailored specifically for one place and its population.

Public organisations also tend to be more risk averse and smart city projects can be risky, which means a lot fail to get off the ground without access and funding from government agencies.

Dan Dowling, urbanisation and cities leader at PwC, says public-private collaboration is fundamentally important for a smart city, but finding the right balance has been difficult.

"This is partially characterised by private companies that look to offer potentially transformative products or services to cities, but in spending areas cities have not always had the time to build capacity in," he says.

"Cities are not always able to discern between the solutions that will work well and those that don't offer value for money

16%

of cities are able to self-fund required infrastructure projects

Deloitte 2018

"Because many products and services are new, cities are not always able to discern between the solutions that will work well and those that don't offer value for taxpayers' money."

Mr Dowling says tension has been sparked by the rise of e-scooters and dockless bikes in many international cities in the past 12 to 18 months.

"The private sector has provided a last-mile mobility solution with little or no public investment, but market saturation and implementation issues press local governments to regulate a new service in the city," he says.

Private organisations have more flexibility and exist to make a profit, whereas governments are reliant on funding, and projects can be dropped or suspended without notice if funding changes. Private companies generally keep their procurement activities confidential, while public organisations need to be transparent about how money is being spent.

The financial and time pressures on councils to deliver smart city projects means they may require help and resources from third parties, and are unable to do everything themselves to keep to deadlines and budget. For this reason, some promote the use of open source technologies to make collaboration easier and provide data across the council in a standardised format. But tech companies can find it difficult to work with open source.

"Public procurement rules sometimes lack the necessary flexibility which inhibits companies from being able to invest speculatively, or unintentionally locks out startups and small and medium-sized enterprises from the market," says Mr Dowling.

Private enterprises could do more to understand the transparency and fairness with which public procurement operates, such as "full accountability for all costs, annual budgetary constraints or limits on access to debt finance", he says.

Nevertheless, businesses and city planners can take a number of precautions to ensure collaborative projects go smoothly, and look to successful implementations around the world for best practice and assurance.

In 2016, the Hangzhou City Brain project was launched by Chinese tech giant Alibaba, which uses cameras systems and sensors across the city to collect real-time data on traffic and weather conditions, feeding it to an artificial intelligence hub. This then manages traffic signals at more than 100 intersections, helping city officials make better informed, faster decisions.

While in Sacramento, California, telecommunications company Verizon installed intelligent traffic technology at 15 intersections to monitor problem areas and collect data to improve traffic flow, and is installing free wifi in more than two dozen city parks.

It's important to remember there are many ways partnerships can work, with different levels of involvement from the private sector over different time periods.

Mr Dowling says one way to overcome possible tensions is with better leadership and policies on data to support innovation at all scales. Innovation districts are a good policy example, where the private sector is invited to test and demonstrate projects to improve city services, and help influence more sustainable urban consumer choices beyond the traditional mandate of city governments.

"This can help cities understand what works and for private enterprise, they can derisk and properly price their technology deployment. Stockholm and Los Angeles are good examples," he says.

Local government-backed innovation intermediaries, such as incubators, accelerators and market amplifiers, which support collaboration, networking and development of new and emerging business ideas, can all help startups finesse their product in an affordable space, access potential investors and communicate better with public policy officials.

Public-private partnerships, meanwhile, can provide access to specialist market capabilities, off-balance sheet financing and risk-sharing between parties.

However, Taylor Shelton, assistant professor in the department of geosciences at Mississippi State University, says there is a risk smart city innovations can be used to exacerbate existing problems, such as using technology to increase surveillance of certain populations or justify local government budget cuts.

It's important for partnerships to not just think about improving the city's image, but to enact real change before collaborating, says Dr Shelton.

"Lost in all these technological innovations is any real focus on actually substantively improving the lives of city residents and reducing social inequality, because doing so would require a more meaningful change in the way policy is made, rather than just creating a new smartphone app or collecting data about a given problem," he says.

The growth of smart cities means more and more public and private organisations are figuring out ways of working in partnership to benefit both. Just like smart cities, every project, local administration and business will require a different approach.

OPINION

‘Being smart is about working in a smarter way with different partners and empowering citizens’

Stockholm is one of the world’s most connected cities, and a beacon for innovators and international talent. We are also a forward-looking city, leading the environmental and smart city agendas. By 2040, we have the ambition to be both carbon neutral and the smartest city in the world.

Sustainability has always been at the heart of our smart city strategy, against a background of rapid urbanisation. Finding smart solutions, delivering prosperity to Stockholmers and applying green principles, while our population has increased significantly, has not been easy, but Stockholm is an example of success.

