SMART CITIES

STRATEGY

TECHNOLOGY

SUSTAINABILITY

PUBLIC-PRIVATE PARTNERSHIPS

LIBERATION

SOCIAL MOBILITY

GOVERNANCE

INCLUSIVENESS

INFRASTRUCTURE

BUSINESSES

Urbanisation, Technology, and the Growth of Smart Cities

CITIZENSHIP

CONNECTIVITY

SCALE

GROWTH

INTEGRATION

INNOVATION

FUTURE

URBANISATION

The dual trend of rapid urbanisation and sophistication of technology will eventually give rise to smart cities around the world. As new challenges emerge, what are Asian cities doing to ensure their success in the future?

By Parag Khanna

Technology alone does not make a city smart; it needs smart governance, smart businesses and smart citizens.

Imagine a city that has enough information about you such that it adapts to you in real time. The city's billboards change as you walk past, displaying advertisements based on your recent shopping patterns. Restaurants present menus tailored to your taste and health. Streetlights brighten or dim depending on whether you are walking or driving. You receive traffic alerts on your phone that are tailored to your journey. And as soon as you book your flight for a trip, you start to receive alerts about the weather, traffic and even political updates of the city you are to visit.

These are the kind of images that often come to mind when we think of smart cities. While there is some truth in these–and our future cities might well incorporate soft infrastructure that is dynamic and customised to each citizen–we argue that technological connectivity is just one part of a bigger whole of what we call a smart city.

Rapid urbanisation over the past two decades has led to the mushrooming of megacities (accepted as those with a population in excess of ten million) around the world. The sheer size and scale of these cities place huge pressure on infrastructure development, public services provision, and environmental sustainability. If we add economic, social and ethnic stratification, as well as health, safety and security risks to the list of challenges, the task facing the leader of any megacity seems overwhelming, and is certainly one that cannot be solved by technology alone.

We believe that technology alone does not make a city smart; it needs smart governance, smart businesses and smart citizens. A smart city is one that can effectively leverage technology, infrastructure, public policy and citizen engagement to create an urban environment that fosters economic growth and productivity, innovation, social mobility, inclusiveness, and sustainability.

This article shares some thoughts on what it will take to plan, run, manage and provide for the cities of the future; and how some innovative megacities have already made headway in the right direction.
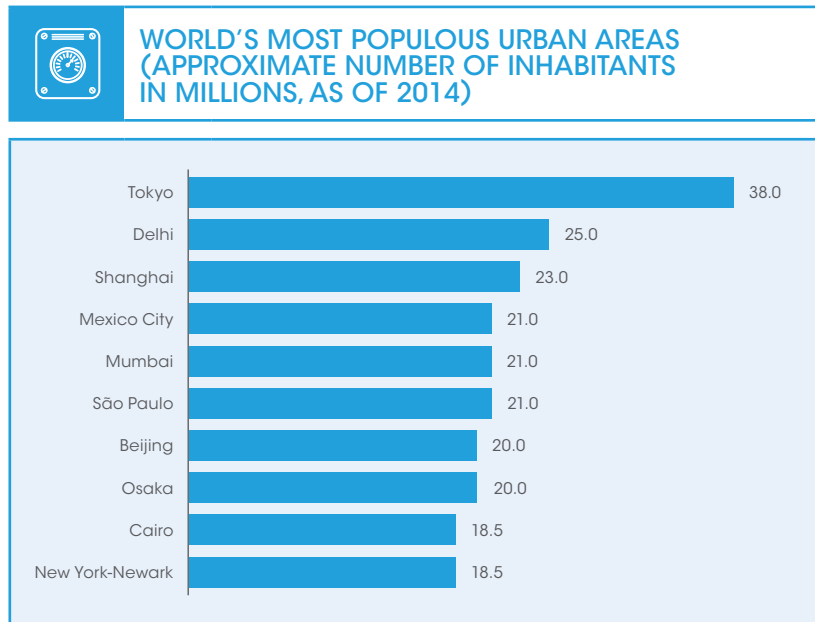
The birth of urban archipelagos

