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Smart city solutions: What drives citizen adoption around the globe?

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This report studies the adoption of smart-city technologies in 15 leading cities around the globe. Following the citizen-centric philosophy of modern smart-city initiatives, we focused on the solutions that can change the daily life of citizens, and that citizens can either use (adopt) or not. While analyzing each solution and providing the synthesis, we pointed out key drivers of adoption and the measures that city administrations can take to enhance adoption.

We have run detailed analyses on how smart technologies are implemented and adopted in the cities that achieved the widest usage. These analyses were based on MGI survey usage data, as well as nonsurvey (objective) usage-related data from a sample of leading cities. The analyses were performed for nine solutions with the necessary city-level data available: e-hailing, online government services, digital care search and scheduling, city presence in social networks, bike sharing, civic-engagement tools, apartment sharing, car sharing, and smart-parking applications.

We also created an overview of smart-city solutions that are not yet widely used and lack data for detailed analysis: local social connection solutions, smart meters and smart thermostats, ride sharing, online education, and health wearable devices.

Recent McKinsey Global Institute analysis on smart cities

When conducting our research, which covered 15 cities throughout the world, we observed how widely smart-city technologies were implemented, and how often their adoption proved successful. While our report deepens the smart-city analysis in this area, it also follows a broader initiative of the McKinsey Global Institute: a recently issued report titled **Smart cities: Digital solutions for a more livable future**.

The core findings of the MGI report are as follows:

- MGI assessed how nearly 60 current smart-city applications could affect multiple quality-of-life dimensions in 3 sample cities with varying legacy infrastructure systems and baseline starting points. Among other positive outcomes, these tools could reduce fatalities by 8 to 10 percent, accelerate emergency response times by 20 to 35 percent, shave the average commute by 15 to 20 percent, lower the disease burden by 8 to 15 percent, and cut greenhouse gas emissions by 10 to 15 percent.
- MGI studied the progress of 50 cities throughout the world and learned that wealthier urban areas are generally transforming faster, although some have low public awareness and usage of smart solutions. Asian megacities such as Beijing, Seoul, and Shanghai, with their young populations of digital natives and large-scale urban problems, are achieving exceptionally high rates of adoption. Cities around the world vary widely in the types of applications they have implemented, though focusing on mobility is a common denominator. When measured against what is possible today even global leaders have more work to do in building a fundamental technology base, rolling out the full range of possible applications, and boosting adoption and user satisfaction. Since technology never stands still, the bar will only get higher.
- According to MGI research, the public sector would be the natural owner of 70 percent of the applications examined, but 60 percent of the initial investment required to implement the full range of applications could come from private actors. Furthermore, more than half of the initial investment made by the public sector would generate a positive return, whether in direct savings or opportunities to produce revenue, creating opportunities for more public–private collaboration. City governments choreograph these activities: providing and tracking data, bringing stakeholders together, ensuring coordination, and addressing unintended consequences. They also engage the public as active participants.



Smart cities: Digital solutions for a more livable future

Smart city solutions: What drives citizen adoption around the globe?



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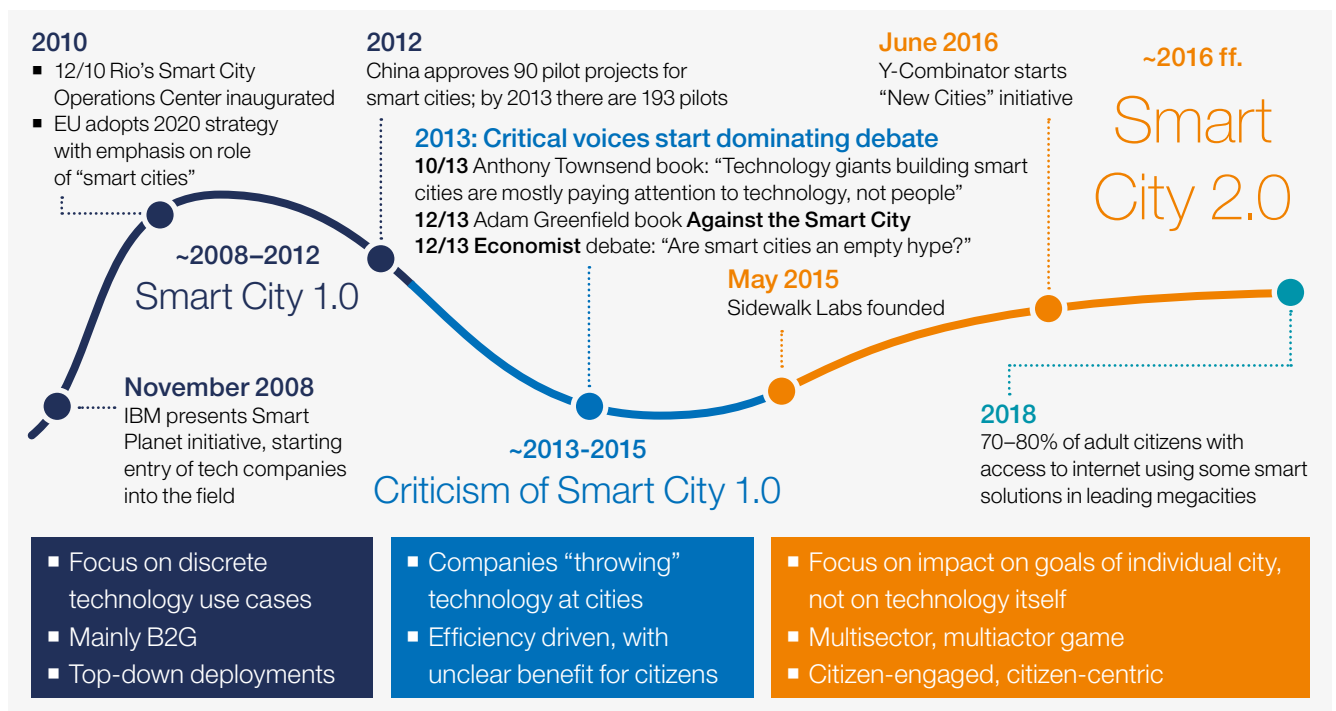
Smart citizen report scope and methodology



Smart city and smart citizen – study scope

The concept of smart cities first took shape in the early 2000s and focused primarily on technology and infrastructure development. This research and investment resulted in new technologies, massive data centers, smart sensors, automated grids, and some healthy skepticism—sometimes even the smartest ways to implement sensors and technology has little noticeable effect on citizens' daily lives.

Following years of trial and error, urban specialists arrived at a new smart-city model built around citizen engagement and how smart technology solutions are used.



We are in the process of entering a "second era" of smart cities, one that could live up to its actual potential by being more citizen-centric and outcome focused

A modern smart city is not just an urban area with a highly developed technological infrastructure, but rather a place where citizens live in a smarter way. Through the use of technologies and digitization of offline services, citizens can allocate their resources and time in an efficient and productive manner—becoming smart citizens in a smart city.

Many reports on smart cities focus on urban technological equipment, and while the funds and effort invested by a city's administration continue to be the major factors of successful implementation, many of these technologies have an indirect—or sometimes invisible—effect on citizens' lives and behaviors. For example, the effects of smart grids or closed-circuit television (CCTV) cameras on the average citizen are often not noticed by citizens because they are employed in a noncitizen-facing processes. These smart solutions are still very important, as they save cities and citizens time, energy, and cost. However, for this study we specifically aimed to understand what increases acceptance and usage of smart solutions when an individual chooses whether to use that smart solution.

Our research concentrated on 21 citizen-centric solutions, or nearly one-third of the smart-city solutions that can be widely implemented until 2025. From those, we analyzed all solutions where city-level data needed for analysis (other than surveys) were available. Additionally, we covered seven more solutions of interest as developing technologies while still having median usage levels below the 25 percent threshold, as well as lacking city-level data.

The group of cities we studied includes 50 cities across the globe where MGI has conducted customer surveys. For our deep dives on specific smart solutions, we selected 15 cities from different parts of the world that represent various income levels and cultures, including Barcelona, Berlin, Dubai, Hong Kong, London, Melbourne, Mexico City, Moscow, New York, Paris, São Paulo, Seoul, Shanghai, Singapore, and Tokyo.

The smart-city benchmarking is focused on citizen-centric smart solutions

City smart solutions

Smart infrastructure and systems

- E-career center
- Personalized school learning through performance analytics
- Building automation system for commercial buildings
- Building automation systems for public buildings
- Distribution automation systems
- Dynamic electricity pricing
- Smart streetlights
- Real-time telemedicine
- Data-based population health interventions
- Environmental monitoring tools
- Infectious disease surveillance system
- Medication adherence tools
- Body-worn cameras
- Early disaster warning systems
- Emergency system/dispatch optimization
- Gunshot detection
- Predictive analytics for safety
- Real-time crime mapping
- Smart surveillance & biometric platforms
- Digital waste payment and management
- Garbage surveillance
- Optimized waste collection (residential)
- Smart trash compactors (public)
- Leakage detection/control
- Remote water quality management
- Smart irrigation
- Autonomous vehicles
- Congestion pricing
- Dynamic bus scheduling and routing
- Intelligent traffic signals
- Load pooling
- Predictive maintenance of public transport fleets
- Smart parcel lockers
- Urban consolidation centers
- Urban delivery droids

Citizen-centric smart solutions—report scope

Citizens have a choice to use smart solution or opt out

- Apartment sharing applications
- Civic-engagement tools
- Digitization of citizen services
- Digital care search and scheduling
- Bike sharing
- Car sharing
- Private e-hailing
- Smart-parking applications
- City presence/interaction on social networks
- Local social connection applications (including volunteer applications)
- Digital payment in public transport
- Integrated multimodal info
- Real-time public transit info
- Real-time road navigation apps
- Food ordering online (apps)
- Health wearable devices and remote monitoring applications
- Online education
- Ride pooling
- Home energy automation
- Water consumption real-time tracking apps enabled by smart meter
- Electricity consumption real-time tracking apps enabled by smart meter

Detailed analyses performed: city-level data available

Brief overview of solutions not widely used yet:
median usage <25%, insufficient city-level data

Data and sources



Our MGI survey

The McKinsey Global Institute ran a global smart solutions survey in 50 cities, covering a representative sample of 380 to 400 citizens in each city.

The survey asked the respondents (18 and over, with personal access to the Internet) whether they were aware of, used, or were satisfied with the smart solutions on our list.



McKinsey global transport benchmarking of megacities

We use a public-transport aggregated index, a private-transport affordability index, and e-hailing prices per kilometer from the report's data.



Website visits

Website visits and user behavior data as measured by SimilarWeb.



App usage

Active app user data as measured by SimilarWeb. The activity data is available for users who downloaded the Android app after February 2016.



Facebook Audience Insights

Share of Android smartphones for each city as measured by Facebook Audience Insights for geographies where there are no local social networks more representative than Facebook (for example, Russia and China).



Demographia World Urban Areas

Urban area (agglomeration) population as reported by Demographia World Urban Areas.



Numbeo

Average monthly net salary after tax as reported by Numbeo.



Open sources

All other data, including the population within the administrative boundaries of the city, was collected from city websites and press (official sources preferred).

Summary



Smart solution usage diversity among cities

Smart routine

One of the first and most important outcomes of our analysis shows that smart-city solutions are widely used by citizens around the globe, and in some cities they have already become a part of nearly everyone's daily routine.

Leading cities

Dubai, Hong Kong, Mexico City, Moscow, New York, São Paulo, Seoul, Shanghai, and Singapore form the group of cities in which the average adoption of smart solutions exceeds 30 percent.¹ Furthermore, if we look at the most widely used smart technology available in each of these cities, the usage rate reaches 70 to 80 percent. That level of usage obviously goes far beyond "early adopters," or even "followers," and extends to nearly every citizen. This data shows that income level per capita, culture, and language do not prevent the spread of smart-city solutions. Any city administration aspiring to promote the usage of smart solutions among its citizens need look no further than the examples of leading cities with similar conditions.

Share of citizens who have used smart solutions ¹	Examples of cities	Users of smart solutions ¹ among adults	Awareness of smart solutions ¹ among adults	Average age of adults (>18)
>40%	Shanghai	52%	72%	40
30–40%	Singapore, Dubai, Moscow, Hong Kong, São Paulo, Seoul, Mexico City, New York	36%	61%	41
20–30%	Paris, London, Barcelona, Berlin	25%	55%	47
<20%	Melbourne, Tokyo	15%	36%	47

¹ Used = used at least once; the numbers are a simple average for the city based on the shares of the adult population with Internet access who used each of the 21 citizen-centric smart solutions in the scope of our study at least once.



Another takeaway is that many of the examples of the increase in smart-solutions usage are in developing markets. The group of cities where usage rates exceed 30 percent is mostly represented by urban centers outside North America and Western Europe, with the only exception being New York. It is quite possible that the lack of well-established and well-functioning traditional solutions is the contributing factor. That is, if conventional parking meters were installed across the city 20 years ago, and citizens are accustomed to them, both habit and cost consideration will lower the incentive to try a smart solution to pay for parking. Alternatively, in places where there is no “traditional” solution, user-friendly “smart” solutions offer the potential for explosive growth (for example, the usage of smart-parking applications in Dubai). Another potential explanation is that customers in those markets are more willing to try something new. Even for e-government services, the rates of usage seem to be higher in cities outside of more developed regions, though the difference in convenience between offline and online offerings should be convincing enough everywhere, and demand for the underlying product is universal.

Influencing factors

Several objective factors, as well as cultural embeddedness, contribute to the usage of smart solutions. Among the objective factors that stand out are population age and density, climate, coverage of public transportation, vehicle ownership, and income. For example, a two-year difference in the average age of the population equals as much as one percentage point difference in smart-solution usage. A more densely populated area demonstrates stronger utilization and provides a more attractive smart-solution economy for both providers and users, especially for shared-economy services such as bike sharing and car sharing. A warmer climate is a strong driver of smart solutions for street activities such as bike sharing, jogging, or other social activities. Wider public transportation coverage reduces the need for a private vehicle and supports smart-transit solutions. Vehicle ownership affects the spread of solutions such as smart parking or navigation apps.

Income level can influence implementation of smart solutions. For example, a recent study by the McKinsey Global Institute, *Smart cities: Realizing the potential of digital intelligence*, has shown that high-income cities have higher-speed communication networks with a broader sensor base. Nevertheless, while a better tech base allows a city to provide a better user experience, it seems to be good enough in all the 15 cities we observed to allow the spread of smart solutions. When the population is wealthy enough to afford broadband Internet, personal computers, and has a 60 to 70 percent smartphone penetration, there are no technical limitations on the implementation of the majority of citizen-centric smart solutions that we studied. At this point, institutional and behavioral factors begin to play a greater role.

Moscow



With all the variety of factors above, a city government's attitude toward smart solutions plays a role. An active citizen and an active government seem like an ideal combination, especially in the areas where government services or functions are being digitized and the private sector is unable to take initiative. Still, even within one city we see wide variations in the usage of specific solutions. So, what is responsible for these variations?

Smart solutions usage diversity among technologies

Looking deeper at the usage data, a group of five leading solutions reached a median usage rate of around 50 percent or higher. This group is represented by widely used smart solutions that digitize existing behavioral patterns and needs with a wide demand among most adult citizens. For instance, an overwhelming majority of adult citizens regularly use traditional urban services such as public transportation, taxis, or government services. Therefore, smart-city solutions that simplify the process, improve customer experience, and do not require significant behavioral shift become as widely used as their underlying urban services.

The rest of the solutions show lower usage rates. Nine solutions have median usage rates of 20 to 40 percent, while seven have been used at least once by less than 20 percent of adult citizens. This situation may be explained by the set of factors that limit smart-solution adoption in most of the cities.



