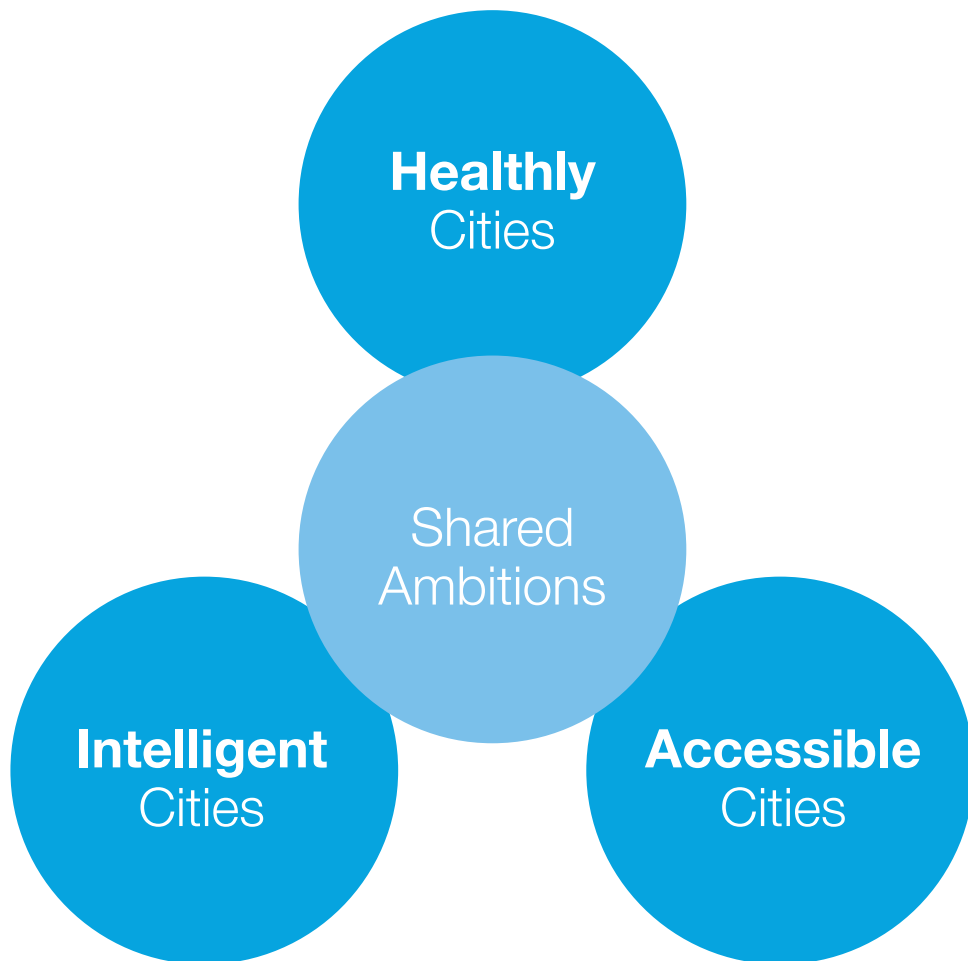

Shared Ambitions

Given these common challenges, many urban leaders around the world have similar ambitions for improvement. Everyone wants cities that are healthier, more accessible and which take advantage of emerging technologies to inherently become more intelligent. These issues are not mutually exclusive and addressing the connections between them is pivotal in creating a better urban future.



AMBITION 1: Healthy Cities

To reduce pollution - especially air pollution - improve access to food, clean water, sanitation and healthcare so that fewer die from preventable causes.

Whether from polluted air, water, poor waste management or simply a lack of open spaces, the list of unhealthy cities is rising steadily. However, while the problems are obvious, and many solutions are available, the speed at which change can be delivered is a worry. A number of leading metropolises are now individually and collectively seeking to set new standards and so ensure momentum builds, but questions are being raised about how

widespread the necessary transformations will be, and what impact can be achieved.

Perhaps **the most detectable threat to healthy cities today is that of declining air quality.**³⁰ This issue was raised in every Future Agenda discussion. In Mumbai, Delhi, London and Dubai, air pollution generated from within the city is clearly the major concern. In Singapore, it was pollution flowing over the border from forest fires in Indonesia, which on occasion has blanketed the whole island in haze.³¹ Even in relatively clean Guayaquil and Beirut, future concerns around dealing with increasing air pollution were also shared.

20 WORST CITIES FOR AIR POLLUTION

	City	Country	Annual mean, ug/m3	
			PM2.5	PM10
1	Zabol	Iran	217	527
2	Gwalior	India	176	329
3	Allahabad	India	170	317
4	Riyadh	Saudi Arabia	156	368
5	Al Jubail	Saudi Arabia	152	359
6	Patna	India	149	167
7	Raipur	India	144	268
8	Bamenda	Cameroon	132	141
9	Xingtai	China	128	193
10	Baoding	China	126	190
11	Delhi	India	122	229
12	Ludhiana	India	122	228
13	Dammam	Saudi Arabia	121	286
14	Shijiazhuang	China	121	305
15	Kanpur	India	115	215
16	Khanna	India	114	213
17	Firozabad	India	113	212
18	Lucknow	India	113	211
19	Handan	China	112	169
20	Peshawar	Pakistan	111	540

Source (v)



Although Beijing has the worst reputation, its visible smog is formed mostly from 10-micron particulates that are marginally less deadly than the smaller 2.5 particulates found in much greater concentrations in Delhi. In fact **Delhi's air is 15 times more polluted than the WHO safe maximum.** Whether from vehicle emissions, industrial smokestacks or paraffin stoves, this pollution is manifested across many Indian cities in escalating asthma rates, higher cancer incidence and more heart attacks and strokes. About 620,000 people are dying in India every year from pollution-related diseases.