This is the century of transformational cities. According to the 2014 World Urbanization Prospects by the United Nations' Department of Economic and Social Affairs, 54 percent of the world's population currently lives in urban areas. This number is projected to increase to 66 percent by 2050, adding a further 2.5 billion people to our cities.[1]
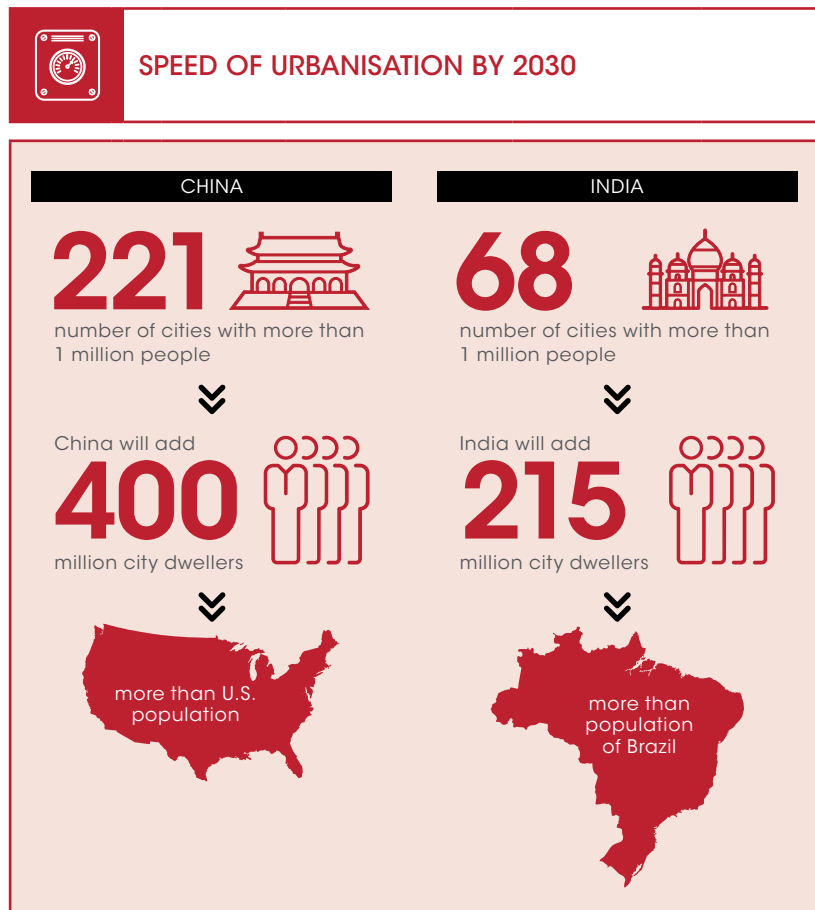
Asian cities have become the centre of the world's urbanisation. Especially since the 2008 financial crisis, migration to emerging markets has been on the rise, and Asia's largest cities have been large recipients. Contrary to perception, Asia is home to 53 percent of the world's urban population, and these cities tend to be much bigger when compared to major cities in the West, both in terms of population and area. Sixteen of the 28 megacities of the world are in Asia (there are four in Latin America, three each in Africa and Europe, and two in North America).[2]

Unsurprisingly, China and India are leading the trend. By 2025, a sixth of all megacities will be in China, and by 2030 the country will have 400 million city dwellers, equivalent to the population of the United States. Similarly, 215 million people will move to the cities in India by 2030, adding the equivalent of Brazil's population to the already teeming urbanites. As urbanisation continues to grow at the current rate, in less than a decade from now, 70 percent of Chinese and 46 percent of Indians will be living in cities with more than one million people.

In cities where investments in infrastructure have improved rail and road connectivity with surrounding areas, we see the rise of city clusters that bring together several adjoining cities—these areas are no longer dots on the map, but rather patches that are rapidly integrating in terms of supply chains, commercial flows and

WORLD'S MOST POPULOUS URBAN AREAS (APPROXIMATE NUMBER OF INHABITANTS IN MILLIONS, AS OF 2014)

City	Millions
Tokyo	38.0
Delhi	25.0
Shanghai	23.0
Mexico City	21.0
Mumbai	21.0
São Paulo	21.0
Beijing	20.0
Osaka	20.0
Cairo	18.5
New York-Newark	18.5

Source: UN Department of Economic and Social and Affairs, "World's population increasingly urban with more than half living in urban areas", July 10, 2014

SPEED OF URBANISATION BY 2030

CHINA

221 number of cities with more than 1 million people

China will add **400** million city dwellers

more than U.S. population

INDIA

68 number of cities with more than 1 million people

India will add **215** million city dwellers

more than population of Brazil

Source: Parag Khanna, Future Trends in the Century of Cities, New Cities Summit 2014, Dallas, Texas

labour mobility. These cities have expanded not only vertically, but also horizontally, to merge with each other to form what we term as 'urban archipelagos'.