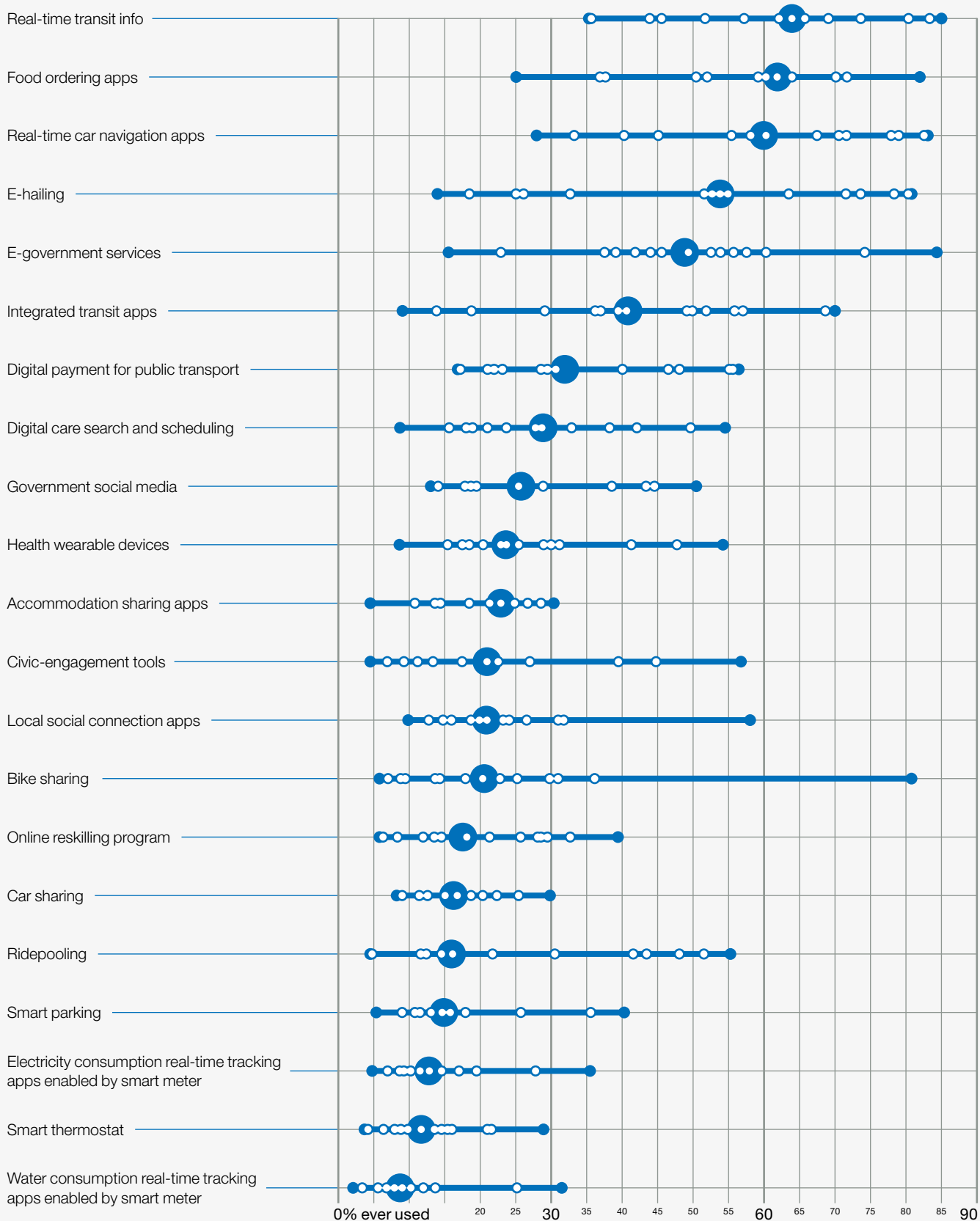
Demand limitations

One possible reason is that the demand for some smart solutions may have natural limitations. For example, large groups of citizens may not require a solution such as bike sharing due to the climate or insufficient cycling infrastructure. Similarly, citizens may not widely adopt an apartment-sharing solution due to a lack of tourists or idle space. On the other hand, where demand for the service was traditionally high, the smart solutions that meet this demand reach wide adoption. For instance, bikes were historically popular in China, and now bike sharing in the country is booming.

Maturity of technology

Some solutions with lower usage rates could simply be at an early stage of evolution. They may have high potential for widespread adoption in the future, but in the meantime the product is not yet prepared to be built into the surrounding systems, or perhaps it is not yet well known. For example, there are potential use cases for wearable medical devices that monitor the health of patients with chronic conditions, but there is a lack of cases of individual devices that successfully link to the healthcare system, and a patient's medical records, that have managed to achieve wide usage.

Usage diversity among technologies



Each point represents one city score

Minimum score

Other scores

Median score

Maximum score

Need for a behavioral shift

Finally, the readiness of citizens to adopt a new technology might be a huge differentiator. Solutions that digitize some widely used existing process are easier to adopt than solutions that create a new pattern of behavior. For example, car navigation apps do not change the driving experience. We still get into the same car and drive the same way, only now we rely on a navigator rather than our own memory or paper maps. We experience riding commuting trains and subways the same way, looking at the real-time transit info app and integrated transit app instead of paper or board timetables. E-hailing and food-ordering apps are also relatively easy to adopt because the only thing that really changes is pushing a button to order rather than calling a dispatcher or an employee of the restaurant.

São Paulo



On the other hand, there are smart solutions that promote new behavioral patterns. These solutions often require a change of attitude or force citizens to do new things, rather than doing old things in a new way. Such solutions often lag behind in usage, probably because behavioral or attitudinal changes take time. For instance, to use car sharing a citizen must first grow accustomed to using a car that is also used by other citizens, in addition to the effort spent locating it. Ride sharing requires being in a car with a stranger and readjusting regular routes, which translates to getting used to new conditions. Likewise, civic-engagement tools require people to change their attitudes from relying on their government, in most cases, to proactively formulating and voting for initiatives and reporting issues.

Government actions towards a smarter city

A city's government plays a role in whether citizens choose to adopt smart solutions, varying from accurate regulation to government promotion or government-led implementation. First, cities might need to set development priorities and target adoption levels. The McKinsey Global Institute's report *Smart cities: Realizing the potential of digital intelligence* provides several analyses of the impact of various solutions on a city's economy, its commute times, and the health of its citizens. Besides their potential impact, factors such as government policies and cultural embeddedness should be considered in the prioritization of smart-city solutions.

Different approaches for different solutions

Second, the suitable approach to smart-solution development depends on the type of smart solution.

Best practices

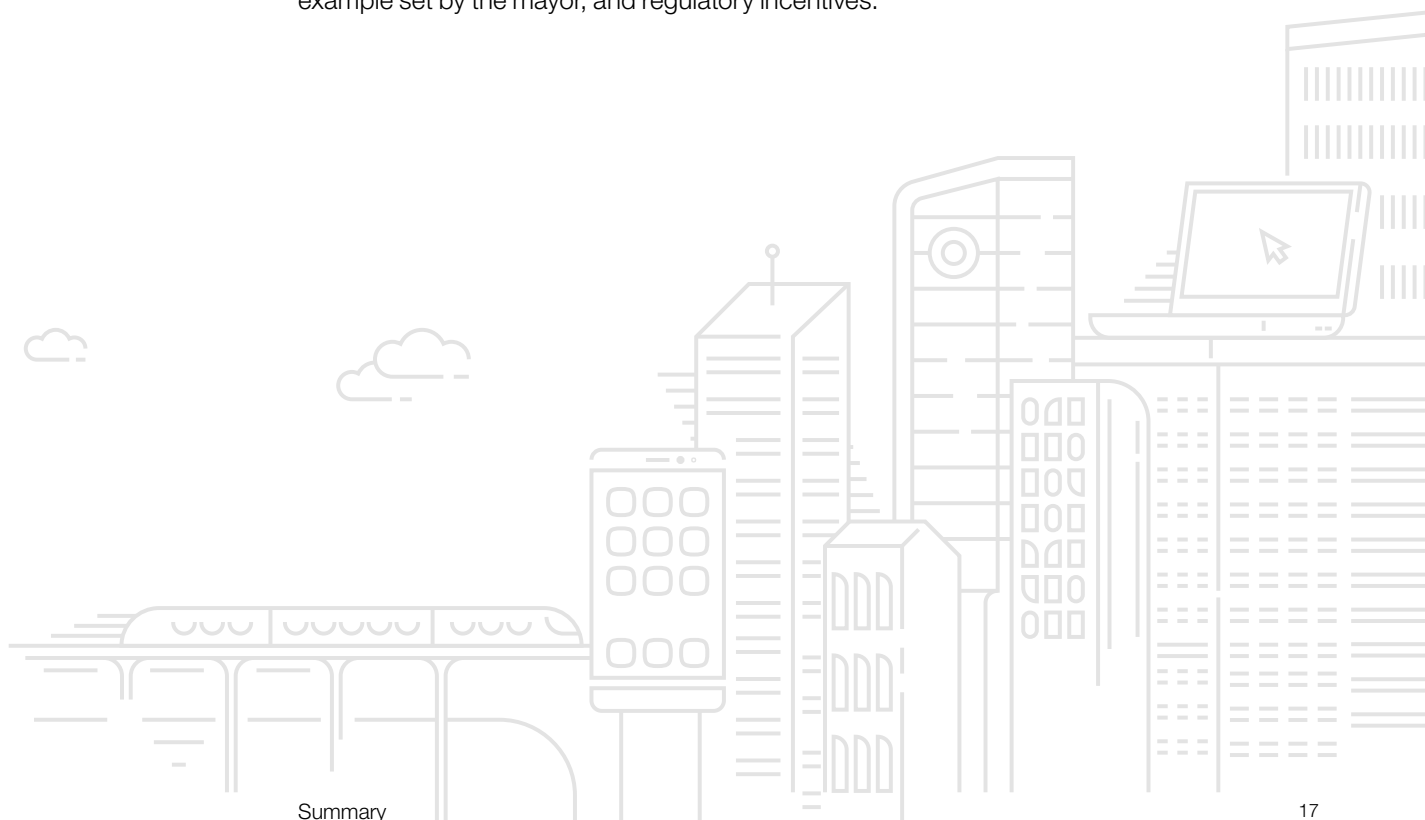
For the leading group of widely adopted smart solutions, best-practice cases may be studied and applied. Many areas include cities that are strong examples to learn from, and many of the most successful cases are described in this report.

Product development

For solutions that are still in the early stages of technical development, experimenting and attracting private partners may be the way to boost solution development. A more flexible regulatory regime can promote technological and economic leadership by enabling technological pilots (for example, autonomous vehicles or telemedicine). The Dubai 10X initiative is a vivid example of proactive, government-led smart-solutions development, and aims to put Dubai ten years ahead of other cities. In 2017, 36 Dubai government entities submitted more than 170 disruptive solutions projects, and 26 of them were approved by the crown prince.

Behavior change

In cases where a significant behavioral shift is required for smart-solution adoption, one of the core goals of a city's government might be to promote new behaviors and attitudes. A few methods of helping achieve this goal are the use of media campaigns, the personal example set by the mayor, and regulatory incentives.



Detailed analyses of smart solutions

The next section shows the results of our analyses for specific solutions. We have arranged our analyses from the most universally popular to the least accepted. Our goal was to understand what factors contributed to the success of each solution in the cities where it was widely adopted and to help the next wave of cities interested in replicating the success of these leaders.



E-hailing

E-hailing services provide computer or mobile-device users with a convenient way to be picked up by a vehicle and delivered to a destination. Pooled e-hailing and ride sharing were analyzed separately. E-hailing services appeared in most metropolises three to six years ago and significantly changed the face of the industry in this short period of time. E-hailing provides a great illustration of the speed of change to both traditional industries and citizen life brought by smart-city technologies.

In our research, we looked at usage, client satisfaction data, the cost of a taxi (Uber or Didi) per kilometer against the average salary, and a number of available taxi licenses in each city.

The arrival of e-hailing services often brings more affordable and convenient taxi services for citizens. For example, in Moscow the number of taxi trips increased by 30 percent, the time of arrival decreased from 30 minutes to 4 to 5 minutes, and the price of a trip decreased by at least 35 percent.

E-hailing platforms significantly lower barriers to entry for drivers and provide an efficient order distribution, increasing utilization and decreasing the cost of the service when compared to traditional taxi stands. The lower cost also incentivizes people to switch from traditional services to e-hailing. Taking this into account, we see that cities with the highest usage of e-hailing services also experience the lowest cost.

	Ever used (MGI)¹, %	Cost per 1 km per average salary², %	Taxi licenses per 1,000 citizens	Level of satisfaction³, %
São Paulo	82	0.11	1.8	12 88
Moscow	81	0.05	4.9	5 95
Shanghai	78	0.04	2.0	13 87
Mexico City	74	0.08	3.7	15 85
Singapore	72	0.02	4.4	8 92
Hong Kong	64	0.06	2.1	26 74
Seoul	55	0.07	3.0	14 86
Paris	54	0.09	1.6	10 90
New York City	53	0.07	3.0	10 90
London	33	0.07	2.3	11 89
Berlin	19	0.11	2.0	24 76
Tokyo	14	0.13	1.3	21 79

¹ Have you used one of those apps: e-hailing which lets you order a driver/taxi through an app?
² Average cost of trips in Uber/ DiDi for China, average salary after tax.
³ Divided by urban area (metropolitan area) population as provided by Demographia World urban Areas

■ Number of taxi licenses limited by government ■ Not satisfied/ not at all satisfied ■ Somewhat satisfied/very satisfied/extremely satisfied

It's also apparent that the influence of e-hailing's growth on traffic needs to be carefully tracked. Each e-hailing trip in a taxi can either be new, a substitution for a private car, or a replacement for public transportation. The implication here is that each e-hailing trip can either have a positive or a negative effect on the efficiency of a city's roads. For example, New York saw e-hailing trips increase from 2014 to 2016, with bus trips declining, and subway trips increasing in 2015 but decreasing in 2016.¹

E-hailing platforms need flexible government policy that allows drivers to be integrated into the legal market. The two cities that show the highest satisfaction with the service are Moscow and Singapore. In Moscow, the local government issues new licenses, which are not limited in quantity. These licenses fully cover existing demand, though there are uniform quality requirements. The level of satisfaction of e-hailing services in Moscow is 95 percent—the highest among the 12 cities in our sample—the share of legal taxi drivers is at 80 percent, and more than 85 percent of taxi orders are made through mobile applications. Singapore has the second-highest level of satisfaction in the sample. The city's regulations allow Uber to operate, require licensed drivers, and do not limit the number of licenses. Both cities have the highest number of taxi licenses relative to population, and therefore high market competition. They also have the highest quality of e-hailing services as confirmed by users' satisfaction and the lowest cost of service compared with citizens salary. Sao Paulo closely follows on usage and satisfaction figures, using the same formula of high competition and quality standards for e-hailing drivers. Moreover, Sao Paulo developed an e-hailing app for traditional taxi drivers to help integrate them into the changing market (there is a similar app in Mexico City). Special laws for network transportation companies were enacted recently in the United States, affecting 48 states, which provide the legal framework for the operations of e-hailing companies such as Uber. These laws are an excellent example of integrating a recent smart solution into the legal field.

At the same time, Berlin and Hong Kong restrict the number of taxi licenses and demonstrate a relatively low level of citizen satisfaction with e-hailing services. A limitation on licenses might support the rise of an unregulated “grey” market, which lacks quality control when it comes to cars and drivers. Moreover, due to limited competition in the legal segment, the motivation of licensed drivers able to provide superior service might also be diminished.

E-hailing market and regulation overview for cities with the widest e-hailing usage **São Paulo**

Uber has changed the taxi market of São Paulo: with only 37,000 active taxi licenses in the city, Uber has amassed 150,000 drivers. Another e-hailing platform, EasyTaxi, works with existing taxi drivers. It claims that drivers can make about 30 to 40 percent more money while working 30 to 40 percent less time.

All Uber drivers are required to pass a 16-hour online course, similar to those available for taxi drivers, which covers official registration, dress code, and more. A group of 100 staff members in or around São Paulo are tasked with performing random checks to make sure all requirements are met.

To alleviate some of the tension between taxi drivers and Uber drivers, an application is being developed under the name of “SPTaxi.” This application aims to give traditional

¹ Unsustainable?, Schaller Consulting, February 2017, schallerconsult.com.

city taxi drivers the features that Uber provides their drivers, including access to geodata, fare estimates, and discounts.