That doesn't mean it is safer to live in a Chinese city. Air pollution there kills about 4,000 people every day - about 17% of all deaths. 80% of the population are exposed to pollution above safe levels so perhaps it is unsurprising that lives in many Chinese cities are over 5 years shorter than the national average. Indeed it is said that **the air in Beijing is so polluted that breathing it does as much damage to the lungs as smoking 40 cigarettes a day.**³² A consequence of this is that the omnipresent paper facemasks of recent years are being replaced by heavy-duty alternatives; parents are even delaying having children because of the poor quality air.

Richer regions should not be complacent. In Europe over 460,000 people a year die prematurely because of air pollution.³³ In London a 2016 study by researchers at King's College suggested it shortens the city's inhabitants' lives by nine to 16 months. According to the World Bank, when measured across whole nations, some of the most toxic air today is found not in India or China but in the UAE.

Aside from the avoidable deaths and illness, air pollution affects the bottom line. A recent Economist article points to research carried out in the University of California that established a correlation between productivity and air pollution. Three call centres in China were monitored and it was found that workers were around 6% more productive on low-pollution days than on days when pollution was high.³⁴ When you consider that the Chinese service sector, much of which takes place in city offices, now accounts for over half the country's GDP then the impact on this across the economy is huge. A reduction in China's air pollution index by just 10 points could boost worker output by at least 15 billion Yuan (\$2.2 billion) per year.

C40 Action

Some cities are successfully battling against bad air. **Led by the mayors of C40 cities such as Paris, Madrid, Athens and Mexico City there is now a concerted effort underway to reduce emissions.**³⁵ Both by introducing bans for diesel vehicles and creating incentives for electric vehicles by 2025, they aim to change the market. Also by pedestrianizing large sections of their city centres and promoting walking or cycling, their ambition is to change citizen behaviours, encouraging them to leave their cars behind. It hasn't all been plain sailing; poorly thought-through policies that cut carbon emissions sometimes also cause a rise in other air pollutants, such as SO₂ and NO_x. Most notably, over the last decade fuel-tax policy in Europe has incentivised drivers to switch from petrol cars to diesel ones, cutting carbon-dioxide emissions but increasing these from NO_x and particulates

Perhaps one of the boldest moves in recent years has been in California where the Environmental Protection Agency has been behind the adoption of a mandate for Zero Emission Vehicles (ZEV). The programme's objective is to ensure that automakers research, develop, and market electric vehicles.³⁶ This is a gradually scaling regulatory requirement for carmakers to switch from internal combustion engine (ICE) products with production volumes steadily ramping up by 2025, when about one out every seven cars sold must be ZEVs. In Delhi an experiment to reduce car emissions by restricting road use to odd- or even-numbered license plates on alternate days (a method occasionally used in Beijing, São Paulo and a dozen other cities) seems to have been an initial success.

Eco Civilisation

However, potentially the most significant action on a global scale is China's Eco-Civilization initiative.³⁷ Poorly covered by Western media but repeatedly mentioned in our workshops in Beijing and Shanghai, this is an unprecedented massive switch of China's economy to be carbon neutral by 2030. Implicit within this is not only the end of the internal combustion engine and the scaling down of coal power, but also significant fines and regulations for industrial polluters. A directive of the Chinese Communist Party, many see this as a game-changer. As a Trump-led US signals a potential retreat from some global climate agreements, many see that with the Eco-Civilization initiative and other international commitments, **China will take the lead on climate change and reducing urban air pollution and so set the standards for others.**

Polluted Water

Although neither as visible nor as widespread an issue, **the availability of clean water is another major challenge to healthy city living.** Untreated or poorly treated sewage can be low in dissolved oxygen and high in pollutants such as fecal coliform bacteria, nitrates, phosphorus, chemicals, and other bacteria. Treated sewage can still be high in nitrates. Groundwater and surface water can be contaminated from many sources such as garbage dumps, toxic waste and chemical storage and use areas, leaking fuel storage tanks, and intentional dumping of hazardous substances.³⁸ As populations grow and climate change increases it stands to reason that the likelihood of drought, water rationing in cities is also likely to rise.³⁹ From Baku in Azerbaijan and Dzerzhinsk in Russia to La Oroya in Peru, Tianying in China and Vapi in India as well as multiple African cities such as Dar es Salaam, Luanda, Ndjamena and Brazzaville, the inventory of the world's most polluted cities includes many suffering from water contamination.⁴⁰

In our water discussions in Brisbane, experts highlighted that many of the solutions lie not only in cleaning up water supplies but also in encouraging industry and citizens to use more recycled water. With Singapore's Newater as the exemplar,⁴¹ even in a water scarce environment, simple joined up actions can transform the water supply and massively reduce contamination.