Back in 2010, Stockholm became the first European Green Capital, and since then we have continually engaged in partnerships and shared our ideas around eco-governance for smarter cities.

As a city administration, our focus is always on improving and simplifying people’s lives. That’s why enabling swift, effective communication and access to information is integral to our smart city strategy. Stockholmers have access to a vast range of e-governance services, and businesses and individuals benefit from an open fibre network, owned by the city.

We also recognise the value of data, and the need to ensure people can access, use and manage their data, and trust public authorities to do the same with anonymised datasets.

In this light, EUROCITIES, a network of major cities throughout Europe, of which I am president, recently launched ten principles on the good use of citizen data. These start from the idea that citizen data must only be used in the public interest, and should generate tangible benefits for citizens and society.

As authorities dedicated to the public interest, cities want to use data in a socially responsible way, to improve decision-making and enhance the efficiency of public services. Armed with this information we can better design, for instance, sustainable local transport networks and services, by monitoring things like traffic flow, noise pollution or carbon emissions.

However, being “smart” for me is also a mindset. It’s not only about the technology and how we manage data. It’s about working in a smarter way with different partners and empowering citizens, via a whole host of means.

Right now in Stockholm we’re trying to involve the business community in an initiative called A Woman’s Place, in which 100 companies have signed up to common values of equality. Our cities’ potential for innovation is increased when all citizens are best able to fulfil their own potential.

We also need to work with other cities, to pick up examples of best practice and learn from one another through networks like EUROCITIES. One of the greatest advantages of European co-operation is access to the single market, giving successful city initiatives and companies a chance to scale up to other areas and places.

On the European level, there are positive examples of new governance mechanisms, such as the Urban Agenda for the European Union, and the European Innovation Partnership for Smart Cities and Communities, which bring together different levels of government and sectors to find smarter solutions to common problems.

However, much more can still be done to encourage the development of new business models and working with private companies to make cities smarter. We’re currently involved in hundreds of smart city initiatives in Stockholm. Through projects such as Smart City Sweden, and many initiated by other actors, we want to make sure individual and corporate capacity for innovation can be directed towards common goals and challenges that benefit all.

The cities of the future are going to be places that unlock people’s inspiration and innovation; they’re going to rely on open and secure data, and they will make life easier for people, while reducing carbon emissions through better application of technology. The future will be smarter and Stockholm is leading the way. ●

Anna König Jerlmyr
President of EUROCITIES
Mayor of Stockholm

Redefining cities with connected and autonomous vehicles

The strategic deployment of autonomous vehicles is set to transform UK cities, bringing unprecedented benefits for citizens, but only if they are implemented in the right way

Connected and autonomous vehicles (CAVs) are an opportunity to radically rethink transport within cities. However understanding where and how to deploy them requires a great deal of thought, research and nuance, as the consequences of poor implementation could have far-reaching economic, environmental and social implications.

There is currently a huge amount of global investment going into researching, building and trialling CAVs, but estimates for when they will be commonplace on UK roads vary significantly. During this time, it’s crucial that cities carefully plan where they are deployed and how they are used.

DG Cities, an urban innovation company, is playing a central role in determining this strategic deployment by understanding the impact new technologies will have on cities. Its research and innovation projects help to articulate the opportunities various technologies can bring, and ensure they are integrated and maximise value for cities, residents and businesses.

Past projects from DG Cities include the UK’s first public trials of CAVs in 2017, which led to the creation of the Smart Mobility Living Lab: London, a £20-million centre of excellence and testbed for CAVs located in London’s Royal Borough of Greenwich and the Queen Elizabeth Olympic Park.

Some of the benefits of CAVs are well understood; they include increased safety, reduced congestion and lower emissions, through electrification. Another advantage is improved accessibility, as autonomous vehicles will increase mobility for disabled, younger and older people.

“While autonomous vehicles have immense opportunity, a potential drawback is that they may exacerbate problems that cities already face,” says Trevor Dorling, managing director at DG Cities. “If cars are simply replaced with autonomous ones, this will leave many of the city’s problems unresolved. The question of interest to us is how autonomous vehicles can actually help our cities.”

DG Cities’ latest CAV research initiative, the £15-million Endeavour project, will be Europe’s largest deployment of an autonomous vehicle rideshare service. Funded by Innovate UK and industry, pilots begin in Greenwich in 2020. While a CAV rideshare has the potential to be transformational, the benefits will only be realised if they are deployed in a way that is compatible with the needs of cities.