Moscow

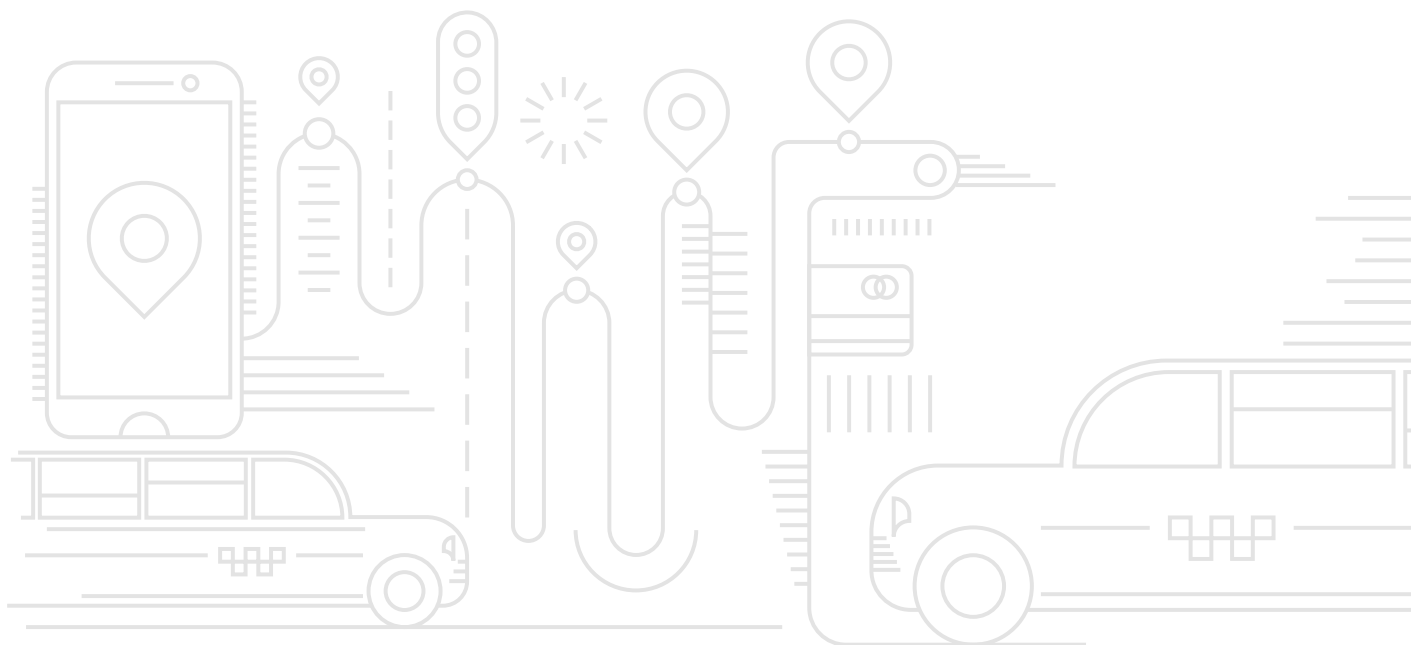
The standard for taxis is the same for all regardless of e-hailing functionality; it covers the age, color, and technical condition of the vehicle, as well as tenure for the driver. E-hailing is allowed and drivers must play by the same rules. These conditions resulted in more than 85 percent of taxi orders being made through mobile applications. At the same time, the share of legal taxi drivers is 80 percent. Moscow demonstrates the highest number of taxi licenses per population in the sample.

When taxi-aggregating platforms first entered the market, the average taxi arrival time decreased from around 30 minutes in 2011 to 4 to 5 minutes in 2017, and the number of trips increased by 30 percent due to aggregators taking over the market. In addition, the average bill decreased from RUR 700 in 2014 to RUR 460 (\$8) in 2016, which is about 1 percent of the median salary, or 0.5 percent of the average salary. Currently 212 million taxi trips are made every year, which is around 3.5 percent of the trips made by all types of transportation.

Singapore

Since Uber and Grab entered the Singapore market, the total number of licensed taxis went from 29,000 in 2014 to 25,000 in 2017. As of 2017, around 10 percent of the taxis that belong to the biggest player, ComfortDelGro, stand idle. In 2014, that figure was less than 3 percent. At the same time, the number of private car rentals since 2013 tripled to 63,259, and it is estimated that 50,000 cars are used in e-hailing services.

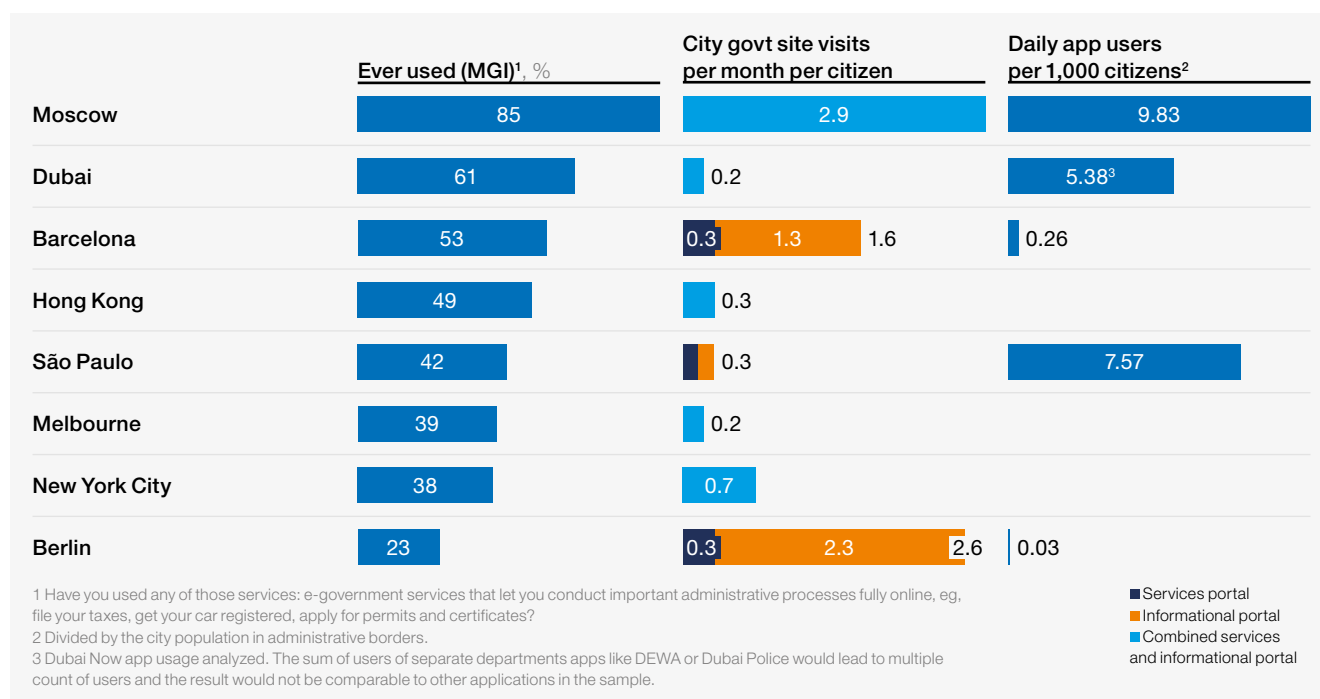
Singapore's local government deregulated taxi fares in 1998, and since 2003 new companies have been allowed to enter the market. In 2014, a regulatory framework for third-party booking services was imposed: only licensed taxis can be dispatched through e-hailing services, and taxi fare information must be communicated to riders up front. This framework also mandates that all rider complaints and queries must be collected and handled by the service company.



Online government services

Government services, from tax returns to construction permits, are being digitized and made available online. Pioneers first began this process more than 15 years ago. In recent years, the majority of the world's governments are likely digitizing their services, although adoption rates still differ widely. What drives the difference?

Widespread adoption of online services might be a consequence of digitizing the maximum number of services in all spheres of interaction between citizens and their government, and not just core civil services (fines, taxes, and permits). For example, in 2017, Dubai's government piloted an "online only" initiative in which service centers were closed for one day and 950 services from 32 public entities were provided online only.¹ Dubai's government also currently provides 55 services from 24 government entities in one mobile app, Dubai Now. Mobile-app access for the most frequently needed services helps to simplify citizens' access and increases adoption and usage. Moscow offers 250 services via the web portal, relating to business, education, healthcare, housing, private transportation, public transportation, family, social support, culture, sports, civil documents, labor, fines, disabled people, emergencies and security, environment and animals, and complaints. Ten popular services are available in the mobile app.



At the same time in Berlin, where a relatively narrow group of people used e-government services, 75 services are available, and listed without categorization, on the city's government services site's "online" page. The city's mobile-services app is only able to inform users how and where to apply for the service, rather than providing the service itself. Of course, end-to-end digitization of the government-services process is a resource-consuming operation. Berlin demonstrates an alternative way of how a city portal might serve people and be frequently visited and used. It provides an extensive informational functionality that is useful to citizens in categories such as theater tickets and job vacancies and achieves a relatively high number of visits per month per citizen.

¹ "950 government services in Dubai available 'online only' on October 26th," Emirates News Agency, October 18, 2017, warm.ae.

Berlin



It's good practice to supplement online government services with a relevant, well-designed, and constantly updated city portal. This portal features useful content for citizens, such as information on life in the city, policies, and assistance for small businesses. The integration of a city's information portal and online government services provides access in a "one-stop shop." People who are willing to use an online service can find useful information on city projects or important news, driving the habit of using the government portal for all their needs.

After a portal's launch, a full range of services and a friendly customer interface matter more than how long it has been available to the public. The cities that digitized their services just 5 to 7 years ago achieved the same or better results than some cities digitized the services 10 to 15 years ago. For example, within three years of its inception, Mexico City's e-services demonstrated a higher usage rate than New York's, which launched eight years ago. Dubai's e-services overtook São Paulo's, which launched two years earlier by a wide margin. Similarly, within five years Moscow's portal demonstrated double or triple the usage figures over Berlin's, New York's, or London's, which all launched at roughly the same time. This could imply that after a few years of a portal's launch the main factor of widespread usage and adoption might be the breadth of digitization of the government's services and interface usability rather than the date digitization began.

Moscow's city portal and online government services

Moscow's city portal serves as a one-stop shop for citizens; the government services portal, mayor's portal, and citizens' feedback portals were all integrated in 2017. The government services available on the mayor's portal extend to many areas of citizens' lives, and the most frequently used services are included in a mobile app. The portal is built in a customer-friendly way, with single- or double-click access to the most frequently used services. Today, 6.5 million people use the city's government services online, and more than 75,000 people use the mobile app daily (it includes 14 popular services). Other services and information are also available on the mayor's portal.

mos.ru

Субботник в Москве: так, вода, как

Популярное Категории

- Электронный дневник школьника
- Запись в кружки, спортивные секции, дома творчества
- Запись на приём к врачу, оплата и перенос записи
- Приём показаний приборов учёта воды
- Получить и оплатить единый платёжный документ (ЕПД)
- Поиск и оплата штрафов
- Посмотреть информацию о посещении и питании в школе, детском саду, колледже
- Приём показаний и оплата электроэнергии
- Платежи в один клик
- Программа реновации: стартовые площадки

Поиск бесплатных кружков

Платежи и оплата

250
services available online

The most frequently used services are: online school diary, water-meter measurement reporter, doctor-visit booking, unified bill for utilities, energy-meter measurement reporter, information on attendance and nutrition in schools, school exam results, registering children for nonschool courses, registering children for kindergartens, application for students' social cards

14
most needed issues available in a mobile app social card

SMS
status notifications

City projects
City voting, problem reporting, smart apartment block (e-voting), housing renovation, online school education


City planning information
Transport infrastructure construction, housing reconstruction

Culture and leisure




Berlin's city portal and online government services

Berlin's city portal, which has been operating for 20 years, offers news, information, checklists, and policies on a broad range of spheres of city life:




The screenshot shows the Berlin.de website interface. At the top is the Berlin.de logo. Below it is a featured article about an art exhibition by Leiko Ikemura. Further down is a 'Berlin Aktuell' section with news items and a weather forecast. At the bottom is an 'Immobilien suche' (Real estate search) section with filters for districts and property types, and a 'SUCHEN' button.




Politics and administration

Profile, performance, press releases, police reports, governance, education, careers in civil services




Culture and leisure

Tickets for almost any public events taking place in the city, from art exhibitions to movies and musicals; contacts and descriptions of places to eat, libraries, gyms, parks etc.; highlights of social and cultural life of the city



Tourist information

Accommodation booking, city plan, information about transportation sightseeing, shopping, weather forecasts, design




Other

Car repairs and insurance, pets, pedestrians, sports, beauty.


Job searching

Vacancies repository, labor law, application hints, news, universities and courses




Economy

Macroeconomic and administrative reports, industry list, tips on start-ups and funding info, investment and city promotion opportunities, business immigration services, innovation (health, energy, logistics, media, incubators), labor-market overview



Advertising

permitted on and accurately integrated to the website design



Real estate and parking

Real estate search (for sale/rent), designer tips

Online government services can be accessed via the website or the mobile app and cover core civic issues in the following areas:



Documentary procedures

ID requests, permits, recognitions, birth and marital certificates, tax determination and collection, bankruptcy and other legal inquiries



Healthcare

Licensing, approbation, consultations and services for the disabled, food safety, infection control



Neighborhood-related services

Eg. recovery of loss, reporting waste and noise



Other

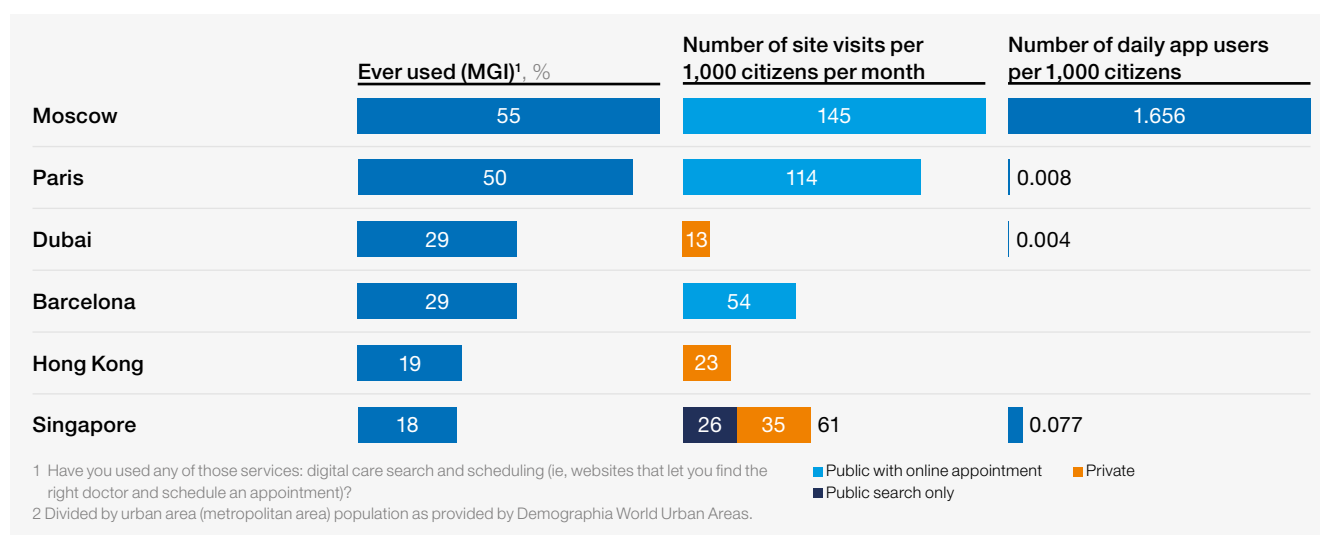
Construction, business, migration, education, sports, media, etc.

Digital care search and scheduling

Digital search and scheduling services help patients choose a doctor or book an appointment.

We studied the share of adults who have access to the Internet and who have used digital search and scheduling services at least once, as well as the number of website visits and number of mobile applications users per day.

Two cases stood out by usage rates and website visits: the United Medical Information and Analytical System of Moscow (EMIAS), a multipurpose medical IT ecosystem with appointment-scheduling functionality; and the appointment-scheduling service for Public Association of Paris Hospitals (AP-HP) in Paris. The private provider that built AP-HP is also the owner of the popular European care search and scheduling platform Doctorlib.



The healthcare search and scheduling functionalities of both platforms have been adopted widely and are implemented by public healthcare organizations. Centralized public organizations have the power to impose service and IT standards and compliance with appointments, as well as enforce the transfer of all units and personnel to a new system. These organizations are also able to respond at scale: a big public organization is more likely to invest in an IT ecosystem to benefit the public.