Waste Management

Add on to air and water the issue of poor waste management and the list of the most polluted cities expands still further. Dhaka, Delhi and Port-au-Prince are three of the most well known, but cities such as Moscow also make the cut.⁴² Lagos, with a population of 21m or so, spews out 10,000 metric tonnes of waste a day only 40% of which is collected at all and of that only 13% of recyclable materials is salvaged from the city's landfills. Other cities face different waste challenges: When we ran the workshops in Beirut, for purely political reasons the garbage had not been collected for six months. In our travels, the most visible location for effective waste recycling was Vienna, but globally the standard bearers for minimum landfill include Switzerland and San Francisco: the former due to behavioral compliance with regulations and the latter because of technology adopted in waste processing.

Given that many cities have neither the regulation in place nor can afford the technology, the question is often raised about how others can achieve similar success. In Mumbai and Nairobi there is a deeply embedded cultural norm around minimizing waste and so a lot of informal recycling – there is value in what is thrown away. People pick through rubbish at dumps looking for items such as plastic bottles that

can be sold to recycling factories. But still, there are many enormous waste dumps within ever growing urban boundaries. These heaps contaminate the soil and groundwater. Plastics flow down rivers into the sea, harming ocean life. Without drastic action, some estimates suggest that **there will be more plastic than fish in the world's oceans by 2050** and 99% of seabirds will suffer from ingested plastics.⁴³

China's rising consumer class means that its' cities are already running out of good places for landfills so they are turning instead to burning rubbish, and some are putting this to good effect by generating electricity at "waste-to-energy" plants. About 70 such incinerators are now being built. In addition to more than 180 already in operation, this is dramatically increasing the capacity to incinerate waste. Shanghai produces the most household rubbish: around 22,000 tonnes a day.

It is perhaps curious that more cannot be achieved through recycling because some recycled materials could be cheaper than virgin commodities. However, **although recycling can go some way to improving the situation, the lack of closed loop infrastructure and associated technology mean that scope is limited.** Furthermore mismanagement and poor planning means that many countries throw too much stuff away. Much depends on public, political and corporate appetites. Despite the fact that making



cans from recycled aluminium requires 95% less energy and creates 90% less greenhouse-gas emissions than virgin stock more than 40 billion aluminium cans hit America's landfills every year - alongside \$11.4 billion worth of recyclable containers and packaging. In part this might explain why America's recycling rate has stalled at around 34% for two decades—far lower than most rich countries.

On a more positive note nearly 50 countries, including the entire European Union, operate a policy called “extended producer responsibility” which shifts the burden of waste disposal from taxpayers to companies. Although by no means perfect, such schemes boost recycling rates and so save cities money by shifting the burden to the corporates. In the US thirty-two states already force companies to handle discarded electronics, batteries, mobile phones and other products and Rhode Island recently introduced a bill that calls on them to recycle at least 80% of packaging by 2020. Some corporates are embracing the need to change. For instance, Coca-Cola has recently announced it supports testing a deposit return service for drinks cans and bottles in Scotland while Pepsi, Nestlé, Unilever and M&S have already committed to producing more eco-friendly bottles by using plant-based materials or less plastic.

It remains the case that people are dying every day because of pollution. The generic solutions are well understood: fewer polluting vehicles; tighter emission controls on industry, improved sewage systems, enforcing regulations on chemical dumping, less use of kerosene for domestic cooking and improved waste management. The challenge is that managing this effectively requires a joined up combination of secure funding, political will and population behavior change.

Urban Obesity

Beyond dealing with the pollution challenges, many cities are also seeking to encourage their citizens to be more active and overcome another fast growing health threat, that of urban obesity. Mass urbanisation, reduced activity and poor diet are all accelerating its rise. Levels in most cities are growing fast and the associated healthcare burden will soon account for 5% of global GDP.⁴⁴ Despite the well understood issues, the problem is getting worse – the World Health Organisation points out that in 1995, there were an estimated 200 million obese adults worldwide and another 18 million under-five children classified as overweight. As of 2000, the number of obese adults had already increased to over 300 million. In 2016 30% of the global population was overweight or obese. This looks set to rise to 50% by 2030.





No country has yet reversed the obesity epidemic; quite the contrary. In the UK the average waist size has increased by over an inch in recent decades.⁴⁵ In part it is economic forces that are conspiring to cause the great global weight gain. Countries grow wealthier and increase consumption. People move from rural areas to cities, where they have ready access to inexpensive, processed foods and take less exercise. Machines do work that humans once did, also decreasing the amount of energy people use. Moreover, the growth in the global food industry means the reach of junk food has never been greater.

Obesity brings with it all sorts of associated illnesses. In India research has shown that **migration from rural to urban areas is directly associated with an increase in abdominal obesity**, which in turn drives other health risk factor changes such as insulin resistance, diabetes, high blood pressure, and dyslipidemia. Indeed the rates of obesity and diabetes are more than double in urban Indians than their rural counterparts. Across Africa, the issue of rising urban obesity, especially for the poor, is also evident. In urban Kenya, Senegal and Ghana it is running at twice the level found in rural areas. Given that it has a higher incidence in disadvantaged households, it also imposes a disproportionate burden on the poor in terms of healthcare costs. Again the solutions of better diet and more exercise are well known but getting sufficient traction is a problem for most public health authorities.