Today, we find almost 600 such city clusters or urban archipelagos—examples include the Pearl River Delta in the Hong Kong area; Shanghai to Nanjing, and Chongqing to Chengdu in China; Tokyo to Osaka in Japan; Greater Delhi, and Mumbai to Pune in India; Dubai to Abu Dhabi; and Los Angeles to San Diego in the United States.

URBAN ARCHIPELAGOS: COUNTRIES UNTO THEMSELVES

Some city clusters or urban archipelagos are so extensive that they transcend multiple municipal jurisdictions. The Pearl River Delta in China is an outstanding example of how cities under separate political jurisdictions have come together to create an integrated urban cluster with full connectivity and free movement of labour.

Hong Kong is the region's financial hub and offers an open and liberal environment, Shenzhen is more state-directed, Dongguan is heavily industrial, Guangzhou has transformed itself from an industrial centre to a major financial hub, and Macau, with its free-wheeling spirit, is known for gaming and entertainment.

These potentially diverse geographies come together to enjoy benefits of scale—this was witnessed during and after the 2008 financial crisis, when this cluster proved to be far more resilient compared to many other cities in the region and around the world.

Source: Parag Khanna, Future Trends in the Century of Cities, New Cities Summit 2014, Dallas, Texas

The potential of megacities: economic growth with resilience

Cities have historically been the centres of economic power of a nation—and the megacities of today continue with this trend, becoming economic powerhouses, both at a national and international level, primarily due to the economies of scale that they command. The demographic and economic weight of some Asian city clusters exceed that of most countries—for example, the combined gross domestic product of the Pearl River Delta would make it a member of the G20. These megacities are able to attract foreign investment, global businesses and top-notch talent from around the world. It is hence not surprising that cities such as Shanghai, Singapore and Dubai have become magnets for hard working people around the world looking for top jobs and a positive work-life balance. Success feeds itself, and these cities are able to invest in better infrastructure and technology that further improves their physical and virtual connectivity, and ease of operation. Ultimately, the virtuous cycle of prosperity and progress leads to microeconomic resilience and improves the ability of the megacity to cope with, recover from, and reconstruct itself after external and internal shocks such as financial downturns, social unrest, natural disasters and epidemics.

Cities such as Shanghai, Singapore and Dubai have become magnets for hard working people around the world looking for top jobs and a positive work-life balance.

In pockets all over the world, politicians, citizens, businesses and consumers are working together to develop innovative solutions for smart cities— with or without the help of technology—to address the challenges faced by our cities.

Tackling the challenges of megacities: innovative ideas for smart cities

The potential of megacities is incredible, but so are the challenges of delivering public services and managing their political, economic and social complexities. The local head or mayor, frequently referred to as the CEO of a megacity, is more often than not the most popular politician in the country. It is often said that the competencies of these local- or municipal-level politicians make them leading candidates to govern the country and become future international leaders.

The unique nature of megacities around the world, and the urban archipelagos of Asia, calls for some equally inimitable solutions to tackle their accompanying challenges. In the age of the Internet, technology seems to be one obvious answer. But in pockets all over the world, politicians, citizens, businesses and consumers are working together to develop innovative solutions for smart cities—with or without the help of technology—to address the challenges faced by our cities.

INFRASTRUCTURE DEVELOPMENT

Asian cities often find their infrastructure development lagging behind urbanisation. The sheer size of megacities can cause complex challenges for local governments when delivering basic services such as housing, water, electricity, waste management and efficient transport. Today, Jakarta is said to be the world's most congested capital, Manila struggles to provide sufficient housing for the growing population, Bangkok faces severe water pollution, Mumbai is home to the world's largest slum, and Beijing's air quality levels have plummeted to a historical low.

Leaders thus need to plan ahead and invest in the physical infrastructure that forms the foundation of a well-functioning city. When the responsibility cannot or will not be picked up by the public exchequer, businesses need to step up to the plate. While investments in heavy infrastructure naturally need to be the responsibility of the governments, they can choose from a range of successful and innovative financing models that emerge as a result of public-private partnerships. Besides the tangible or physical infrastructure needs, it is equally important to invest in intangible elements, such as widespread broadband Internet and mobile connectivity.