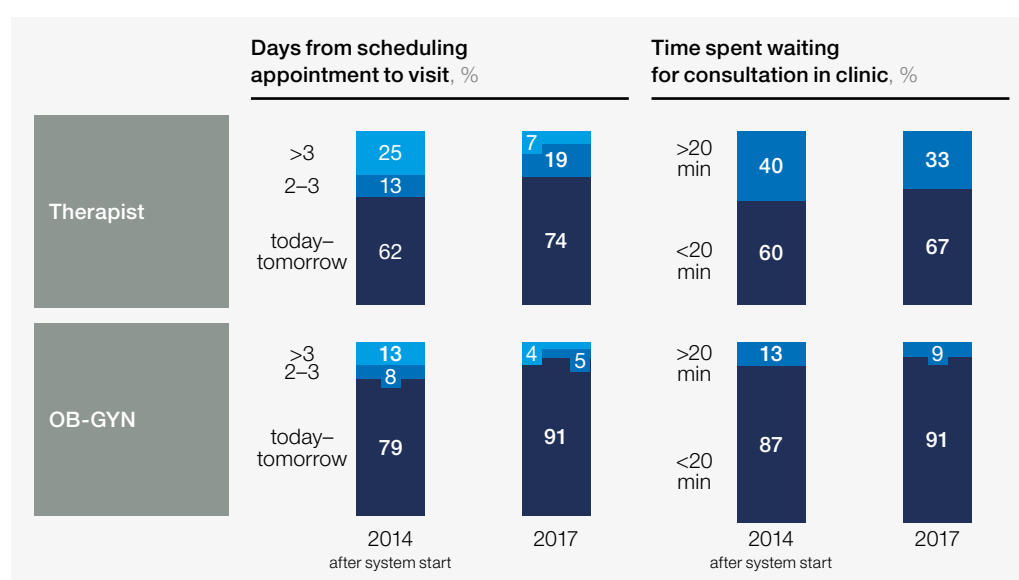
Though AP-HP was implemented three years after the launch of EMIAS, it has achieved similar results. Moreover, it has covered a higher share of citizens than other systems that launched four to five years ago. That comparison again suggests that high usage is determined by the ability of a government to cover the maximum number of hospitals with a unified appointment system, an easier feat in a city with predominant public medicine.

The basic functionality of booking medical appointments, which requires only a publicly available calendar that allows for filling slots, is relatively easy to implement. Plenty of private platforms and vendors can provide the required technology and skills. In addition, these implementations come at a lower cost since no major IT infrastructure investments or reorganizations are needed.

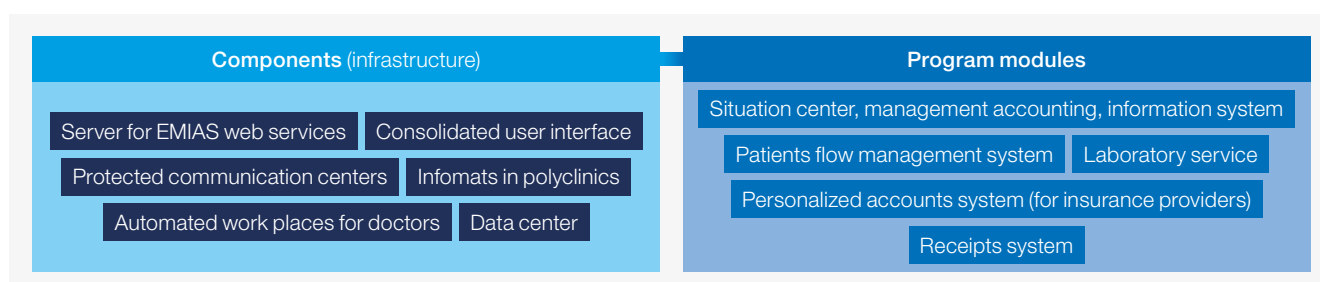
Broader digitization and additional functionality of medical-information systems enable further process automation and efficiency gains but require complex implementation. These systems might include functionality to allocate a medical organization's resources, provide queue management on a citywide scale, book appointments for home visits, track utilization by doctor or medical department, and track patients between medical organizations. Such systems may also provide communication with other organizations linked by the healthcare system—for example, ordering and paying for laboratory analyses or medicaments and settling accounts with insurance companies.

Moscow's EMIAS system

In Moscow, EMIAS supports 660 public healthcare units, including 400 polyclinics and has 9.8 million people registered. The mobile app has been downloaded 800,000 times, and more than 2 million medical appointments are processed every month. Further, citizens of Moscow can access the functionality from the government services app as well as online. EMIAS also provides an open application programming interface (API) to allow for third-party development.

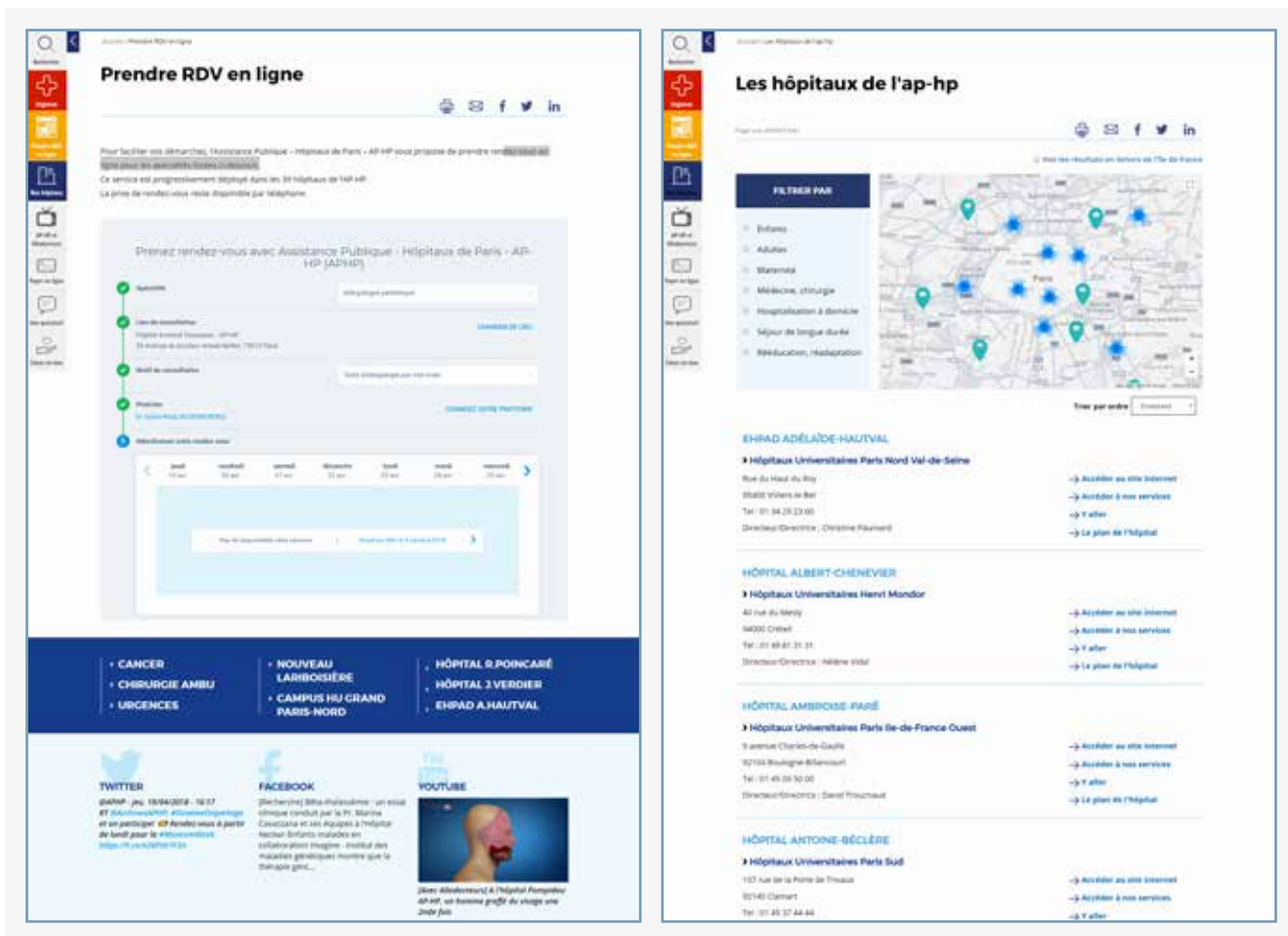


EMIAS has led to a significant efficiency improvement. Following its implementation, it has reduced waiting times for patients. The reduction in waiting times was achieved by providing access to multiple clinics and hospitals, giving patients transparency on available appointment slots across all medical organizations, and standardizing the process, including doctors' timetables and standardized duration and classification of visits and procedures.



Paris's AP-HP system

The AP-HP digital care appointment system covers 39 public hospitals and 23,000 health professionals. Its user interface was developed by the private developer who also owns Doctorlib, a popular app for scheduling appointments with doctors in France. Working on a number of mobile applications (AP-HP Patient, AP-HP Pro, Doctorlib) and web platforms (the AP-HP website, the websites of various clinics, Doctorlib), the system supports appointments with public healthcare providers. Public Association of Paris Hospitals is the leading healthcare organization with 39 public hospitals and 676 public clinics.



AP-HP allows users to make an appointment with many types of doctors, covering more than 120 specializations. In addition, the AP-HP website provides links to the websites of every hospital, as well as their building plans, addresses, and areas of specialization. Last, the site includes video content on healthcare topics, interviews with doctors, and functionality that allows users to pay for services or donate funds.



While the AP-HP website scores high in terms of visits, the mobile app has yet to achieve widespread adoption—fewer than 5,000 users of Android devices installed the app. Nevertheless, the app is effective in providing functions beyond appointment scheduling. Patients can quickly locate and navigate to one of the 39 AP-HP hospitals and their emergency services; once they have arrived, the app will help them navigate inside the building. Preferred hospitals can be saved to the home screen, and many of the administrative procedures, such as hospitalization forms, patient history, and hospital bill payments, can be completed from the app. The app also provides patient information, including patient rights, hospital check-in and checkout procedures, disease prevention information, and news regarding AP-HP and its 39 hospitals.

City presence in social networks

In addition to traditional meetings and press interviews, city leaders would be wise to use social media. These platforms allow leaders to communicate directly to groups of citizens that are otherwise insufficiently covered by other channels, including young people, and also provide feedback from the audience in the form of likes, comments, and reposts.

First, a city's account on social networks helps its government explain policies and measures to citizens, and this better understanding might translate to increased adoption. Second, these accounts may help collect feedback from citizens in the form of comments. And third, they help citizens learn more about their city. Knowing where and how to spend time, and an increased awareness of city-level activities, may help citizens form new communities and raise general life satisfaction among citizens.

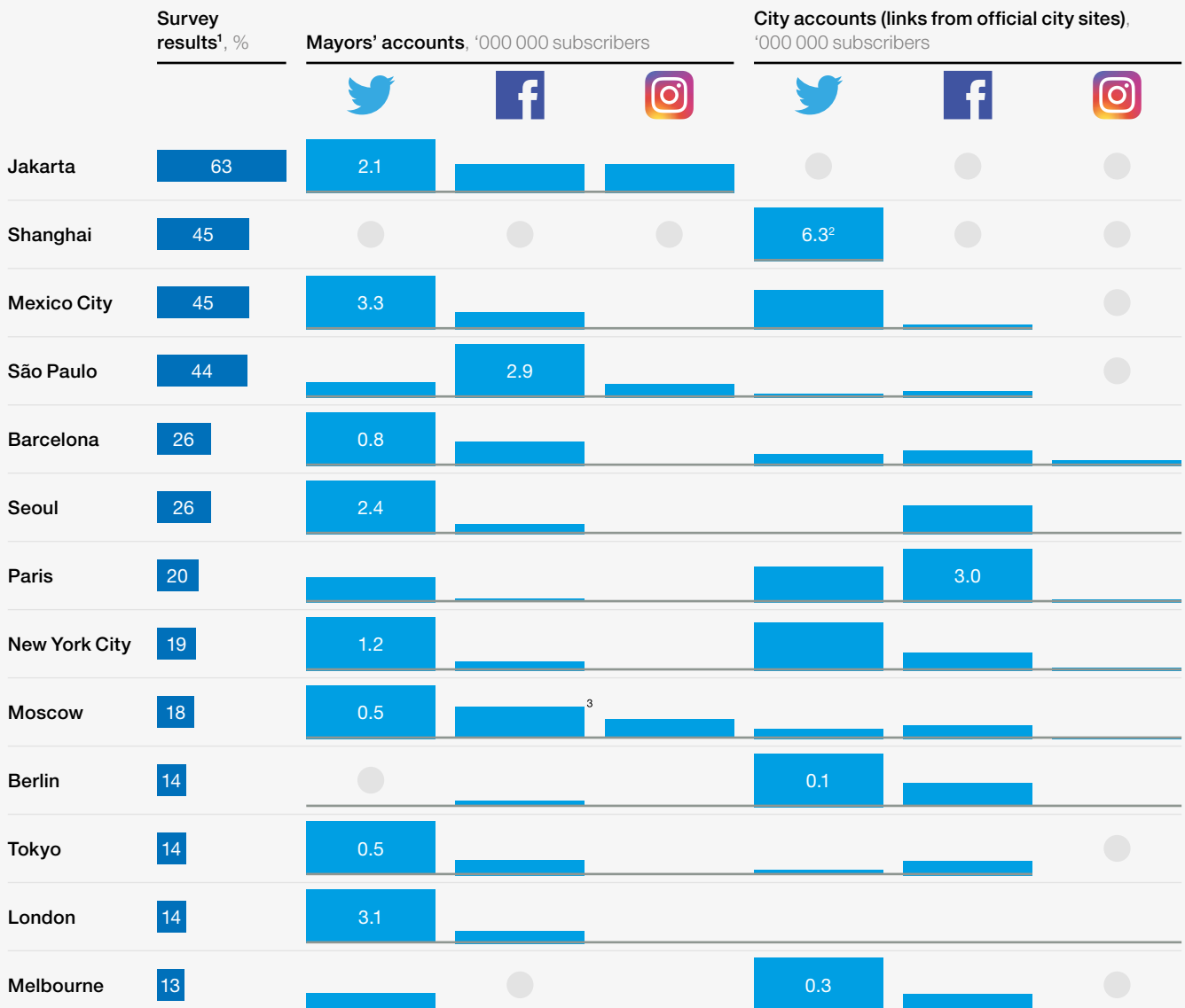
A majority of cities in our research have official social-media accounts for their mayor and for the city itself. In most instances, Twitter is the social network of choice, followed by Facebook and Instagram. The notable exception is São Paulo, where Facebook is predominant. We analyzed the style and content of posts by successful accounts for mayors and cities to provide examples for those who strive to develop social media into an effective city communication channel.

Successful accounts for mayors demonstrate a large diversity of topics. Some of these topics, which make up 10 to 13 percent of overall posts, include strategic goals and elections, social issues, city events and holidays, the economy, security, world and country news, culture, emergencies, civil rights and minority issues, and urban projects. By contrast, successful accounts for cities demonstrate a high concentration of content related to city events and holidays (34 percent) and lifestyles (30 percent).

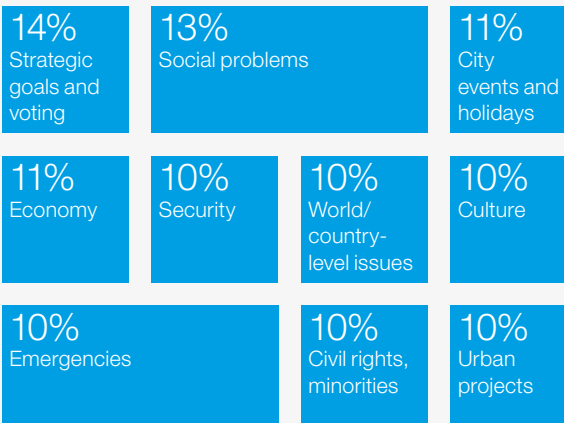
When it comes to the style of posts, successful accounts for mayors appear to feature a more personal tone rather than an official tone. In more than 50 percent of posts, these accounts demonstrate an informal style of communication, as well as personal appeals to citizens and emotional judgment. Successful accounts for cities also demonstrate casual style of content and communications. In more than 50 percent of posts, these accounts demonstrate an informal style of communication, as well as appeals to citizens, calls to action, links to websites or events, and informal photos.



Have you visited any of your city's social media pages in the last 6 months?



Top 10 topics of posts in successful mayors' accounts,⁴ median share of posts on the topic in an account



Top 10 topics of posts in successful city accounts,⁵ median share of posts on the topic in an account



1 Survey results for adult population with access to Internet by McKinsey Global Institute
2 Account in Weibo.
3 Account in VK.com – the most popular social network in Russia similar to Facebook.

4 Mayor's Twitter for London, Jakarta, Mexico City, Barcelona, Facebook for São Paulo.
5 Paris Facebook, Melbourne Facebook, Shanghai Weibo.

Bike sharing

Bike-sharing and hiring platforms and applications give citizens convenient access to locating, hiring, and paying for bike usage. The services can either be free floating or station based.

We analyzed survey results, the data on the number of bikes, and the number of trips taken, and identified two cases with widespread service adoption: Shanghai has a free-floating model, where bikes are owned by private tech startups; and Barcelona has a government-owned and -subsidized station-based bike-sharing service.