Through a sharing model, autonomous vehicles can make cities function more efficiently and with reduced environmental impact. Whereas the growth of cars has led to urban sprawl, an autonomous vehicle rideshare can support denser cities.

By operating in strategic locations, a CAV rideshare can also complement existing public transport. If placed in areas with low access to public transport, it can service communities in first and last-mile connectivity, helping them to reach transport and mobility hubs and thus supporting mixed, integrated journeys. This is demonstrated through the MERGE Greenwich project, the precursor to Endeavour, which found that up to 28 per cent of all local vehicle-based trips could be shared.

With such a service in place, and with CAVs able to move about while empty, less space would need to be devoted to cars and parking. Currently, the total parking space needed for private vehicles in Greater London is 30,350 hectares, equivalent to 22 Hyde Parks. The introduction of CAVs could free up this space for other, more productive, uses. It could also declutter the urban landscape and provide a quieter and more pleasant city experience. This model could also enable a safer environment for cyclists and pedestrians and help create more liveable cities.

“If implemented and integrated correctly, a CAV ridesharing service will have the potential to bring considerable opportunity and benefits to cities and citizens alike,” says Mr Dorling. “We want to create more liveable, pleasant and interesting cities, and we think a CAV ridesharing model is a step to achieving that.”

Connected and autonomous vehicles are just one piece of the wider smart cities jigsaw. The challenges facing cities go beyond transport, with pressures also mounting on infrastructure, services and the environment. As cities grow ever larger, these pressures will become greater and will require new, integrated solutions.

A holistic approach, cutting across multiple sectors and technologies, will be paramount to creating a city that works safely and efficiently for residents, the economy and the environment.

On average, cars are parked

95%

of the time

OECD International Transport forum

94%

of road traffic accidents in the UK are caused by an element of driver error

Department for Transport

For more information please visit dgcities.com

dg:cities

Commercial feature

On a mission to illuminate London and connect the world

Illuminating London's bridges is not only shedding light on energy efficiency, but also connecting people in the capital city and beyond

Mike Simpson has a mission. He says: "Sometimes I wish I had a giant switch with which I could turn off all the lights in the world in one go."

It may seem an odd thing to say for someone who has dedicated the last four decades of his life to illuminating things, but as he elaborates, it starts to make sense. "People take the power of lighting for granted," he says. "They don't appreciate how powerful and complex lighting can be. I would love to be able to change that."

We've all heard of cheesemongers and fishmongers, but Mr Simpson is a lightmonger. Arguably, he's one of the most prolific. Two years ago, he served as master of the Worshipful Company of Lightmongers, a London livery company. He lectures on the subject and has helped light up landmarks such as London's iconic St Paul's Cathedral.

His expertise has helped bring several Olympic and Paralympic Games to life, but it's through his work as global application lead at Signify that he's really found himself at the forefront of a new paradigm of lighting innovation.

Signify, formerly known as Philips Lighting, has been a pioneer in the field of energy-efficient lighting for many years. Now, by leveraging the power of the internet of things, it is cementing its industry status, with Mr Simpson guiding the way.

In November 2018, a competition that attracted more than 105 submissions was won by American light artist Leo Villareal, best known for lighting up San Francisco's Bay Bridge, in collaboration with London architects Lifschutz Davidson Sandilands.

Then after a long tender process, Signify was awarded a contract by the Illuminated River Foundation to provide the technology and technical lighting design provided by Atelier 10 to light up to a 2.5-mile stretch of the Thames through LED installations on up to 15 of London's bridges.

Their pitch by Mr Villareal impressed the prestigious jury for its commitment to respecting the natural environment and its promise to celebrate the unique architectural character as well as rich history of each bridge.

Unique and ambitious, the project will showcase technology which can simultaneously stand for both aesthetically striking form and cutting-edge function, where neither compromises the other. "It's completely one of a kind," says Mr Simpson, adding that it will "make a huge difference to the riverscape through London for many years to come".

The first phase of the project, which is funded by the Rothschild Foundation, Arcadia, a charitable fund of Lisbet Rausing and Peter Baldwin, and the Blavatnik Family Foundation, will see lights on four bridges being switched on in the summer.

Around 22,000 colour kinetics LED light points will eventually cover all 15 bridges and Signify has committed to providing life-cycle services to monitor and manage the connected bridge lighting remotely for the next decade, using its Interact Landmark System.