MANAGING CONGESTION AND THE ENVIRONMENT

Megacities tend to grow vertically first, and then horizontally. Asian cities have shown unique adaptability in that we typically find not just one, but multiple 'downtown' or central districts. Singapore, for example, has built several business hubs, and the 2030 plan of the country's Urban Redevelopment Authority, the organisation responsible for the island state's land use planning and conservation, is looking at heartland areas such as Jurong, Changi and Tampines to become business centres in
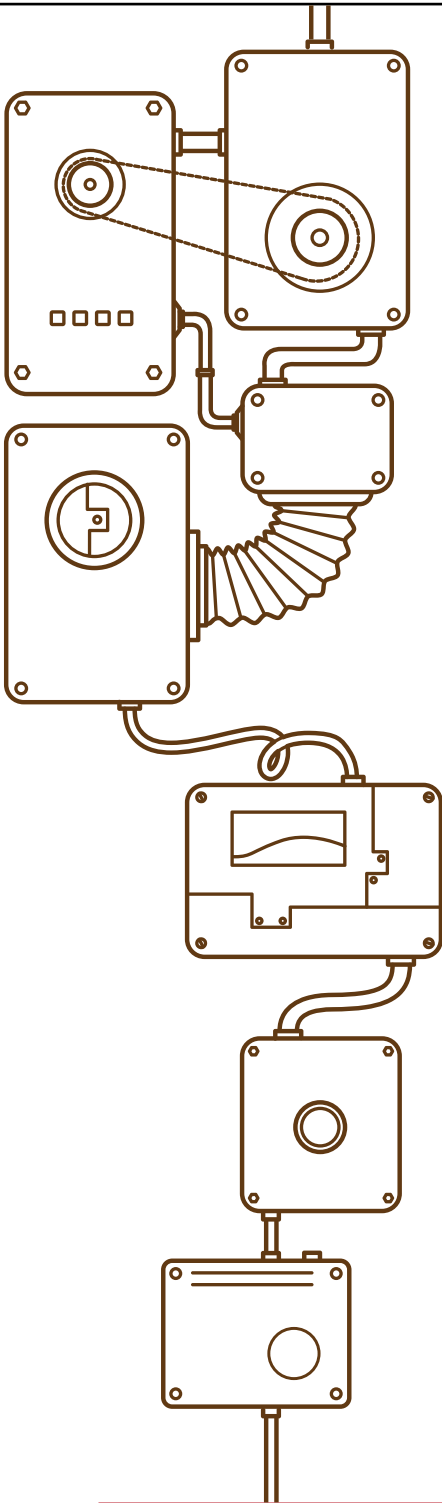
their own right. Such efforts certainly help to contain congestion and spread economic development. Similarly in India, Gurgaon and Noida have come up as major business hubs in what were earlier considered remote suburbs of Delhi. So the sheer scale of cities in Asia means that there is a trend toward multi-cluster, multi-hub cities, which is quite unlike that seen in the West.

Despite this, we find all major cities in Asia (and in the West too), struggling with the challenges of traffic and congestion, and the symptomatic outcomes of pollution and environmental damage. To address these issues, both policy and consumer/citizen behaviour need to be altered.

Singapore offers a great example of smart policy. The establishment of the Housing and Development Board, water management policies, and the Electronic Road Pricing (ERP) system are all examples of state directives that have made the island-state a smart city. For example, the ERP system is a variable pay-as-you-go scheme that charges motorists for the usage of some key roads during peak hours. ERP rates vary for different roads and time periods depending on local traffic conditions. Additionally, plans are on the cards to offer a rebate of up to 40 percent on the purchase of low-emission vehicles.

Some smart cities have gone beyond large-scale investments, and taken initiatives to produce innovative and disruptive business models that may be equally effective. For instance, when Bogota's mayor observed that the city's traffic police was not effective in regulating traffic, he put mime clowns to tame the city's unruly traffic. The mimes ridiculed reckless driving and traffic violations, and handed out thumbs-up/thumbs-down cards to help people shame bad drivers. The social experiment worked, with traffic fatalities dropping from an average of 1,300 per year to about 600.[3]

There are also many cases of private companies working in conjunction with city governments to solve chronic issues. In San Francisco, for instance, Streetline decided to help address the city's parking problems by installing wireless sensors that detect the availability of parking spots. The information is available through a mobile app, which drivers can download to find the nearest available parking spot.