	Ever used bike sharing (MGI) ¹ , %	Trips per citizen per year	Bikes per 1,000 citizens	Average annual temperature	Dockless bikes available ³
Shanghai	81	>60	64.1 ²	17	✓
Barcelona	31	3.0	1.3	16	○
Paris	30	1.8	0.8	12	○
New York City	25	0.7	0.6	13	✓
Seoul	23	0.2	0.5	12	○
London	18	1.0	1.1	11	✓
Moscow	14	0.1	0.2	6	○
São Paulo	14	0.1	0.1	20	○
Berlin	9	0.1	2.3	10	✓
Tokyo	5	0.1	0.1	16	✓

¹ Have you used any of those services: bike-sharing program for short-term bike rentals?
² Aug 2017, Shanghai municipal transportation bureau: 1.5mln sharing bikes on the streets.
³ While station-based model available in all cities in the sample.

Based on our analysis of successful cases, we uncovered important success factors for bike-sharing services.

Bike sharing is not a major mode of transportation in most of the cities we observed. In fact, most citizens treat bike sharing as an occasional or leisure activity, taking an average of fewer than three trips a year.

Nevertheless, there are exceptions. Shanghai is an outstanding example of free-floating bike-sharing service adoption, with a remarkable 7 percent modal share. This free-floating model is the only business model that has achieved a truly widespread adoption among citizens.

Government regulation is needed for free-floating bike sharing to prevent chaotic parking, as well as blocking pedestrians and building exits.

Since bike sharing often serves as a means of “last mile” transportation, it spreads more quickly in urban areas where public transportation coverage is strong. Cities need to construct stands near train and bus stations.

Services are also much easier to develop in urban areas with high population densities. It is easier to achieve high utilization in these areas, allowing for the potential to increase profitability and offering a return on private investments.

Bikes don’t have to be expensive. Cheap bike models help to achieve higher profitability and decrease losses due to vandalism.

In places where bike usage has been historically popular, citizens might be more supportive of modern bike-sharing services.

In some cities with low potential for bike-sharing usage (see factors above), the scale of utilization might be naturally limited.

Station-based bike-sharing services appeared in most cities five to eight years ago, while the revolutionary free-floating services came to China in the past three to four years. Their introduction was followed by a period of rapid growth. From July to December 2016, the total number of users of Ofo and Mobike grew from fewer than 10 million to around 400 million.

Shanghai case

Growth in bike sharing is driven by well-financed tech companies with countrywide coverage. Other factors include a historically strong bike culture, high population density, and high coverage of public transportation.

Bicycles have historically been a popular means of transportation in China due to low incomes. From the 1960s through the 1970s, bikes were often given as wedding gifts, labeling China the “bicycle kingdom.” The mid-1980s saw a 60 percent modal share in Beijing, and the 1990s saw a 20 percent modal share in Guangzhou. More recently, the share of bike users declined as incomes and car ownership rose. With the advent of bike-sharing services, bike usage has rebounded in the past three to four years.

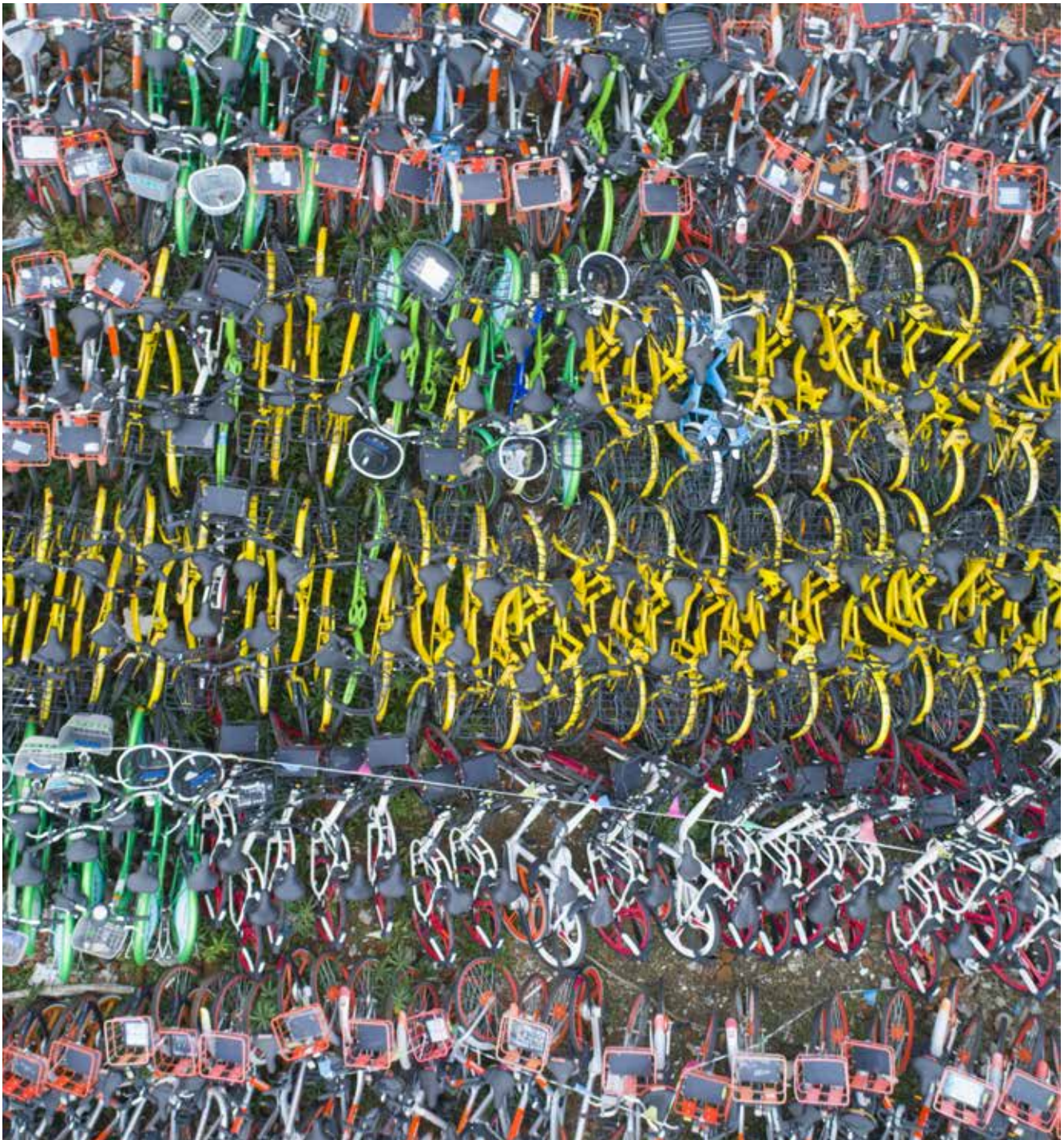
Bikes are often used as last mile transportation, in combination with public transportation. Shanghai’s metro system is ranked number one in the world by operating miles (more than 600 kilometers), with around 400 stations. Around 80 percent of the trips made using this system are in the range of 1.8 to 3 kilometers, and peak usage occurs from 7:00 to 9:00 AM and 5:00 to 7:00 PM.

Shanghai’s climate is relatively mild and therefore comfortable for biking. The daily mean temperature is 17°C (5°C in January, 29°C in July), which allows for year-round bikes usage. Population density is another positive factor: Shanghai’s inner core population density is around 46,100 people per square kilometer. By comparison, Manhattan has a population density of 27,000 per square kilometer, and Barcelona has 16,000 people per square kilometer.

Leading bike-sharing service vendors receive financial and technological support from their investors. Ofo has a capitalization of \$3 billion and has so far raised nearly \$1 billion of investment from a reputable list of investors that includes Alibaba, an e-commerce giant. Mobike's capitalization is also around \$3 billion, and it is supported by Tencent, an online conglomerate with 39,000 employees.

Shanghai case:
stationless bike sharing
mass usage. Bikes owned
by private tech startups

Bikes offered by Ofo and Mobike are relatively cheap to produce: the cost of producing an Ofo bike is around RMB 300 (\$41), and the cost of producing a Mobike Lite bike is RMB 200–500 (\$30–\$80).



Both vendors provide GPS navigation to find a bike, and each bike is equipped with a GPS+SIM card module that costs around \$50. Citizens can use the app to scan a QR code to unlock the blocking brake. Users can reserve bikes for up to 15 minutes on Mobike, and 20 minutes on Ofo.

The cost is affordable, and a 30-minute trip using the services offered by Ofo or Mobike costs RMB 1. Ofo provides a 50 percent discount for students and teachers. Both services require a deposit, with Mobike requiring RMB 299, and Ofo RMB 99. In 2017 the average salary in Shanghai was RMB 9,802 per month (\$1,568). Therefore two 30-minute trips taken daily would cost a citizen of Shanghai 4 percent of their salary.

The bike-sharing boom, which began in 2016 and led to a record adoption of the service, was soon followed by government regulation of the industry.

Our survey shows that 81 percent of the citizens of Shanghai have used bike sharing at least once. Shared bikes account for 51 percent of parking space in Shanghai, and Mobike and Ofo dominate 95 percent of the Chinese market.

Both vendors process 50 million rides per day and offer services in more than 100 cities.

Ofo, which was founded in 2014, had tens of millions of users. Its Shanghai operations employ 2,500 people, including bike repairmen and relocation staff. Mobike, which was founded in 2015, operates around 7 million bikes globally.

Following the boom, Shanghai's government imposed industry regulations.

To control the number of bicycles on the streets of the city, the Shanghai government banned the biggest bike-sharing players from deploying new bikes. Operators are now required to inform users where parking is forbidden, such as fire exits.

New regulations are being planned, including making vendors responsible for client injuries, restricting a bike's service life to no more than three years, and forbidding privately owned bikes from being used by bike-sharing services.

Barcelona case

Bicing is a government-initiated and -owned station-based bike-sharing service in Barcelona. The key factors supporting its popularity might include low fees, good climate, gamification, and the availability of electric bikes.

Launched in 2007, Bicing was initiated by the government of Barcelona, which chose Clear Channel International as the operator based on its experience in Oslo, Rennes, and Stockholm. Clear Channel uses 21 vans with trailers to redistribute bikes between the stations and manage usage patterns. It also operates two storage and maintenance centers, where it delivers the bikes using three vans and three motorbikes. On average, 224 bikes get repaired every day (3.7 percent of the total number of bikes), which means that every bike gets repaired once a month. Upon payment by a Spanish bank card, subscription cards are mailed to users. This is done to prevent competition between Bicing and Bicitours, a bike-rental service designed especially for tourists.



Barcelona case:
government-owned
and subsidized
station-based bike
sharing service

For the citizens of Barcelona, the annual Bicing subscription costs €47. This subscription allows a user to make a 30-minute trip for free. After 30 minutes, and for the following one and a half hours, the cost is €0.74 for every half hour.

A user must return the bike to one of the stations within two hours or be subject to a penalty of €4.49 per hour over this limit. Third-party insurance is included in the subscription. Membership is withdrawn after three warnings for the violation of the subscription agreement.

A smart card is required to rent a bike. Citizens can also install the Bicing mobile app, which shows the nearest stations on a map and calculates the fastest, shortest, and flattest routes between stations.

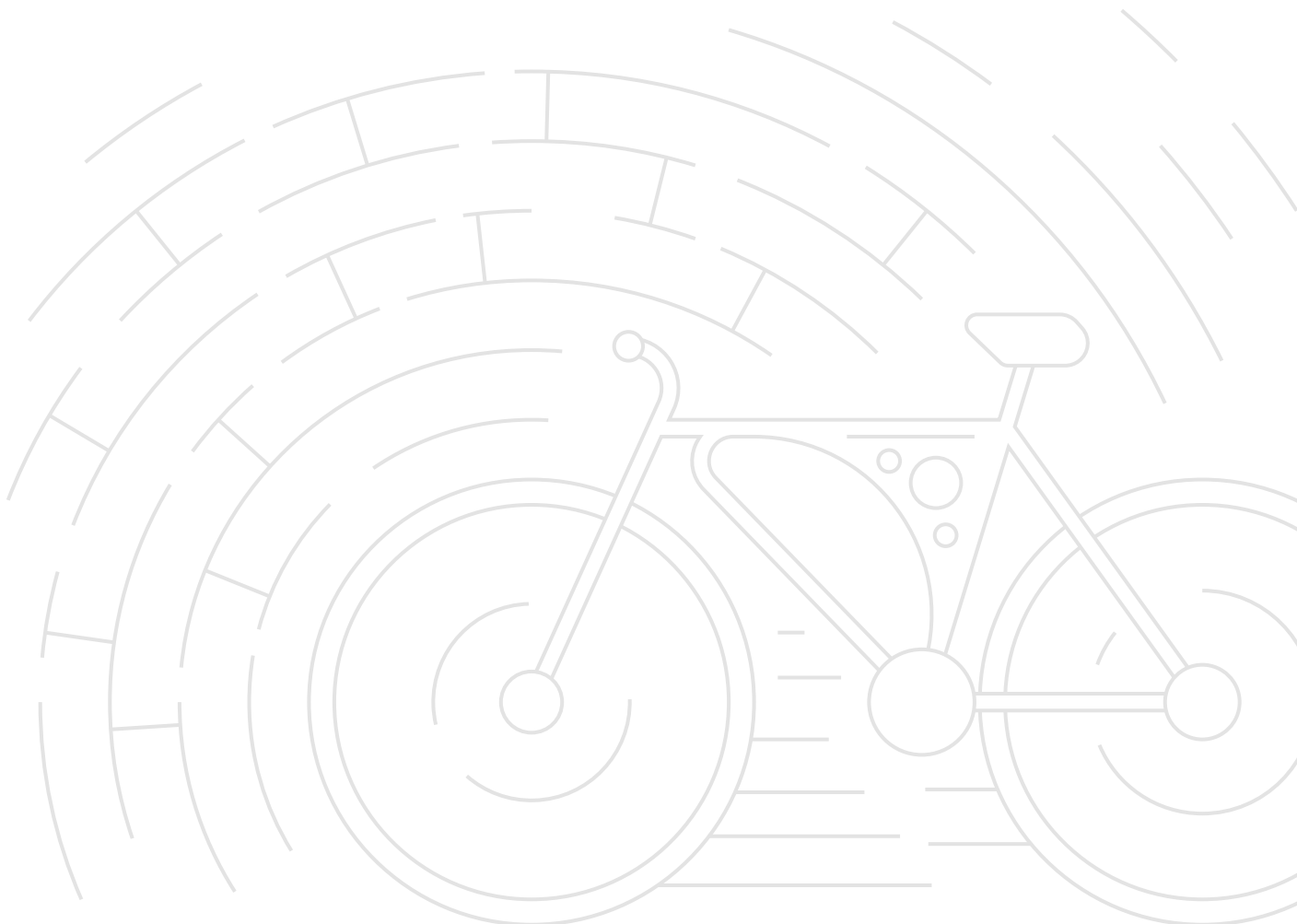
The Bicing app includes gamification features. For instance, users can register their profile in the app and start gathering points for each trip, as well as track calories burned, CO2 emissions saved, and the level of endorphins released. Users can also earn points that can be exchanged for entertainment tickets, discounts, and accessories.

Bicing runs all hours on Saturdays and Saturdays, and only closes from 2:00AM to 5:00 AM on weekdays. However, users are still able to drop off their bikes during these hours.

The fleet mainly consists of traditional bikes with three speeds, adjustable seats, and a place for a bag. Electric bikes were introduced in 2016. They are available at 46 stations and have additional features such as three levels of pedaling assistance and night lights.

Subsidized by the government, Bicing currently has 107,000 subscribers, which is equal to about 2 percent of more than 4.6 million people living in Barcelona's urban area.

Growth might be limited by a number of station usage constraints. The system has 420 stations with 20 to 40 slots each. These stations cover approximately 70 percent of the city, with the exception of the suburbs and hilly areas. The stations are typically located 300 to 400 meters away from one another and are usually found in close proximity to public transportation stops. In total, Bicing has 6,000 bikes, but some stations tend to be empty or full. Another factor impeding further development is subsidies, as they question the financial attractiveness of the service to private investors. The subsidies received from the government of Barcelona come from paid parking (more than €2 million per year) and an exclusive sponsorship agreement with Vodafone (€1.2 million per year).



Civic-engagement tools

Civic-engagement tools are digital platforms that citizens can use to participate in crowdsourcing, voting, and decision making; report noncritical problems; and make service requests.