"This is a wonderful opportunity to refocus our attention on the bridges across the Thames that we are familiar with, but perhaps do not notice any more," says curator Sarah Gaventa, director of the Illuminated River Foundation, who is leading the project.

"We want people who cross them every day to stop, stand and really appreciate them. We want them to take a moment out of their busy commutes after dark and to even perhaps share a moment with someone else who is enjoying the artwork. It's a project that's about reconnecting and celebrating community and collaboration at a time when London needs it most."

> **It's a project that's about reconnecting and celebrating community and collaboration at a time when London needs it most**

For more information please visit https://www.interact-lighting.com/en-gb/what-is-possible/interact-city

Signify
the meaning of light

Connected future

The capital's bridges project will no doubt attract attention for its uniqueness and accessibility as a piece of public art when around 200 million bridge crossings are made every year.

But Mike Simpson, global application lead at Signify, says it will also teach us about lighting's ability to make cities more dynamic, economic and liveable, thanks to emerging technologies such as those pioneered by Signify, formerly Philips Lighting.

The company's low-energy LED technology and Interact Landmark monitoring system are being rolled out across workplaces, industrial facilities, retail and hospitality spaces, and urban landscapes.

At a basic level, installing lights in certain parts of cities can improve safety by reducing crime rates, but it can also form part of the internet of things, sending and receiving nuggets of data to make cities greener, more secure, easier to navigate and therefore more efficient.

In 2014, Signify launched an indoor positioning system that uses the beams of LED light to create a highly accurate positioning grid for creating a sort of indoor GPS. The system delivers location-based services, such as way-finding and asset-tracking, in workplaces, shops, industrial facilities, offices and other indoor locations

Retailers can use the technology to collect data on shopper and staff traffic flows, for example, enabling them to optimise store layout and operations accordingly. Workspace managers can use it to monitor occupancy in open-plan office spaces and conference rooms, monitor lighting and energy usage, and optimise operations and reduce costs.

Staff can manage lighting with an app that configures, groups and schedules lighting while also receiving alerts. Signify's technology further enables businesses to monitor lighting and energy usage, either across a single store or a whole chain of outlets, providing analytics to optimise operations and reduce costs.

Also, horticultural lighting experts have created "LED light recipes" tailored to the specific requirements of particular plants and vegetables, enabling growers to improve quality, taste and yield of produce, while saving operating costs.

And Signify's use of Light Fidelity, or LiFi, provides broadband data connections through light waves. With an increasing number of devices being connected everyday, the radio spectrum is becoming congested and can be overloaded. In some cases, conventional wireless is simply no longer suitable.

LiFi, unlike wireless technologies which use radio waves, uses the broader spectrum of light waves to transmit and receive data wirelessly. Signify's LiFi-enabled luminaires provide a stable and fast two-way broadband connection of 30 megabits per second, which is enough to make a video call and download, and play two high-definition movies simultaneously. And faster systems are expected in the future.

The common denominator with all these case studies, is the controllability factor translates directly into energy savings and therefore cost savings. Mr Simpson says being able to adjust light levels centrally, at the touch of a button, is a game-changer. The London bridges, for example, are most likely to be lit at around 50 per cent of capacity most of the time and will be switched off completely at some point during the night, when the last of the late-night city revellers have left.

Just like the bridges over the Thames, lighting connects, and as Signify leverages the power of the internet of things, it's exemplifying this in perhaps the most innovative way. Far from just being able to illuminate a dark place, it's helping to create a world that is cleaner, greener and, as urbanisation continues to gain momentum, more pleasant for future generations, wherever they live.

London bridges to be lit up by Signify for 'Illuminated River', the world's longest public art commission

2.5 miles installation along **4.5 nautical miles** of river

200 million river crossing each year

22,000+ Philips LED light points monitored remotely by Interact Landmark

Connected lighting on up to **15 London bridges** capable of generating **16 million colours**

London **8.8 million** population and **19.1 million** international visitors (2016)

PORTO

Porto: a case study in city branding

Raconteur talks to the man behind the rebranding campaign for Portugal's second city, to explore the importance of urban messaging and visual identity

01
Residents describe the logo as "innovative" and "futuristic"

02
The new identity was rolled out universally, and legacy logos were scrapped

03
Eduardo Aires says consistency is key to city branding

Oliver Balch

Porto, the historic second city of Portugal, is hot property. Tourists flood its streets and construction cranes line the skyline. For three of the last six years, visitors have voted the city best European destination.

Its success comes with an innovative rebranding that sees the same eye-catching imagery plastered on everything from municipal buildings and building sites to dustcarts and police motorbikes.