Finally, as the service sector grows, there will be greater opportunities to telecommute—it is estimated that three times as many workers will telecommute one decade from now as employment in this sector grows and broadband Internet access spreads.[4] Such trends suggest the possibility of a virtuous circle of greater employment, less congestion and more innovation.

IMPROVING PUBLIC AND EMERGENCY SERVICES

Owing to the high population density, even a minor hitch in the delivery and management of public services impacts a large number of residents, and is susceptible to a domino effect with broader implications. The ultimate concern for any politician of a megacity is the risk of natural disasters, health epidemics and breach of national security. Most megacities have been built on ocean coastlines, and these heavily populated urban areas are susceptible to rising sea levels. Moreover, the high population density means that any risk of a natural disaster leads to a much greater loss of life and material assets.

If we have decided to put all our eggs in the megacity basket, then we must plan efficient and effective relocation strategies for unforeseen events. Technology is a key enabler in this regard, and cities the world over are leveraging mobile connectivity to keep in touch with citizens and responsible public authorities. So for instance,

If we have decided to put all our eggs in the megacity basket, then we must plan efficient and effective relocation strategies for unforeseen events.

in Jakarta, a new era of proactive urban governance has emerged, creating a city administration that is more open to citizen participation. QLUE, a crowd-sourcing mobile app, allows every Jakarta resident to report immediate local concerns, such as flooding, waste collection and road conditions, to the government. Simultaneously, a similar mobile solution, *Cepat Respon Opini Publik*, notifies the nearest and most relevant government officials of the complaint, and allows them to respond directly to the public. The app already has over 30,000 users and 100 daily reports.

A similar initiative was taken by New York City, which started a complaints hotline called '311' through which residents could register a fault or complaint about city infrastructure or public services. From the citizens' point of view, the initiative did not involve a high-tech solution, but the borough council used the information from the calls to develop a database, work out patterns, prioritise and chalk-out solutions for the most common and frequent complaints.

In the future, we may envision having smart utilities (smart objects) that can sense a problem and relay the information to the council database directly—machines talking to machines. For example, a faulty traffic signal will be able to send a wireless message to the city government, eliminating the need to file a complaint. As the cost of technology becomes cheaper, these vanilla sky ideas will one day become real.

There are two important learnings here. First, moving to a smart city is an iterative, phased and gradual process. Second, despite the advances in technology, success still depends on how the authorities respond to complaints. Technology is a great tool, but clearly not the be all and end all of all our problems.

### MANAGING SOCIO-ECONOMIC STRATIFICATION

Megacities are a melting pot of many nationalities, ethnicities and religions—the percentage of foreign-born population in Dubai is 80 percent, in Toronto it is 49 percent and in Singapore 40 percent. Leaders of megacities must hence have the ability to manage multi-ethnic societies that are socially, economically and even ethnically diverse. Second, city leaders must also come to terms with the fact that this immigration is not a temporary phenomenon, but a permanent reality. So eventually, they have to find a way to make every economic contributor become a stakeholder in society, even though they might not be able to offer citizenship.

An added challenge that comes along with the economic growth and prosperity of Asia's urban clusters is that of economic stratification. While we celebrate urbanisation as a huge economic opportunity, we need to remind ourselves that rapid acceleration of urbanisation in recent decades also correlates directly to the rise in income inequality within nations, even as it diminishes between them.

Indeed, big cities are inadvertent drivers of income inequalities, which manifest at three levels: First is the widely recognised rural-urban income gap—the larger the urban cluster, the higher the Gini coefficient for the cities and rural areas of that country. Second, there are also inequalities between megacities and second tier cities. Unlike western countries, which typically have anywhere from six to ten major cities or city hubs that support the population even in the inner frontiers of the country, countries in Asia (think Indonesia, the Philippines or even Malaysia) may have just one or two cities that are financially viable. Levels of labour productivity, and consequently income, differ widely, further exacerbating economic inequality. Finally, there exist growing degrees

What will increasingly differentiate cities is not how 'smart' they are in terms of technology penetration, but the extent to which they leverage technology to bring about innovation, sustainability and inclusiveness.