We analyzed survey results, website visits, and mobile-app activity data and identified two groups of civic-engagement tools that, in our view, constitute different stages of platform development. Civic-engagement tools of the first generation are issue-reporting platforms. These platforms may be seen in cities such as Jakarta, New York, and San Francisco. The tools of the second group form full-scale civic-engagement ecosystems that include crowdsourcing, voting, and issue reporting. One example is Moscow, which we explore in more detail later in the report. Notably, “first generation” cities have often also launched separate tools for crowdsourcing or for voting. However, these tools lack popular demand. For example, in Seoul, where both issue reporting and voting platforms are present, more than 110 000 people installed the voting app, and fewer than 500,000 people have downloaded the issue reporting app. By comparison, in Moscow Active Citizen voting platform gained 2.1 million participants, and the issue-reporting platform Our City gained 1.2 million participants.

	Ever used (MGI) ¹ , %	Daily app users per 1,000 citizens	Site visits per 1,000 citizen per month ²
Moscow	58	3.6	109
Jakarta	40	2.9	
San Francisco	33	0.6	
New York City	27	1.6	
São Paulo	21	0.2	6
Paris	14	0.2	31
Berlin	10	0.8	

¹ Have you used any of those services: civic-engagement tools that let you participate in city planning or report issues and make service requests?
² Divided by the city population in administrative borders.

The most successful cases feature a few distinctive attributes.

Regarding the reporting tools for city-level issues, the first key success factor is coverage. Citizens should be able to report on every problem they might encounter. In San Francisco, for example, the SF311 service allows users to submit reports on 129 issues. Some typical examples of reported issues from Moscow, Jakarta, and San Francisco are potholes, malfunctioning streetlights, overflowing waste receptacles, inefficient public transportation, or walls covered with graffiti.

Successful issue-reporting portals also make it easy to report accidents—the more user friendly the interface and the fewer clicks it takes to report the issue, the better. Transparency and commitment to resolve issues are very important. Portals that allow the citizen to track the status of issues—and that show the city’s government staying committed to resolving those issues—instill trust in the system, which therefore leads to more usage. The leading cases explored in this report provide tracking capability, as well as commitment. In Moscow,

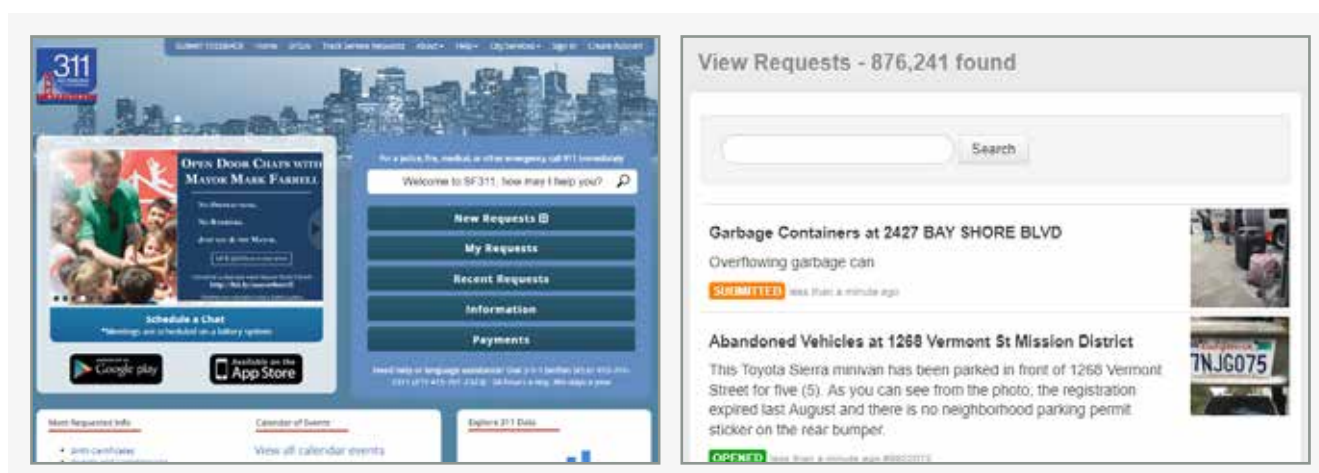
90 percent of citizen-reported issues are resolved within 8 days. Light outage service requests made through New York’s NY311 system have a targeted resolution term of 10 days; for potholes, the resolution term is 30 days.

Successful crowdsourcing and voting platforms require even stronger commitment to implementing projects that are developed by and voted on by citizens. It is important to systematically attract and retain citizens by providing relevant sets of issues and questions for everyone to discuss. Successful platforms can regularly, even frequently, suggest issues to discuss and vote on. They aim to find topics relevant to specific groups. For example, citizens of a district may vote on where to build an arena for a sports team, or students at a state university may decide which artist to book for their graduation ceremony.

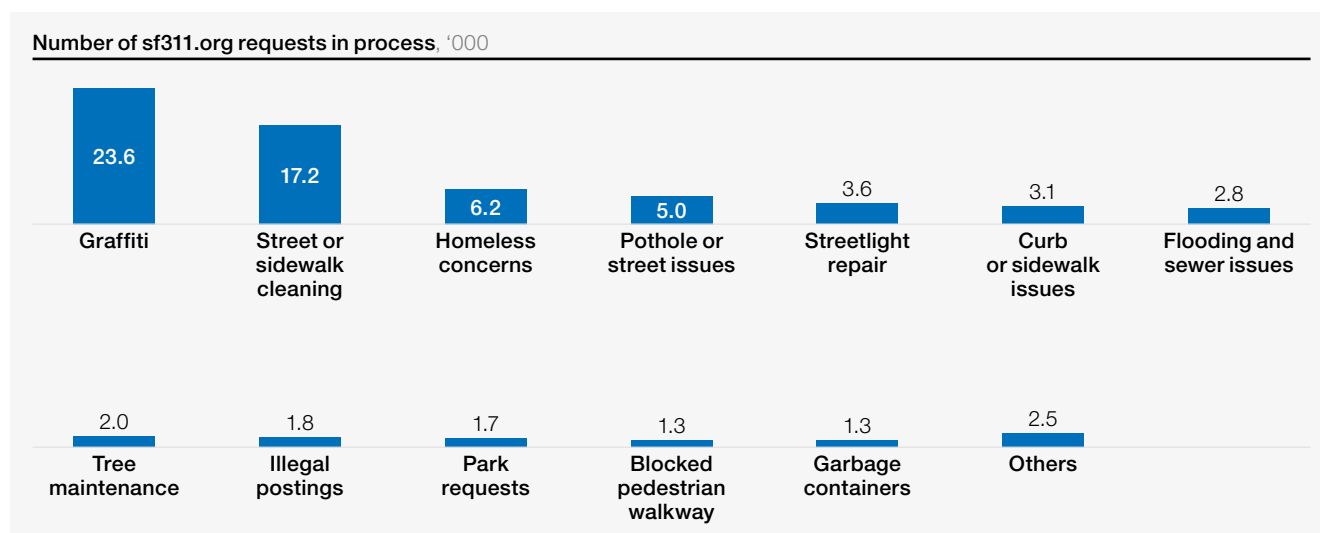
Civic engagement evolves into a wider activity when integrating multiple tools, including crowdsourcing, voting, and reporting on issues. These tools enable every citizen to find their preferred mode of interaction with the city, whether that means reporting a problem, voting on relevant issues, or even simply using the platform to make a suggestion and then engaging discussion of how to drive that suggestion further. Among the cities we studied in the course of this report who lead in the adoption of civic-engagement tools, we encountered no cases where a crowdsourcing or voting solution achieved wide usage without being part of a broader system of platforms. An integrated system of platforms enables the cross-penetration of target audiences. For example, people who vote using the city app can be further encouraged into reporting issues through another city app, and vice versa. Integrated platforms make it easier for the citizen to move from simply reporting problems to taking an active role in helping the city make decisions. Thus, such systems reinforce citizen engagement to a greater extent.

To be successful, at least initially, civic-engagement platforms might be promoted using all available channels. The goal is to gain a critical mass of users. Together with traditional ads and banners—in subway stations and on buses—city governments can use their social-media accounts, and the mayor’s communication channels, to create incentives for “tell your friends” reposts. As previously stated, awareness leads to usage, and regular voting and engagement leads to habitual participation in city issues.

SF-311—San Francisco



Historically, 311 has been an easy-to-remember telephone number that connects customers with highly trained customer service representatives. These representatives are ready to help callers with nonemergency government matters in the city and county of San Francisco. The cell version has worked since 2007, online services were introduced in 2008, and apps for Android and iOS devices were introduced in 2013.



In March 2018, 42 percent of 311 requests were received through a mobile app, 34 percent by phone, 23 percent through the website, and 1 percent from Twitter. To add a new request in the app, a user needs to choose a type of problem, add a photo (optional), a description, and the location on a Google map to track its status. On average, 50,000 requests are made a day. From the 129 issues to choose from, the most popular are graffiti and street or sidewalk cleaning, representing more than 50 percent of requests.



Qlue—Jakarta

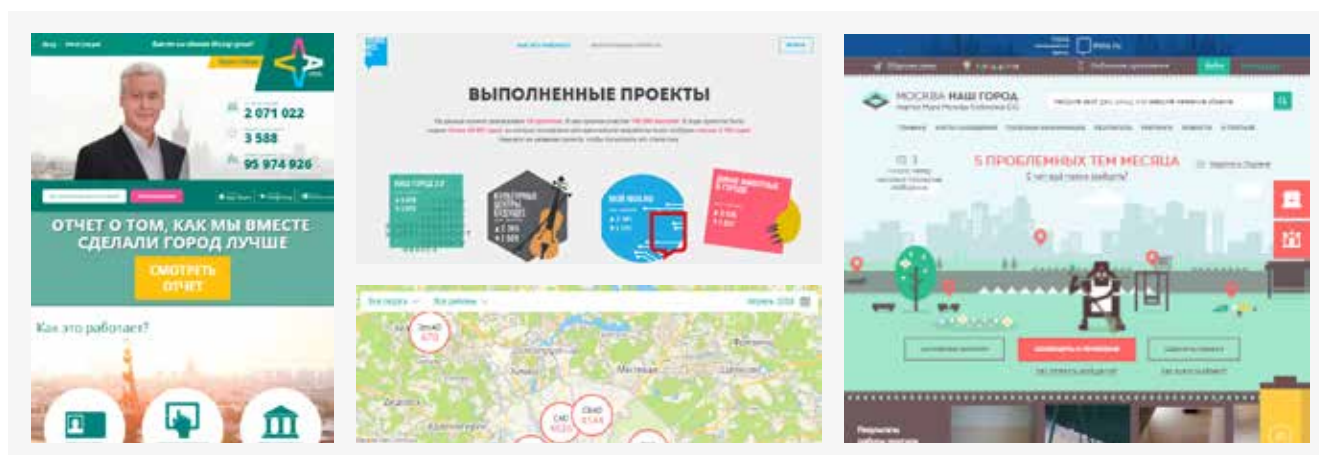
Qlue is a set of smart-city solutions aimed at simplifying city management and communication between citizens and the government. It offers several features, including a platform for citizens to report issues (Qlue MyCity); a dashboard for city managers (Smart Governance Dashboard); a sensor-based, real-time tracking platform with predictive functionality (Smart Environment); a CCTV-based platform to analyze traffic (Smart Mobility); social-media topics and sentiment analysis (Smart Media Analysis); and a CCTV-based safety platform to search for a missing person or a car (Smart Safety).

The top five problems reported through Qlue MyCity are waste disposal, spatial-planning violations, issues related to public facilities, illegal parking, and illegal street vendors.

Moscow's "Together" civic-engagement ecosystem

Civic engagement in Moscow is currently integrated into the "Together" platform, which is shorthand for its slogan, "Together We Will Make Moscow Better." This platform consists of the crowd.mos crowdsourcing platform, the Aktivny Grazhdanin (Active Citizen) voting platform, and an issue-reporting platform called Nash Gorod (Our City).

Launched in 2014, crowd.mos.ru currently has 140,000 participants. Over the years, about 89,000 ideas were suggested by participants as part of 15 projects. The projects implemented include Our City 2.0; Culture centers; My mos.ru; Wild animals in the city;



Active elderly; Moscow libraries; ecology strategy of Moscow; school councils; Moscow children leisure standard; My office of online services; and Our routes. All projects are discussed and developed within a structured process through an online platform.

The Active Citizen voting platform has also been a success with 2.1 million registered participants, and 3,600 referendums held. More than 1,700 initiatives have been implemented, and the total number of votes exceeds 98 million.

Some citywide voting topics are:

- Streets and squares that need reconstruction
- Logo for a new park
- Activities for public spaces during holidays (animation, games, or concerts)
- The best places for street musicians (parks, pedestrian zones, or squares)
- Musicians for the city's school graduation party

Municipal-level voting topics include:

- The suitable time for public events and performances in each district
- The development of new sports facilities
- Installing elevator cameras in municipal housing
- Implementing online instruments for the owner's association council

Active Citizen was heavily promoted online through social media and offline on billboards and subway ads. There are currently ten subway trains that include portraits of project participants, as well as their motivations. These are updated every three months.

Participants are rewarded with special points, which can be redeemed for souvenirs such as stickers and smartphone cases, tickets to events and museums, and transportation or parking cards.

Today, 1.2 million users have registered on the Our City problem reporting platform, 2.6 million issues have been resolved, and 90 percent of those issues were resolved within eight days. Each problem is linked to one of 120,000 facilities and buildings available in the system.

Apartment sharing

Apartment-sharing platforms allow citizens to rent out their homes, or a room, to another person for a short-term stay.

Short-term apartment sharing has a number of positive effects. First, it can be a source of additional income. By renting out spare rooms and apartments, citizens improve the overall utilization rate of the city's residential properties.

Apartment sharing is also a revenue source for the government and communities, as it brings in more tourists attracted by the more affordable pricing, as compared with hotels. Furthermore, thanks to apartment sharing, citizens, tourists, and communities engage more actively in cross-cultural communication.

However, apartment sharing also has negative effects, which, without proper control, may offset its positive impact.

In some cities, many short-term rental apartments are owned or operated by professional landlords that own more than one apartment. For example, as of 2014 more than one-third of the listings in New York were made by professional landlords. These landlords are in fact creating illegal hotels that disregard licensing, taxes, and safety regulations. (In general, regulations are more stringent for hotels than for private apartments). Moreover, such listings do not help the average citizen earn extra money.

Another negative factor is the annoyance of neighbors who may complain about noise. These complaints are more likely when an entire apartment is rented out to tourists for a short period of time. Since a short-term rental is often more profitable than a long-term one (50 percent more profitable in Dubai, for example), professional landlords inflate the demand for real estate in popular neighborhoods. Prices and rental rates increase, local residents are forced to look for more affordable housing, and ultimately have to move to other districts. Thus, while professional landlords earn money, the city itself becomes less comfortable and attractive to its own citizens and those who are considering moving there.

Cities in which apartment-sharing services are relatively unpopular do not typically impose additional restrictions on the real-estate industry, though cities that make up the world's most popular tourist destinations imposed regulations on short-term rentals to discourage professional landlords from running illegal hotels.

In Berlin and New York, for example, short-term apartment rentals are allowed as long as the owner is present and renting out a spare bedroom. This allows citizens to earn income on their spare space, promotes cultural exchange, and is not suitable for professional landlords. In other cities, rent is allowed for no more than a certain number of nights per year (120 nights in Paris, 90 nights in London), and for no more than one apartment, which makes it convenient to rent while the owner is away for a holiday. The penalties for violating these short-term rental restrictions are sometimes quite strict—up to two years of imprisonment in Hong Kong, or a fine up to €600,000 in Barcelona.

	Ever used (MGI) ¹ , %	Number of foreign tourists per 1,000 citizens per year	Short term rental offers ² per 1,000 citizens
● Paris	27	7,297	18.6
● Barcelona	23	5,491	11.6
● Dubai	25	5,335	2.0
● Singapore	21	2,397	1.4
● London	23	2,276	6.7
● New York City	22	1,452	4.7
● Berlin	14	1,427	5.0
● Hong Kong	15	1,319	0.5
Tokyo	4	1,319	2.3
Seoul	29	1,225	1.4
Melbourne	19	593	0.6
Moscow	11	404	0.7
Mexico City	23	320	1.3
Shanghai	31	275	2.9
São Paulo	29	210	0.9

● Additional regulation except for paying taxes and registration/ reporting the business

Relatively low offers to foreign tourists proportion

Dubai: relatively expensive Airbnb prices, approximately equal to hotel-room prices. Moreover, renting out part of the apartment to a foreign guest might be not comfortable due to religious restrictions on alcohol, pork consumption, and clothing.