With obesity trends intertwined with economic forces, some advocates say that health considerations need to be written into trade and economic policies. Certainly **urban planning has a role to play in obesity prevention by, for example, designing cities to encourage more outdoor activity**. We can observe that several governments are being pressured to ensure that public spaces are created and retained. There is rising public support for the

creation and maintenance of public parks and destroying them is increasingly unpopular. As was seen in Istanbul in 2013, many public demonstrations against the potential development of Gezi Park sought to change government policy.⁴⁶ Going forward all those we talked to saw that environments that reconnect people with each other and their city brings multiple benefits including increased healthier citizens, better community engagement and improved mobility.

Some cities have already adopted a “health in all policies” approach. Seinäjoki, a community in Finland, has seen positive results using this strategy. Six years ago, nearly 1 in 5 five-year-olds were overweight or obese in this city. As a result of implementing their obesity prevention plan this number has been reduced by 50 percent. Focusing on the school environment in particular, the community works together to improve child health. This comprises physical and nutrition education, including cooking classes and yearly health exams for all students. This success story underscores the point that it is possible to halt the obesity epidemic. The challenge is that currently few other societies act together in as coherent a manner as the Finns.

Agreed Benefits

If we chose to measure successful cities not by their output but by the longevity and happiness of their inhabitants then some argue there would be a greater incentive to plan for a healthier environment to drive real change. No new technologies are required. **Policies encouraging a healthier lifestyle will improve urban design** and consequently result in reduced pressure on healthcare, better community resilience, and overall offer improved life expectancy. It is largely about acting on what we already know. Governments, schools, media, businesses, health care providers, families and individuals all need to play important roles in promoting healthy lifestyles and creating a climate for sustained change.

AMBITION 2: Accessible Cities

To plan cities that provide better public transport services and to create more walkable areas which are accessible for all.

People Not Cars

We live in a world where the majority of our cities have been designed for cars first and people second. Whether you look at an aerial photograph of Shanghai, Dubai, LA, or pretty much any US urban area, what you see is a highway-focused environment. Equally, on the streets of Mumbai, Cairo or Jakarta you encounter roads that are bursting with vehicles well beyond their design capacity. Some think that in the US and Europe we have reached peak car but everywhere else the growth of the car shows little sign of slowing anytime soon. Cities will bear the brunt of this, making them increasingly unhealthy, dangerous and polluted.

Many believe that urban life could be better without cars – or certainly without so many of them. City planners have known this for years but now they are, at last, doing something about it. Oslo, for example, has announced that it will ban all private cars from its city centre by 2019 and Dublin and Milan also have similar intentions. Helsinki has ambitious plans to make its “mobility on demand” service so good that nobody will want to drive a car in the centre by 2025, while Paris’s car-free days have successfully reduced high pollution. New cities – such as the Great City⁴⁷ on the outskirts of Chengdu, China, and Masdar⁴⁸ near Abu Dhabi – also plan to focus on mass transit or electric cars.

Walking or riding a bike is certainly healthier and generally safer. Public transport is frequently cheaper. Copenhagen and Amsterdam, where 70% of mobility is either by walking or cycling, are recognised leaders in supporting non-motorized transport. Even Los Angeles recently announced plans for hundreds of miles of bus and cycle lanes. Oslo plans to build at least 40 miles of new bike lanes, introduce rush-hour charges (on

top of existing congestion fees) and remove parking spaces

From Guangzhou and Brussels to Abu Dhabi and Chicago, cities are shifting their attention from keeping cars moving to making it easier to walk, cycle and play on the streets. Speed limits are being slashed, some central roads are being converted into pedestrian promenades and others flanked with cycle lanes. More than 700 cities in 50 countries now have bike-share schemes. Bogota in Colombia captured the imagination as far back as 2000 when it introduced Ciclovía, or ‘cycle only Sundays’. Now adopted by approaching 100 cities in over 20 countries it is just one example of imaginative initiatives that are bringing people back onto the streets.

One solution is simply to make cars slow down. Slower traffic makes neighbourhoods quieter and safer. Speed bumps, pedestrian countdown lights and slow zones around schools mean that New York now has fewer deaths each year than when it started counting them in 1910. Sweden has halved road deaths since 2000, and cut them by four-fifths since 1970. London recently cut the speed limit to 20mph on more than 280km of its roads and is getting rid of pedestrian-unfriendly giant roundabouts. Toronto has reduced the speed of traffic on more than 300km of its roads.

Poor Public Transport

And yet these initiatives are still the exception. For most conurbations today, the future threatens to be one with more cars, albeit increasingly electric and autonomous. The lack of good public transport, coupled with rising incomes in some places, has pushed up the use of cars. Pew Research estimates that in Lebanon, where the only public transport available is by bus, 81% of Lebanese households have a car. It is no wonder Beirut’s roads are busy.