FOREIGN-BORN POPULATION

80%
Dubai

49%
Toronto

40%
Singapore
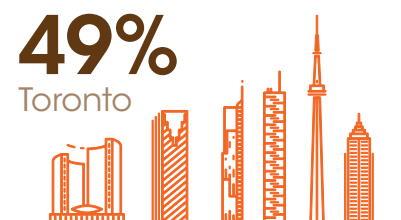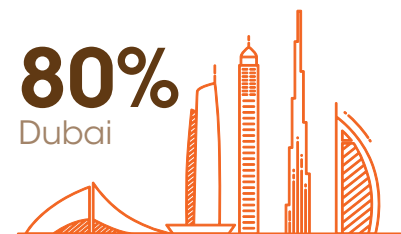
of inequality within each megacity—these large city clusters often become stratified into two, three, or even four cities divided on the basis of access and income.

Governments need to work much harder to ensure that appropriate safety nets are in place so as to achieve a more balanced economic development. In Mumbai, new housing is being developed to help shift residents of the city's largest slum, Dharavi, into permanent settlements. And in Rio de Janeiro, cable cars have been put in place to connect favelas to central districts, increasing both mobility and economic opportunity.

Balancing the mission with execution

Smart cities existed even before we coined the term, which was just five or six years ago. Today, we use the term smart city to add technology, Big Data and the Internet of Things to fundamental smart policies, smart governance and smart citizenship. The technology platforms used by megacities need to be designed in such a way so as to enable government efficiency and public access to useful data. This can include cloud computing services, sensor networks and data centres, and traffic management systems for both road congestion management as well as public transportation systems such as subways and light rail. Policies built on top of these platforms include e-government portals and e-government services that allow citizens access to data on shared Application Programming Interfaces, leveraging the information for community benefits.

As the price of technology falls and data analytics become more widespread, what will increasingly differentiate cities is not how 'smart' they are in terms of technology penetration, but the extent to which they leverage technology to bring about innovation, sustainability and inclusiveness.

The numbers seem staggering, the possibilities endless. So why is it that even today, we find only a handful of truly smart cities around the world? For many local governments, it is the short-term economic realities that deter plans to develop smart cities. The lack of resources (budgetary constraints) may constrain efforts to invest in the infrastructure and technology required to support a seamless, smart city. In fact, for cities with smaller populations, the investments may not prove efficient as the real benefits are derived from economies of scale.

Notwithstanding these challenges, there are still many options to leverage the existing infrastructure and plummeting costs of technology to develop smart concepts and innovation in public service. The megacities of Asia have to prove to the world that their potential is greater than the challenges they face, and that they can become a model of urban development in the 21st century.

Parag Khanna
is the Managing Partner of Hybrid Reality Pte Ltd., a geostrategic advisory firm based in Singapore

References
[1]   UN Department of Economic and Social and Affairs, "World's population increasingly urban with more than half living in urban areas", July 10, 2014.
[2]   Ibid.
[3]   Kerry MacLaine, "The Mayor who used Mimes to cut Traffic Fatalities in Half", AppealingStudio, December 9, 2013.
[4]   Ken Hess, "Death of the office and rise of the telecommuter", ZDnet, June 2, 2014.

THE VIRTUAL BIG BROTHER?

Rather regrettably, the name smart city has become one of the most polarising terms in the world of urbanisation. Some view it as a form of salvation and a means to cope with the pressures of urbanisation—and it was in this light that the Indian Prime Minister, Narendra Modi, recently announced, "I want to build 100 smart cities"—hoping to spread economic growth more evenly and enabling residents increased access to a wide range of public services. At the other end, smart cities are also viewed as spectres of Big Brother, of a surveillance society and an all-powerful government that perpetuates inequalities and social non-inclusivity. At a more basic level, there are concerns about privacy and security breaches, and the possibility of personal data landing in the wrong hands.

It is true that smart cities cannot operate without gathering data on citizens. However, privacy and security are less of a concern as most of the data used in the smart city context is anonymised meta-data that is used to track traffic conditions, bus routes, electrification, and other public utilities. As such this data is innocuous, and the benefits of convenience and security should certainly outweigh any unease of sharing personal data. Notwithstanding, as these technologies develop, we can and should invest in better regulation for how this data is used.