Singapore: 80 percent of apartments are owned by the Housing and Development Board. Citizens are not allowed to rent HDB apartments to tourists, for less than six months, with fines up to SGD 200,000 (about US \$150,000), and 12-month imprisonment.

Hong Kong: need a guesthouse license to rent rooms in the city. The license is very hard to obtain for an individual apartment owner due to strict safety and apartment layout conditions.

Relatively high offers to foreign tourists proportion

Shanghai: demand for Airbnb, Xiaozhu and Mayi is mainly driven by domestic tourists. Still. Rentals to citizens ratio is relatively low as compared to leading tourist cities in Europe.

¹ Have you used one of those services: accommodation sharing apps that let you rent out your private home to peers (e.g., AirBnB)?

² Airbnb and big local analogs: oyorooms.com, Xiaozhu (小猪短租), Mayi (蚂蚁短租), Dada Room, Tujia

Car sharing

Car-sharing services provide short-term car use without full ownership. The services differentiate by type and can be round trip, one-way, peer-to-peer, or fractional. Station-based car sharing is a relatively old solution that appeared in some major cities 15 to 20 years ago. A new wave of car sharing featuring free-floating models mostly evolved three to seven years ago.

A few cases advocate that car-sharing adoption can shift the modal share toward public transportation. According to a survey in Switzerland, car sharing led to a decrease in the number of trips by private car by 35 percent, while public transportation usage increased by 12 percent among car-sharing users. In France, a survey estimated decrease in private-car usage, and increase in public transportation usage among car-sharing users. Nevertheless, the influence of car sharing on the modal share needs to be tracked, as the service might eventually become popular enough to cannibalize rides on public transportation.

High penetration of car sharing is typical for Europe, while remaining less popular in other regions. The ratio of the car-sharing market to the e-hailing market is 1:65 in the United States and around 1:200 in China. By contrast, in Europe it's around 1:5. In 2017, 17,200 cars were used in car-sharing services in Germany, 8,400 were used in the Netherlands, 6,000 each in France and Italy, and 4,000 in the United Kingdom.

While car sharing competes and coexists with all other means of mobility, its core competitor is e-hailing. However, in Western Europe strict policies against e-hailing, high driver wages, and regulation of the e-hailing give car sharing a competitive edge.

For example, in Berlin the price of a single-kilometer trip using Uber as a percentage of the average salary is .11 percent. In Berlin 23 percent of respondents reported used car sharing, while only 19 percent used e-hailing services. In Moscow the same trip is equivalent to .05 percent of the average salary, and only 15 percent of respondents reported used car sharing, as compared to 81 percent who used e-hailing.

Density of population plays a role in the success of car-sharing services, as it is hard to keep vehicles in close proximity to users in widespread cities. Good and popular public transportation is also important because it helps to combine modals and indicates that groups of people are not used to owning a car. City regulations, such as the availability of free parking for car sharing in European cities, policies against e hailing, and high taxes of car ownership, may also stimulate car-sharing usage. City parking lots are provided free of charge for shared cars in Dubai and Shanghai, with citizens of Seoul seeing a 50-percent discount. Berlin, New York, and Paris provide dedicated charge-free parking lots.

There are some limitations to the current car-sharing modal spread, however. According to experts, the business model is feasible in cities with more than 500,000 inhabitants, since high utilization is needed to maintain competitive prices.

Nevertheless, there are strong positive effects of scale at the city level. All other things being equal, if the market at the city level is more consolidated (fewer providers), then cars will be better utilized and better service profitability will be achieved.

	Ever used car sharing ² , %	Ever used e-hailing (MGI), %	Cars per 1,000 citizens in car sharing ³
● Shanghai	31	78	0.28
● Seoul	26	55	0.19
● New York City	25	53	0.17
● Berlin	23	19	0.72
● Paris	20	54	0.35
● Dubai	20	52	0.05 ¹
Singapore	17	72	0.08
London	16	33	0.27
São Paulo	15	82	0.06
Moscow	15	81	0.39
Hong Kong	13	64	0.27
Barcelona	12	26	0.03
Tokyo	9	14	0.10
Melbourne	8	25	0.09

● In most cities with high car-sharing usage rates, e-hailing demonstrates relatively low penetration. Shanghai is an exception: the city performs well in almost all smart solutions.

London, Moscow, and Hong Kong demonstrate good car coverage, which could further support usage growth since distance to the closest car is an important modal choice factor.

¹ While car sharing in Dubai started with only 200 cars, the service is owned and promoted by city (Road and Transportation Authority), that might have resulted in high “ever used” rate. Udrive and Ekar operate the service on contract with the city (100 cars each).

² Q5B. Have you used any of those services: car-sharing program for on-demand, short-term rental of a vehicle you do not own?

³ Divided by urban area (metropolitan area) population as provided by Demographia World Urban Areas.

Adversely, effect of scale is limited at the country level. Strong utilization and market share in one city has almost no influence on utilization and market share in another city.

Car-sharing services are able to compete with e-hailing in part due to cost advantages and better end-consumer prices. Around 50 percent of the cost of running an e-hailing business is paying drivers’ salaries, which is a cost not present in car-sharing businesses. However, in the long term, when autonomous vehicles are allowed to operate on regular basis, car sharing and e-hailing are likely to merge in a robo-taxi e-hailing model, while car sharing in its current mode is not likely to exist as a widespread model in the future.

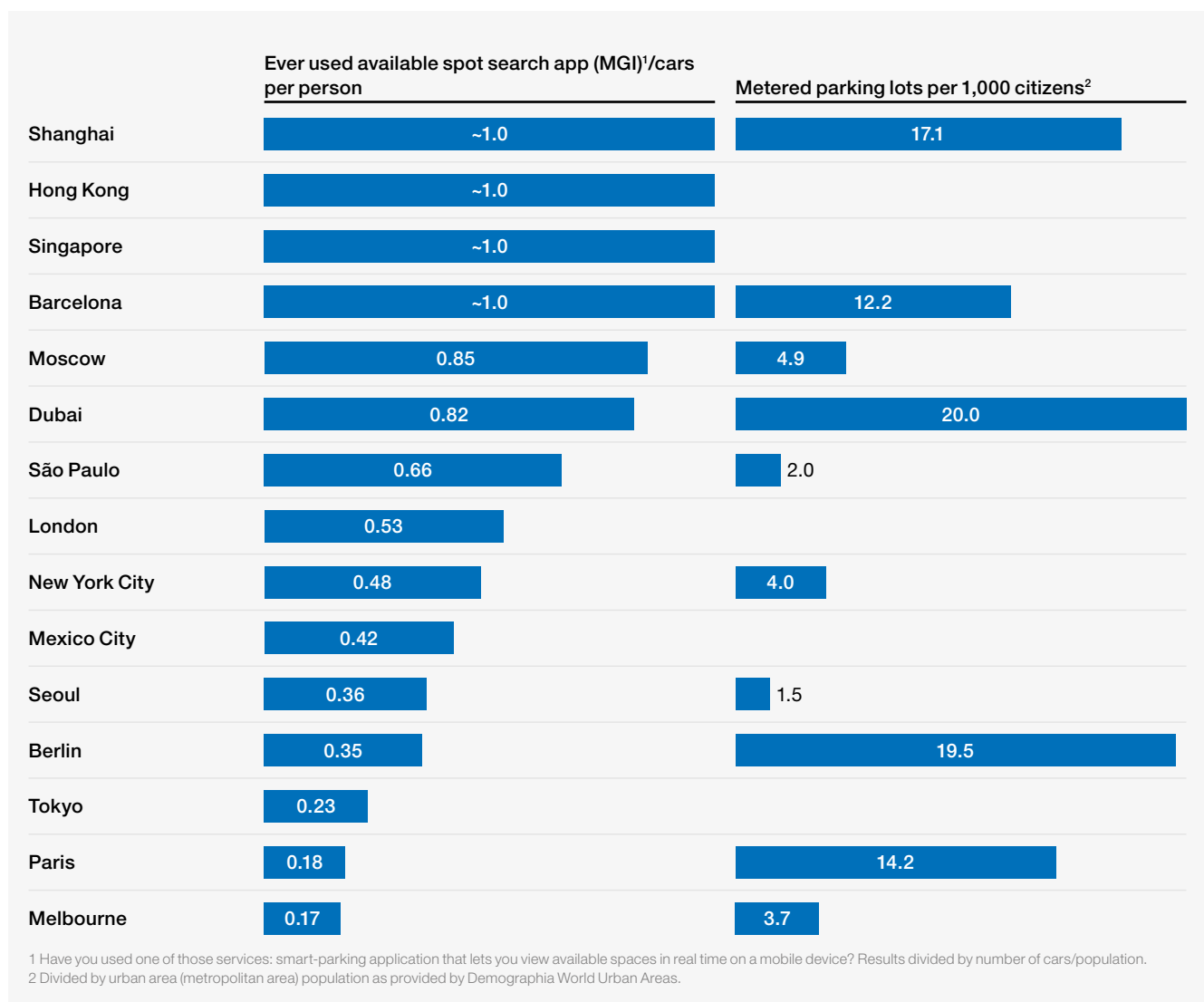
Smart parking applications

Smart-parking apps allow citizens to find and pay for available parking spots nearby.

Our research shows that a citizen's "parking journey" is being digitized across all stages: from finding an available spot, the actual process of parking, and finally making the payment. Navigating to the parking location and making digital-parking payments using a smartphone app are two basic functionalities that are implemented and used in the majority of cities in our sample.

Apps from third-party developers also allow users to book parking spots and pay up-front fees in many cities working with parking lots or garages, including Moscow (A1Park), New York (Parkmobile), and Singapore (Park&Go). One exception to the rule is Dubai, where the Dubai Parking app with such functionality was developed by the local government.

Most city parking apps appeared just three to five years ago, and huge potential remains to develop functionality. To further decrease traffic as cars search for an available parking spot, a navigation solution for open spots is needed. Although existing technologies for available-spot detection have their limitations, further opportunities might be found in integrating data from several sources, which often requires cooperation between government and the private sector.



Cameras and optical/magnetic ground sensors provide data on which parking spots are occupied. These data are then processed and transferred to the user interface. This technology does come with limitations, however, including high cost and the need to implement communication infrastructure between the sensors and repeaters, repeaters and servers, as well as installing the sensors into the asphalt or concrete. Moreover, there were unsuccessful implementation efforts that resulted in sensors not working correctly in open-air locations in areas that experience inclement weather (dirt, dust, ice, and water can interfere with sensor readings). Nevertheless, cities with the widest usage of smart-parking solutions (for example, Shanghai, Hong Kong, Singapore, and Barcelona) use sensor technology.

A navigation app's geolocation and accelerometer data allow to indicate any recently vacated parking spots and predict the share of available spots in the area, while past traffic data allow to predict the share of available lots in the area during a particular time. While this technology is used in a number of apps, it has been integrated only in some navigation apps. Limitations on this technology occur because not all drivers use the same navigation app, if they use one at all, and so the predictions are not always accurate.

Parking-payment apps collect and send data on users leaving their cars once they park and sometimes even predict what time users will leave a spot. Since parking spots can often be occupied by residents, the app can't always indicate whether the spot is going to be available. Local residents may not need to register in the system if they have a permit to park in that particular area.

Mobile CCTV vans photograph cars and dispense data on available parking spots and illegally parked cars. This system's data on whether parking spots are occupied is also limited since it is updated only a few times per hour.

The next-generation solution for city parking might be dynamic pricing, which allows cities to regulate demand for parking. This is done by increasing the price of parking during certain hours in congested areas, and therefore allowing a number of available parking spots to remain available at all times.



Overview: Smart solutions not widely used yet

In this section, we would like to provide some examples for the citizen-centric solutions that are still not widely used (median usage below 25 percent). While these solutions lack city-level data for a detailed analysis, they deserve an overview as they have a potential to make citizens' lives smarter.



Local social connection solutions

Social apps with local connection elements are applications or platforms that connect people with similar or complementary interests and help them make new acquaintances. These apps work on the neighborhood or city level and often facilitate the creation of communities. Some examples include apps for neighbors, platforms based on common interests (Meetup and Hong Kong Dog Rescue), dating apps, and volunteering platforms. Donor and fund-raising platforms are sometimes promoted by cities, but major platforms are often country level (American Red Cross) or international (ShareTheMeal).

Research shows that using social apps might result in various benefits for users. Socially active people live longer than those who are socially isolated. Loneliness causes as much damage to the human body as smoking 15 cigarettes a day. Strong social links stimulate healthy brain activity and minimize memory loss. The scope of social interaction at the age of 20 and its quality at the age of 30 raise the level of happiness at the age of 50.

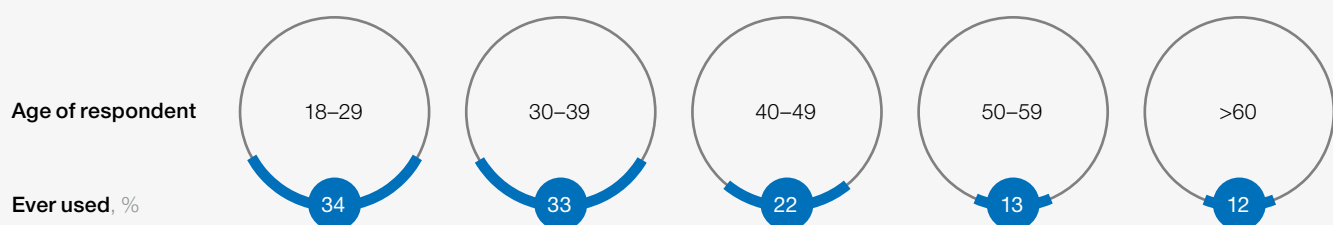
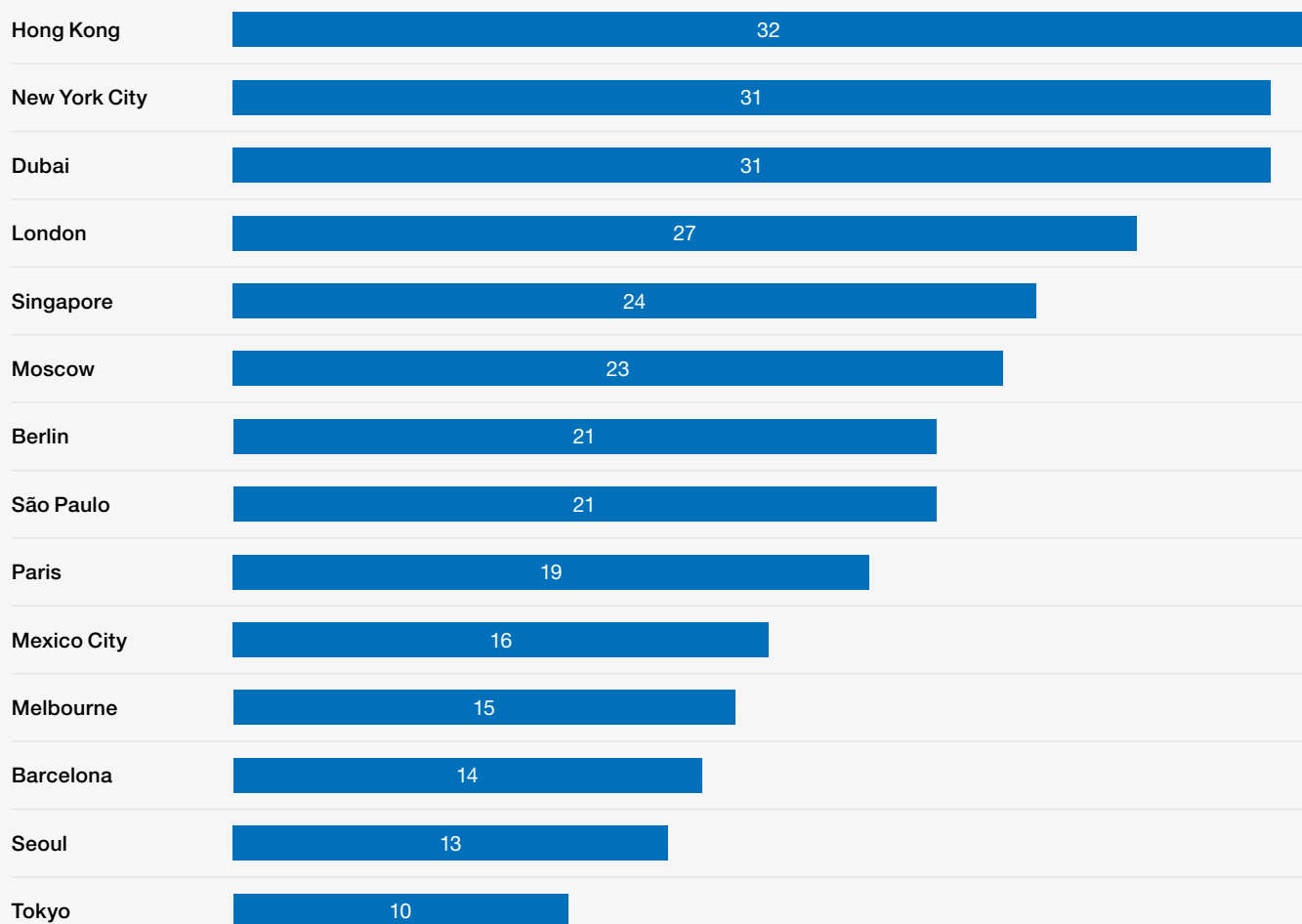
The usage of social connection smart solutions is already quite high in a number of cities. The McKinsey Global Institute has shown that up to 30 percent of citizens have used social interaction apps to facilitate social interaction on the local and city level, with Hong Kong, New York, Dubai, and London leading in our survey.