City branding is a multi-billion-dollar business, but striking a distinctive note that fires people's imagination and sets a place apart is no easy task. So how did Porto pull it off and what might others learn from its experience?

> **The most difficult thing is translating an abstract idea into something visual**

The man to ask is Porto-based Eduardo Aires, a multi-award-winning designer and founder of the boutique design consultancy White Studio. In June 2014, he won a three-agency race to create a new identity for this riverine city famous for its eponymous port wines.

The brief from City Hall was relatively straightforward: come up with something that encapsulates the character of the city and its people, while also signalling the municipality's portfolio of services.

"The most difficult thing is not representing the city by an icon or something physical. It's more translating an abstract idea into something visual; that's the most difficult thing," says Mr Aires.

His eventual solution comprises a family of simple yet bold images that depict the city's unique gastronomic, architectural, cultural and geographical elements. Overlaying this suite of images is a grid structure that helps frame how they are presented, as well as elucidate the inter-relationship between the different themes.

Pulling the whole branding exercise together is the name of the city, reinforced by a dot. Mr Aires admits to phonetic good fortune. Orally, the word "Porto" is not only short, but it lends itself to forceful pronunciation. As he notes: "It would be harder if it were Marinha Grande."

Since its rollout five years ago, Mr Aires' 'Porto.' concept has turned the city's identity on its head. Its influence affects how residents perceive the place where they live as much as it does how tourists view the destination they have paid to visit.

A recent opinion survey carried out by Pedro Quelhas Brito, a professor at Porto University's economics faculty, found that 22 per cent of respondents say the logo gives a sense of unified organisation. A further 17 per cent connected the descriptors "innovative" and "futuristic" to the design.

For Porto-based hotelier and former interior designer Juan de Mayoralogo, the identity of the city is now much more uniform and easy to recognise. "The city's branding has moved Porto towards a feeling of modernity that many other major European cities don't have," he says.

When it comes to advising other designers, Mr Aires, who is now invited to give lectures around the world, has three main tips. The first revolves around striking an authentic note. Slick and smart as many city brands are, there is a generic quality to many that gives them a sense of interchangeability.

The key word for Mr Aires is "territory". Every city has a unique cultural, geographic and architectural landscape. Unless this can be identified and brought to the fore, then the result will be a wishy-washy banality, however hip the actual design.

His approach, therefore, is to involve as many people as possible, who know and love the city, in the concept stage. To this end, he favours working with interdisciplinary teams, frequently drawing on input from poets and artists through to geographers and sociologists.

"In the case of Porto, we put ourselves as observers of our territory and we got out of the inner circle so we could see the city from the outside," he says.

Mr Aires' second word of advice centres on the need for consistency. Before the 'Porto.' visual identity, the city's branding was characterised by a hotchpotch of logos, crests and lettering. For the new design to really hit home, he told City Hall that any legacy imagery had to be binned.

The municipal authority listened. Not only did it erase all traces of its previous branding, it rolled out Mr Aires' new city identity universally. To ensure consistency, his studio produced a style guide for the dozens of other designers working for City Hall. The document serves as a manual on the dos and don'ts of using the 'Porto.' palette of colours, fonts and icons.

His final piece of advice relates to implementation. Habitually, design teams are called in at the beginning of a city branding exercise, they put together their solution and then walk away. Job done.

Not so in Porto's case. Despite signing off the initial proofs back in 2014, Mr Aires has remained closely involved in the design's evolution and implementation. Shifting from a pure graphic designer to something closer to a branding strategist, he advises the many different divisions within City Hall on general branding strategy as well as specific projects.

At present, for example, he is leading the branding of a huge redevelopment of the city's iconic Bolhão market. The building, which stretches across an entire block, is wrapped in a colossal tarpaulin that carries the now ubiquitous 'Porto.' iconography.

Testament to Mr Aires' creative vision is the number of cities around the world that have "borrowed" his 'Porto.' idea. Yet this isn't what makes him most proud. That honour goes to how the people of Porto have taken to the city's branding as their own.

Some have even had 'Porto.' logo tattoos. He notes: "As a brand designer, there's no better sign of people embracing your work than that, right?"

Luminext

Smart Lighting

Save over 60% energy

Save 30% operational costs

Provide a safe public space

Create your smart city now

Visit us at Luminext.eu/thetimes

Powerline & Wireless Mesh Networks • Luminizer Telemanagement Software • Smart Sensors • Traffic Data Integration