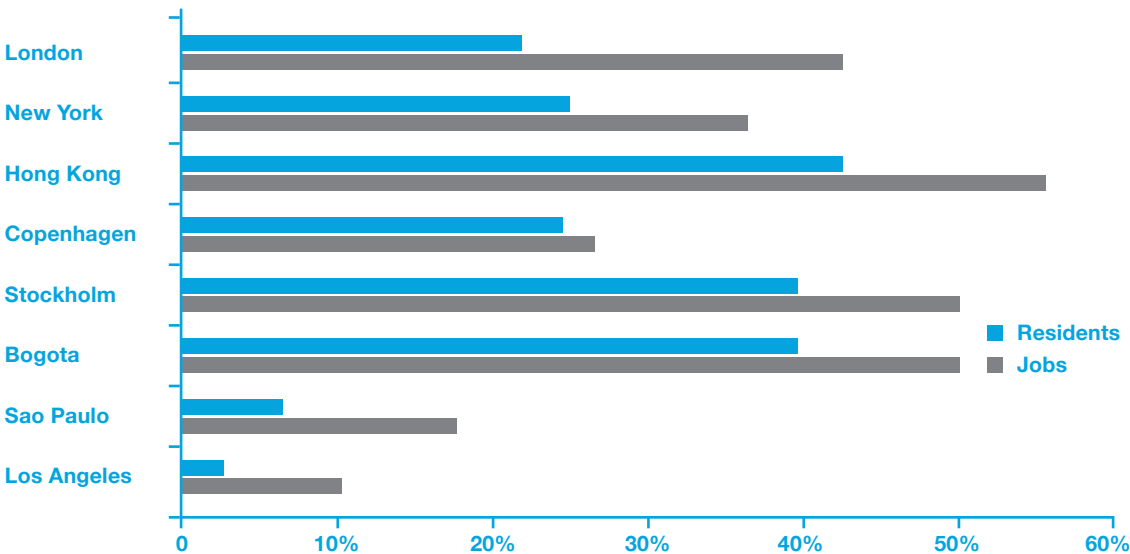
Meanwhile in other, poorer countries where cars are still too expensive for many, donkeys and carts, tuk-

tuks and matatus fight for space in shantytowns. All this adds to the congestion, the noise and the delay. A World Bank study estimated (conservatively) that 4% of Egypt's GDP was lost each year because of time wasted in traffic in Cairo. It also makes city streets very dangerous. In the developing world, laws and safety measures are failing to keep up with population growth, urbanisation and rising car use. Ironically by paying for new roads that are not safe, development banks and donors can sometimes make it worse. A quarter of the pupils at the Nesco School in Kibera, Kenya's largest slum, were involved in a road crash in 2016 because they have to cross multi-lane highways on the way to classrooms. A safe crossing would have made all the difference.⁴⁹

Better Public Transport

What can be done to sort this out? A good public transport system would be a start. It certainly makes a city more accessible and efficient. Munich, Singapore and even London have led the way in reinvigorating their wider use. Indeed, with its population doubling, **Singapore sees mass transit as a core driver for a more effective city.** By 2030, 80% of households will be within a 10-minute walk of a train station and 75% of journeys will be on public systems. In Medellin, in Colombia, the government increasingly collaborates with business to improve the institutional fabric as well as core infrastructure through building new cable cars and metros. In many of our future of transport discussions, the issue of providing cities with better public transport systems, and particularly the use of multi-modal hubs to enable easy access between one transport option and another was raised repeatedly.

CITY POPULATIONS IN WALKING DISTANCE OF RAIL AND METRO STATIONS



The proportion of metropolitan residents and jobs within 500 metres (5 to 10 minutes' walk) of rail, metro and bus rapid transit stations.

Source (vi)

But shiny buses and trains are not always enough to tempt people out of their cars. Sometimes a nudge is also needed. Governments, from Egypt to Iran, have started to remove fuel subsidies, causing the price of petrol to rise. Road tolls and higher parking charges are also effective tools. Led by London's example, congestion charges have dramatically reduced the number of cars in many cities. Beyond this, technology is also transforming the public transport experience as smart phones allow you to use apps to check routes and pay for trips. In Helsinki, residents will soon be able to travel within the city by using an app that mixes and matches a variety of public and private means of transport. If there is no obvious route, a bicycle from the city's bike share programme or a walking alternative will also be suggested. Several such schemes in other cities are due to start this year.

Walkable Cities

In their comprehensive 2016 report, *Cities Alive - Towards a Walking World*,⁵⁰ engineering firm Arup have done a good job in highlighting some of the multiple challenges, opportunities, benefits and design options for creating more accessible cities and noted the impact of such issues as spatial quality, car and bike sharing. The report points out that **walkable cities are safer, more attractive, more inclusive and easier to govern.**

The High-Line in New York, the Cheonggyecheon River in Seoul,⁵¹ the Eixample area of Barcelona and more recently Beijing's historic Hutongs district are all good examples of significant, high profile developments which have transformed the walkability of cities. But small tweaks make a difference too. In London as long ago as 2004 Mayor Ken Livingstone vowed to make the centre "walkable". The changes he suggested included a scheme to create clearly marked maps for use across the city. Most boroughs now have the distinctive yellow-branded signs on their streets allowing people to better understand the distance between tube stops; for example, from Covent Garden to Leicester Square is only 0.3m (0.5km). This means more people choose to walk. Streets are also being adapted to be more pedestrian-friendly. In South Kensington, chockablock with tourist friendly museums and cafes, the removal

of curbs and the replacement of tarmac by granite bricks to create a more prominent shared use space has meant that fewer cars choose to go down the main Exhibition Road, providing more space and a safer environment for pedestrians.