Nextdoor is a successful example of a social connection smart solution with a strong local context:



Have you ever used dating and communication applications to make acquaintances and communicate with people in your neighborhood/city?

Percent, survey results for adult population with access to internet by McKinsey Global Institute (MGI)



The Day for Dubai app is a good example of an app that promotes volunteering in a city. Launched by an initiative of the crown prince of Dubai, Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum, the idea behind the platform was to ask citizens to devote at least one day of the year to volunteering. The platform is available as an application and a website and operates exclusively in Dubai. It helps individuals to plan volunteering activities using a calendar of events and the user's geolocation. Citizens can choose a project from 13 categories that best suit their interest and skills: assistance for the elderly, role models for children, support for people with impaired mobility, educational activities, mentoring, health, help for the community, sport, culture and arts, ecology and environment, tolerance, emergency preparedness, and international volunteering.

GoodGym is a city-level volunteering platform with additional fitness contests. The app was developed in 2008 by Social Innovation Camp and supported by London's mayor at the time, Boris Johnson, as part of the Team London volunteering service. The platform runs through a website in 44 areas of the United Kingdom. Since it launched, more than 4,500 missions have been completed. To add a health benefit, all volunteers must jog to the mission location and then jog back to where they started. The platform provides volunteers a choice of projects that match their interests: assisting others, providing companionship for the lonely, and working with groups.

The popularity of **dating apps** (Tinder) and **interest group apps** (Meetup) will most likely continue to grow. Since the popularity of these apps is highest among people under 40, such apps will be used even more widely over time as new generations replace older generations. Moreover, a critical mass might occur: when 30 to 40 percent of young people claim they have used the solution, it means that nearly everyone in that generation either uses it themselves or has friends who do. In such situations, using the app is no longer new or strange; it becomes part of the mainstream. Since everyone else already uses the app and talks about it, new users are more likely to try it.

City governments may want to promote local social connection apps, perhaps focusing on topics such as charity, donating, and volunteering, since those address the most pressing issues. For example, city governments can encourage citizens to download and use such applications by promoting them in the press and on social media. The mayor can demonstrate his or her own volunteering or donation activities. In addition, sponsorship or municipal discounts can be provided to citizens who participate in volunteering or charitable activities. Day for Dubai and Team London both demonstrate how cities can develop their own volunteering platform. By helping to construct a city identity and sense of community, these apps encourage people to spend time with one another for the sake of the city and other citizens.

Smart meters and smart thermostats

Smart meters are enabled with an app that allows resource consumption to be tracked in real time. This functionality allows users to better understand their consumption patterns as well as optimize their payments by consuming resources during off-peak times.

The economy benefits from reallocating electric power to off-peak hours, as citizens are motivated by off-peak taxes or fees.

	Are you or is your household using any of these smart applications?, percent		
	Electricity consumption real-time tracking application enabled by smart meter	Water consumption real-time tracking application enabled by smart meter	Smart thermostat (eg, device that automatically sets optimal temperature)
Shanghai	37	32	30
Dubai	28	25	22
Hong Kong	20	14	22
London	17	12	15
Melbourne	15	7	7
Singapore	15	12	7
Paris	14	9	12
Seoul	13	9	15
Barcelona	12	6	16
São Paulo	11	10	8
New York City	10	12	14
Tokyo	9	4	3
Mexico City	9	7	10
Moscow	7	8	5
Berlin	5	2	10

Smart thermostats are a smart technology that allows users to remotely control and program their home's temperature using a tablet, smartphone, or computer. Thermostats are connected to a home's heating, ventilation, and air-conditioning system (HVAC). The smart solution offers the ability to connect to an interface through a Wi-Fi connection or automatically optimize the temperature depending on human behavior. Such solutions can enable consumers to save up to 12 percent of the energy required for heating and 15 percent of the energy required for cooling.

Governments around the globe promote smart thermostats and smart meters alongside other smart-city initiatives. In China the government-owned electricity companies gradually replaced standard electricity meters with smart meters, which were integrated with the smart grid. In 2017, the private company CLP Power Hong Kong Limited announced the launch of a one-year smart-energy program, for which smart meters have been installed for 26,000 select residential customers. These customers were then given real-time access to their consumption data. In December 2017, Dubai's Electricity and Water Authority (DEWA) had installed more than 3.3 thousand smart meters (electricity and water) for buildings in the inland exclave Hatta. This initiative is a part of DEWA's journey to drive electricity and water efficiency.

Great Britain's Energy Company Obligation program is subsidized by the government. This program encourages energy companies to help clients reduce energy consumption by installing special measures, including insulation, boiler repair and replacement, and heating controls.² The smart meters are electricity and gas meters that connect directly to the supplier, providing accurate bills as well as nearly real-time customer control on energy spending. The government has set a target for all UK homes and small businesses to have been offered a smart meter by their energy provider by 2020. As of September 2017, 7.7 million smart meters have been installed to homes and small businesses.

In Singapore, the government promotes smart electricity meters with the Open Electricity Market initiative. This initiative allows a household to choose from peak/off-peak electricity plans. Energy consumption is tracked every half hour by a smart meter that is connected to an e-services account. Smart meters are the standard electricity meter in the state of Victoria, Australia, where Melbourne is located. Since 2006, the government encourages electricity distributors to install smart meters in every home and small business, enabling Victorians to better understand and manage their energy usage. Today, 2.75 million meters have been installed.

The overview above offers many examples of government-led smart meter and thermostat implementation programs, which lead to widespread installation of such devices. Still, only 15 percent of respondents from Melbourne, where smart meters are mandatory, claimed that their household used the application connected to the smart meter to track electricity consumption. Usage of a tracking application requires a user-friendly application to regularly track consumption and adjust accordingly. Opportunities exist for government efforts aimed at promoting development of such applications among providers and forming new consumption behavior among citizens.

Ride sharing

Ride-sharing services allow passengers to share rides in a vehicle that is driven by a professional driver or another citizen. On the supplier side, an analytics-based tool is needed to determine optimal routes, which is accomplished by matching individual requests with available seats.

	Ridepooling which lets you share a driver/taxi with other passengers , examples for different cities: Uber Pool, Lyft Line, Didi Shun Feng Che, Dida Pinche, Urbvan, Jetty, Alligatorshuttle, CleverShuttle, Grabshare		Public transport aggregated index , availability, affordability, efficiency, convenience, safety in equal proportions	Private transport affordability index
	Have you used any of those services? , percent	Do you know, if the service is available in your city? , percent		
Shanghai	56	84	0.44	0.44
Mexico City	52	82	0.32	0.63
Singapore	48	90	0.70	0.53
New York City	44	84	0.51	0.75
São Paulo	42	76	0.25	0.58
Paris	31	78	0.56	0.65
Hong Kong	22	51	0.70	0.67
Seoul	15	44	0.54	0.54
Moscow	13	48	0.57	0.78
London	12	43	0.45	0.60
Berlin	5	22	0.41	0.79
Tokyo	4	18	0.43	0.60

McKinsey Global Transport Benchmarking of Megacities

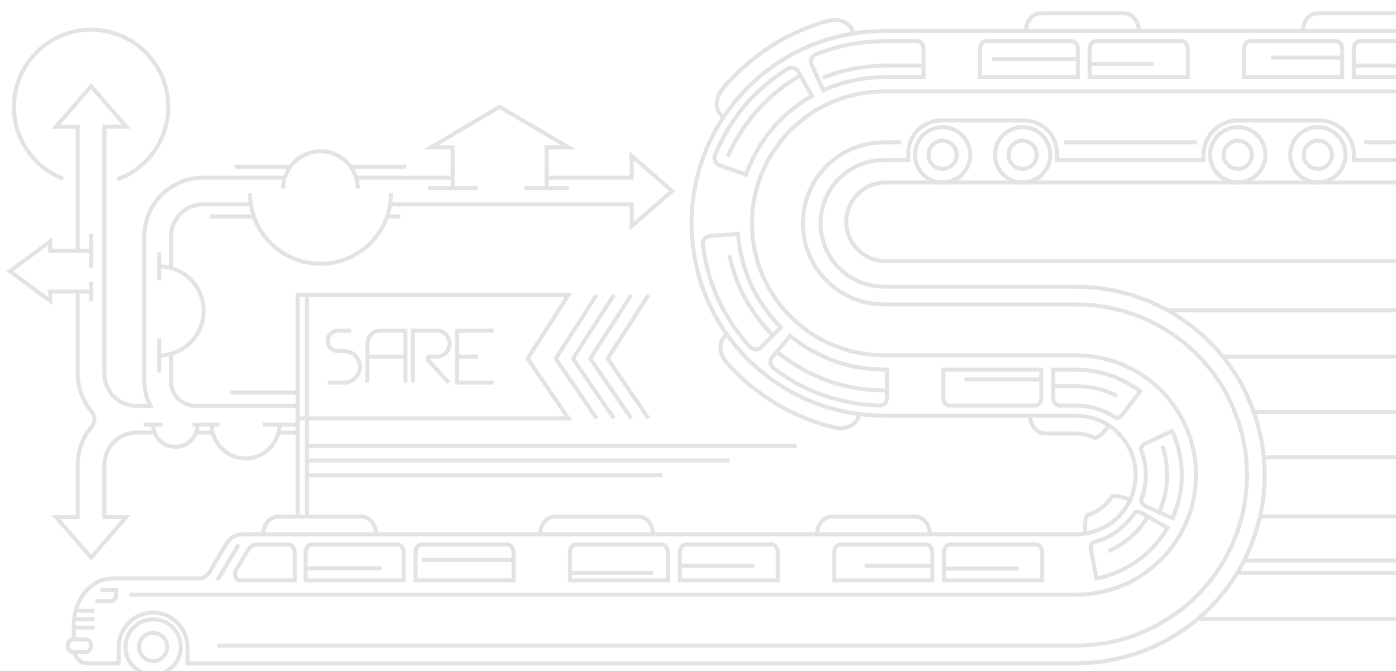
There are a few types of such services, depending on the provider and the type of transport. First, e-hailing apps provide pooled e-hailing features. Examples include Uber Pool, Lyft, Line, and Grabshare, which allow drivers to pick up a few passengers in one trip. Grabshare is a ride-sharing service provided by Grab, a popular e-hailing provider in Singapore and other countries in Southeast Asia. Grabshare claims that the economy for passengers is up to 30 percent and guarantees only one additional passenger drop-off during the ride. An example of flexible legislation can be found in Seoul, where private cars “shall not be provided or rented for compensation... for transport,” except when “commuting to and from work.” This regulation means that though e-hailing without a license is prohibited, it is allowed when taking passengers to and from work during peak hours.

Second, there are services specializing in shared rides only. Urbvan and Jetty in Mexico City operate vans that ride routes based on the destination points of passengers. Both provide Wi-Fi onboard, with Urbvan even providing smartphone chargers, as well as CCTV for security. Jetty claims that it costs 30 percent less than taking your car, and 60 percent less than other services. Berlin has a similar minivan service, allygator, as well as the CleverShuttle service, which works with CO2-neutral cars.

The survey results show that all the cities with widely used ride sharing (40 percent and above) demonstrate high awareness of the service (around 80 to 90 percent). Awareness is definitely a strong driver of usage, depending mostly on the marketing efforts of private players and word of mouth. The latter, in particular, works well when the service fits citizens' demands. Since ride sharing might serve as a substitute for public and private transportation, the quality and affordability of both influence the demand in carpooling. For example, carpooling is popular in Mexico City and São Paulo, where an aggregated index on public transportation is relatively low. Citizens might decide to pay a little extra and use ride sharing that is more convenient than public transportation.

In cities such as Shanghai and Singapore, where owning and driving a car is relatively expensive, citizens might prefer ride sharing that is less convenient, but also significantly cheaper.

Substituting public transportation with ride sharing is not optimal from a government's point of view since it may lead to greater road congestion. In this case, improvement of public transportation might be considered. In the meantime, substitution of private transportation with ride sharing improves traffic, as well as the environment. In such situations, governments may actively promote it, or at least allow it as Seoul does.



Online education

There are various applications of smart technologies in education as well, from digitizing the course material and exams to building an individual education trajectory. While the survey results cover only one practical type of online education—reskilling courses—these platforms are also used in grade-school or university educations to study programming or languages, among other things.



Among the strongest benefits of online education is ease of access—the only prerequisites to enroll in the course are Internet access and the payment of a small fee, which are incomparable with in-person courses. Flexible hours allow students to learn without interfering with work hours or other school programs. For example, the peak usage of Coursera is reached outside the working hours in Brazil, China, Colombia, Mexico, Spain, and Russia, and during the lunchtime in Canada, the United States, and the United Kingdom. Employers are increasingly acknowledging online certificates, and some employers have started using such courses for employee talent development.

Privately founded platforms for online courses, such as Coursera, Udemy, Codecademy, edX, and Udacity are available around the globe and quite popular. For instance, Coursera has 25 million registered users, more than 2000 courses and 149 university partners. These platforms are used by both private and public institutions, meaning that universities can provide courses on such platforms. The top five areas that students study on Coursera are business, computer science, data science, social science, and arts and humanities.

Job skills education solutions combined with job search platforms are sometimes developed and delivered by the government through the use of specially designed platforms, as has been seen in Melbourne, Singapore, and Dubai.

The role of government in the field of online education might be to fill gaps on the market (for example, courses on government service) or to subsidize privately developed courses for the right audience. This may be preferable to building new solutions in the areas where affordable high-quality private supply already exists.

Health wearable devices

Are you or is your household using any of those smart applications? Lifestyle changing health wearable device (e.g., wearable health or fitness monitoring device such as Fitbit), %



Wearable health devices allow users to improve their physical well-being and are connected to some platforms and applications. User-friendly interfaces help to analyze data and make decisions on correcting behavior or choosing a treatment program.

Wearable devices with fitness functionality may help improve a user's psychological and emotional state, weight, sleep, or quality of physical activity and fitness. The solutions may have several layers of use, including a device that collects data, an application that allows an interface to interpret the data, a cloud platform that stores the data and performs some additional analytics or statistics functions, or contests that allow communication with other athletes and users. Fashion plays a huge role in the dissemination of wearables. For example, the survey of owners of wearables in Hong Kong has shown that 37 percent of respondents pursue fashion trends when deciding to purchase a wearable device (wireless headphones, smart watches, fitness bands, and activity trackers).

There are various private providers of smart solutions in the health and fitness area, including meditation apps that provide courses of voice-led meditations; weight tracker apps that integrate with phones and track weight goals; and smart fitness bands that show pulse, calories burned, and steps taken, as well as exchange data with smartphones. An interesting example of a government-developed app is the Fitness Walking app, which was developed and promoted by the Hong Kong Department of Leisure and Cultural Services (a government unit). This app allows users to track training statistics, choose walking routes and navigate to them with a GPS function, and share achievements. It also provides information on the health benefits of walking.

While the spread of fitness wearables is driven by fitness-related fashion, they do not bear even the basic medical functions important for monitoring common chronic diseases, for example, blood pressure or blood sugar measurements. Medical wearable devices are piloted, but the examples of wide usage are still very rare. For example, remote monitoring devices are piloted in the Netherlands, France, the UK, and the US for patients with heart disease, viral diseases, diabetes, and hypertension. While the technologies themselves are in place, the missing links are most likely providing wide groups of people who suffer from disease with affordable devices, and integrating those devices into medical systems, such as providing necessary data infrastructure and legislation frameworks. Governments may play an active role in this stage of the institutional integration of these technologies. For example, in Yinchuan citizens can subscribe to a smart health service and receive wearable devices to check blood pressure and blood sugar.