Local Clusters

As well as providing better public transport and more open walkways, compact spaces are made more appealing to those with a focus on health, environment and sustainability. To achieve this the idea of local hubs for those working in knowledge-based or specialist sectors, has long been proposed as a means of minimising the daily commute to a few hundred metres at the maximum. 'Work, live, play' clusters in cities allow residents to access different activities all embedded in one area. This point was highlighted equally in Singapore, London and Dubai. However, with many people currently spending up to 4 hours a day travelling between home and work, achieving this is not so simple, requiring a change of mind set around the ways businesses operate. Yet as organisations become more flexible, porous and virtual, as was outlined in our discussions on the Future of Work, the necessity to be in the office every day may recede.





Implicit in this, as was first raised in our New Zealand discussions, is the importance of improving digital connectivity enabling people to work more effectively from home or in local communities rather than having to commute into offices. Enhancing the speed and reach of broadband is a fundamental in achieving this objective..

Cities for Ageing Populations

Many see the need to make better accommodation for the elderly in an urban environment, especially, in developed countries where 80% of older people are expected to live in cities by 2050. Arup's Shaping Aging Cities report⁵² reinforces the point that they "will need to change, to make sure older people continue to play an active role in the community and don't become isolated. Isolation has a negative impact on health so tackling that is really important." In terms of solutions, again simple changes can make a significant difference: "Reducing the distance between transport stops, shops, benches, trees for shade, public toilets and improving pavements and allowing more time to cross the road all encourage older people to go out."

Some consider that improving building access, more assisted living schemes and adopting more US style retirement communities are part of the solution. Others push back against this and advocate "integration rather than segregation" and support the opportunity for people to "live independently as long as possible." The solution is probably a combination of the two – giving those who can, the opportunity to remain in their own homes and those who are more vulnerable, the security of community living.

Learning from Japan, the country with the highest dependency ratio of all, **some see examples of governments prioritizing more age-friendly cities.** The principle of the compact / dense city is again highlighted where "people live in limited residential areas close to services and with good public transport – so they don't need to drive." Key here is not to characterise ageing as a problem but to recognise that these strategies make life better for everyone as well as helping older people.⁵³

Increasing Accessibility

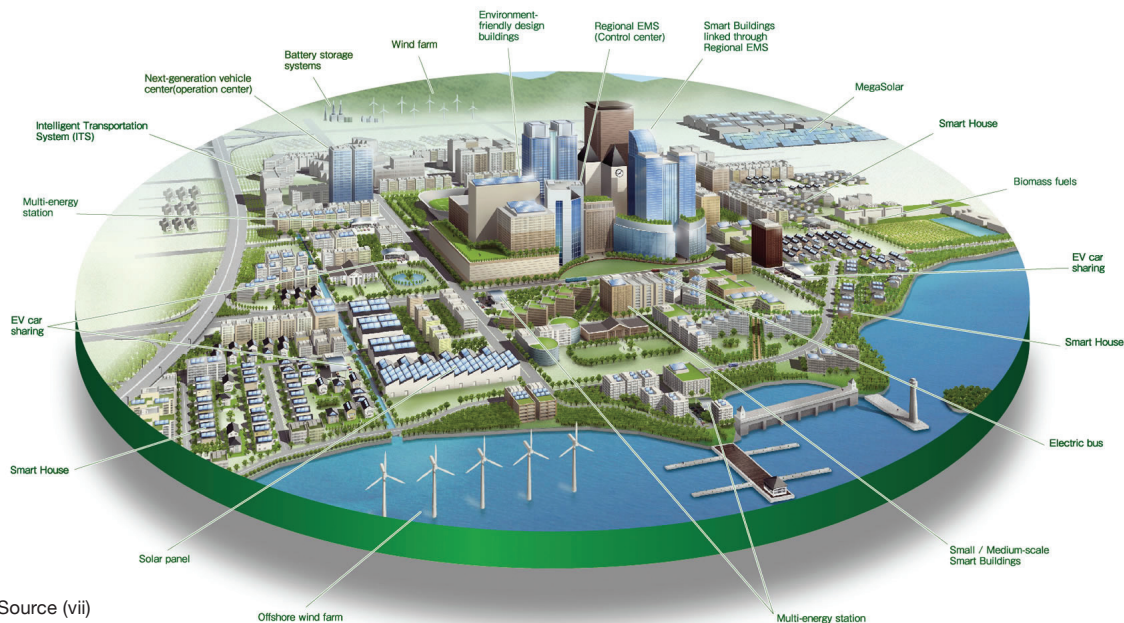
Moving forward, the cities without extensive public transport systems should focus on improving access to other forms of transport without constraining the broader movement of people and goods by vehicles. Creating pockets of walkable spaces is evidently possible in many locations but interconnecting these effectively to make fully walkable cities seems to be the greater challenge. The cable car approach taken in Medellin, which is surrounded by hills, was often quoted in our discussions as a low cost but effective people mover for this city and hence one option for others. Most agree that in many cities **there should be more innovation focus on better, low-cost systems that can effect greater movement of people and things in a more effective way.** If densely populated Hong Kong only uses 5% of its GDP to move people and goods around while widely spread LA uses over 40%, there is clearly a major efficiency gap. While cities cannot be re-built, better thinking about multi-modal transport options and encouraging different, more effective solutions is a must for many.

AMBITION 3: Intelligent Cities

To use data, connectivity and analytics more effectively to make buildings, infrastructure and citizens smarter and cities more efficient.

The Smart City Ideal

Increasingly equipped with digital technologies and 'big data' **many cities are now making buildings, infrastructure and even citizens smarter** and therefore making themselves more "intelligent". In the main it's down to technology. "Bossy tech" - technology that intervenes - is the new big thing in many mayors' offices from London to Boston, Quito to Delhi. City planners are keen to take advantage of the improved connectivity by creating more sensors and using fast-developing analytics to interpret them. In Barcelona, as just one example, this use of technology is adding resolution both in terms of greater detail to what is already known and also making connections which were previously unknowable. Data from multiple sources across the city can be transmitted and analysed in real time so that lights can be switched off, heating monitored and rubbish bins emptied - all without the help of a human hand.



Source (vii)



The information and knowledge gathered by multiple devices and integrated with real-time monitoring systems is used to tackle inefficiency – reduce queues at train stations, ensure the traffic runs smoothly, help ambulances get to accidents and the police to crime scenes. Collectively, many see that smart data can deliver a world where renewable energy systems, effective transport networks, and digital infrastructures all align to create a super-efficient and more sustainable urban environment.⁵⁴ IT companies, industrial conglomerates, governments, transport organisations and a plethora of start-ups recognise this potential and are keen to build on the opportunity.

As bossy tech gets bossier and public authorities become used to the notion that, at the click of a button, human behavior can not only be monitored but changed, the truly intelligent cities will be the ones which can combine the corporate compulsion for efficiency with the human desire for privacy, security and community.

Smart City India

It's easier to deploy new systems where there is new development. Here India and China have arguably greater opportunities than many. India has already invested \$15bn to create 100 smart cities as satellite towns. The aim is to improve basic infrastructure, water, sanitation, power supplies and public transport, and to significantly enhance IT connectivity thereby providing 'smart' solutions to the urban challenges. The first, GIFT City, is being built on 886 acres (358 hectares) of semi-desert near Ahmedabad, in Gujarat. Despite the fact that it is an earthquake zone, the hope is that the new metro, 25,000 new apartments, hospital and artificial lake will attract high-profile companies and eventually generate around a million jobs – mainly in the financial sector. Certainly the state owned banks have already signed up.

Although the smart city concept may well be refined to include existing cities, locations for all the 100 new smart cities in India have been tentatively

named and states will experiment with plans for them, bidding for central funds for their development (\$945m was budgeted for 2015).

In China, by contrast, much focus to date has been placed on accelerating development in one city, Yinchuan, ahead of others. This is where smart payments, buses, taxis, rubbish bins and lockers plus holographic receptionists are already part of the mix. The government has created a joint venture between the city and the private sector – namely ZTE, the Chinese multinational telecom company. As principle and technology are proven in the test bed of Yinchuan, already tagged by CNN as ‘the smartest city on earth’ then they will be quickly deployed into 200 more smart city projects across the country.⁵⁵

Corporate Partnerships

Several other notable examples have also turned to municipal / corporate partnerships to help deliver the dream. IBM’s Smarter Cities / Smarter Planet initiative has been embraced by mayors in cities such as Rio de Janeiro where massive sensor networks, cloud-based storage and predictive analytics have all been integrated. Intel has installed sensors all over San Jose to measure air and water pollution, noise, traffic flow, energy usage, communication, and public transportation use. In addition to producing efficiencies the programme has created over 25,000 local jobs in clean technology as an added boon. Although behind schedule, Masdar in the UAE is still aiming to be one of the most sustainable, environmental and smart cities on the planet; and Songdo in Korea has implemented Cisco’s ‘Smart+Connected’ view of the city.

The Voice of Caution

Some temper their corporate and technology enthusiasm with a little pragmatic realism. Author of an often-mentioned book on Smart Cities, Anthony Townsend, points out that the smart city is not a seamless web of integrated and joined-up technologies and probably never will be.⁵⁶ Rather, he argues, it is more an opportunity to match the right pieces information to the circumstance and individuals and so make our environment more livable, functional and equitable through the use of new technologies. Indeed, **smart cities could be just as much about**

better governance and urban planning than about integrated machines. “Smart cities need to be efficient but also preserve opportunities for spontaneity, serendipity, and sociability. If we program all of the randomness out, we’ll have turned them from rich, living organisms into dull mechanical automatons.”⁵⁷

Others are even more reserved about total interconnectivity and suggest the vast network of sensors amount to millions of electronic ears, eyes and noses – so future cities will be transformed into places of perfect and permanent surveillance by whoever has access to the data feeds. They point to Rio De Janeiro as a precursor of this. Townsend writes: “What began as a tool to predict rain and manage flood response morphed into a high-precision control panel for the entire city.” He quotes Rio’s mayor, Eduardo Paes, as boasting: “The operations centre allows us to have people looking into every corner of the city, 24 hours a day, seven days a week.”⁵⁸ Not everyone is comfortable with this.

Smartphone Impact

Whether urban areas should be left to be intelligent in themselves or whether technology should enable citizens to be more informed, take better decisions and so participate more actively, is often debated. Certainly, assuming universal connectivity, digital platforms such as **smartphones have the potential to bring people together and collaborate to ‘fix’ problems and so create a more efficient system.** They allow us to interact with and better understand our environments. Pivotal here is presenting people with accurate information at the right time to prompt them to make positive decisions – be that on activity, diet, destination or mode of travel. If the right prompts are given at the appropriate moment via the most effective medium, often an app, then whether choosing A over B or deciding to do C can sometimes become easier. However, there are already constant demands on our decision making capabilities, not least from commercial advertisers so it would be wrong to assume that everyone will be able or will want to participate in every decision-making opportunity.



Open Data

Six years ago the US became the first country to make all data collected by its government “open by default” - except for personal information and that related to national security. Almost 200,000 datasets from 170 organisations have been posted on the data.gov website. Nearly 70 other countries have also made their data available: mostly rich, well-governed ones, but also a few that are not. Open Knowledge, a London-based group, reckons that over 1m datasets have been published on open-data portals using its CKAN software, developed in 2010. There are many beneficiaries of this, from individuals checking out traffic routing, to councils deciding on upgrading road links, to businesses looking for suitable sites for a new restaurant in a high footfall area.

Once information is free and open, then different parties and interests can start to collaborate. In the US, the urban open data movement has been growing for several years, with cities including New York, San Francisco, Chicago, and Washington leading the way. Bryant’s Park in New York was one of the early local hubs for the development of citizen based networks from which sharing has spread. London, which currently has more open public data sets than any other European city, is fast taking a lead in this area. Other UK councils including those in Bristol and Manchester are making the information they hold on city parking, procurement and planning, public toilets and the fire service publically available. In other locations, cities such as Helsinki, Rio, Dubai and Singapore have all opened up significant public data sets and are exploring different options to make good use of them.

Big Data Analysis

At first, the open data movement was driven by a commitment to transparency and accountability. City, state, and local governments have all released data about their finances and operations in the interest of good government and citizen participation. Companies like OpenGov enable city managers and residents to examine finances, assess police department overtime, and monitor other factors that let them compare their city’s performance to neighboring municipalities.

Perhaps **the most intriguing data sharing and analysis to date has been in Los Angeles with the LAPD.**⁵⁹ Using years – and sometimes decades – worth of crime reports and combining this with weather conditions, traffic updates, sports events and retail activities its algorithms analyse the data to identify areas with high current probabilities for certain types of crime. These are then streamed into patrol cars that proactively go to these locations. While some see this as too intrusive and a step towards Minority Report’s ‘precogs’, this is all about predicting where and when crime is most likely to occur, not who will commit it. Performance is already impressive – with police presence in identified locations reducing around 20% of crime events and rising.

What seems clear is that open data, used appropriately can make cities safer, cleaner and more efficient but, to do this, citizens, consciously or not, will live under constant surveillance tracked by sensors, cameras and drones. What is not clear is how secure this data can really be. We know that the openly accessible data of London’s cycle hire scheme can be used to

track individual cyclists.⁶⁰ This sort of information when in the wrong hands can make individuals and their possessions very vulnerable; consider theft, the tracking of children, wide scale fraud and even terrorist attacks. How can we protect ourselves from unwanted intrusion? To date the privacy debate around this has yet to have much public airing; when it does it may well generate strong feeling for many parties.

Responsive Cities

Given what is already technically possible, many are now looking at how far the intelligent connected city can progress. How can we best mix the Internet of Things with the Internet of Bodies⁶¹ to optimise cities? Leading thinkers in the field include Carlo Ratti, Director of MIT's SENSEable City Lab⁶² who we met in Istanbul. He sees that the way we describe and understand cities is being radically transformed and believes that using sensing to better comprehend urban flows is a key step forward. He argues that the **pervasive digital systems that layer some of our cities are already transforming urban life** for some and once this information is better shared between planners, designers and the public then we can collectively shape our future cities.

Smarter Citizens

As more digital systems become part of the urban fabric, a new generation of products and services are emerging that make cities more responsive, interacting and adapting with overlapping systems. They are therefore able to respond to citizens more efficiently. Always-on devices connect people to each other, physical space and dynamic processes. As Saskia Sassen of Columbia University notes that it will be vital to “leak the (human) knowledge of the neighbourhood into codified systems – like a backward Wikileaks... and activate the citizenry”.⁶³ Top down data collection is mixed with bottom up data aggregation to give more and more interlinked sources of information - ‘Big Brother’ and ‘little sisters’ together.⁶⁴ This allows cities to be more responsive, encouraging the direct engagement of citizens in the planning and management of their home and wider community. The ideal is that cities ultimately become adaptive, emotional and experiential environments that are able to connect and process information, and most importantly adapt to the changing needs of the citizen.

