

EMPOWERING CITIES

The real story of how citizens and businesses are driving smart cities



Supported by

PHILIPS

Table of contents

Executive summary	2
About this research	5
Introduction	6
1. The connected city: Digital technology as a catalyst for urban transformation	8
2. The fixable city: Near real-time feedback on urban services	12
3. The crowdsourced city: A growing citizen interest in shaping their cities	17
4. The collaborative city: The private sector as a partner for advancing smart cities	21
Conclusion: Implications for decision-makers	23

Executive summary

Digital technologies are the lifeblood of today's cities. They are applied widely in industry and society, from information and communications technology (ICT) to the Internet of Things (IoT), in which objects are connected to the Internet. As sensors turn any object into part of an intelligent urban network, and as computing power facilitates analysis of the data these sensors collect, elected officials and city administrators can gain an unparalleled understanding of the infrastructure and services of their city. However, to make the most of this intelligence, another ingredient is essential: citizen engagement. Thanks to digital technologies, citizens can provide a steady flow of feedback and ideas to city officials.

While this helps cities fix problems and provides powerful new insights into the functioning of urban services, it also shifts the relationship between city governments, businesses and residents fundamentally. If citizens can provide feedback on potholes, street-light outages or uncollected waste, they may also expect to be able to voice concerns about bigger issues, such as the city budget, for example, and seek more direct engagement in the political process.

This trend has important implications for policymakers as they pursue smart city strategies. They need to do more than invest in hardware and software by increasing their capacity to use this equipment. They must also bring about a shift in the culture of their organizations, moving away from an exclusively top-down approach to one in which all stakeholders have a voice in shaping the city of the future.

Capturing many of these developments, this study by The Economist Intelligence Unit (EIU), supported by Philips Lighting, investigates how citizens and businesses in 12 diverse cities around the world—Barcelona, Berlin, Buenos Aires, Chicago, London, Los Angeles,

Mexico City, New York City, Rio de Janeiro, Shanghai, Singapore and Toronto—envision the benefits of smart cities. The choices of the respondents to the survey reflect the diverse nature of the challenges and opportunities facing different cities, from older cities in mature markets, where technology is at work with infrastructure that may be centuries old, to new cities in emerging markets, which have the opportunity to incorporate digital technologies as they grow.

Coupled with expert perspectives, these insights paint a fresh picture of how digital technologies can empower people to contribute—giving city officials a roadmap to smart city life in the 21st century. The key findings include the following:

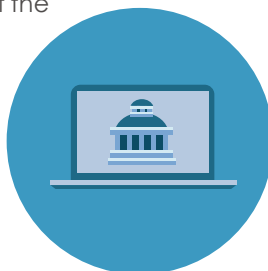
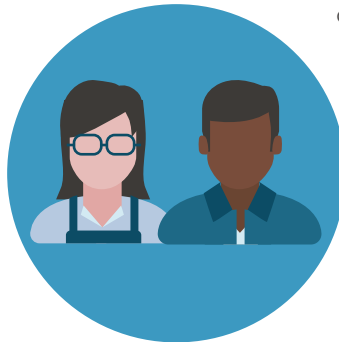
- **Smart cities have active citizens, but there is room for further engagement**

Citizens feel they can guide the improvement of infrastructure and services in three top areas: social services, such as healthcare and education; pollution reduction and environmental sustainability; and waste collection, treatment and recycling. Yet when it comes to smart city projects specifically, few respondents (15%) believe they can make any meaningful contributions.

"Cities have been quite slow to step into dialogue processes with citizens [on smart cities]," says Jarmo Eskelinen, chief technology and innovation officer at Future Cities Catapult, a London-based center for the advancement of smart cities. According to Mr Eskelinen, some cities have not tapped into the data generated by new urban services or invested sufficiently in their ability to analyze the data they do have.

- **Digital technologies are already improving city services**

Almost one-third of respondents (31%) say that digital technology has improved transportation services in the past three years. One-quarter of



businesses see it as an area that will be improved in the near future.

However, the impact of digital technology goes beyond transportation. From sensors that can receive and transmit information to data-analytics systems, digital technologies can facilitate the real-time or near real-time monitoring of infrastructure such as power and water networks, improving the efficiency of those assets and addressing vulnerabilities before they become problematic.

Sarah Williams, director of the Civic Data Design Lab at the Massachusetts Institute of Technology's School of Architecture and Planning, cites the example of water management, which is becoming more important as climate change leads to more severe and frequent weather events. "It's essential we know how

much stormwater is running off in order to manage it," she says.

"But if we don't have those data, we can't do that work."



• **Citizens want more ways to interact with their cities**

While just under one-third of citizens (32%) are currently providing feedback to their local authorities, over one-half say they would like to do so. They prefer the usual suspects—social media and e-mail—as the means to interact with local governments. By comparison, businesses are currently more likely to report problems related to urban infrastructure (41%) and services (32%) in a more traditional fashion.

Overall, the desire for digital communication channels and transparency in city services is strong. A large number of citizens (51%) want wider access to digital platforms to enable them to communicate with government; they believe that the expansion of free Internet access in public spaces and more information about smart city projects (both 50%) would encourage them to engage further.

• **Using new tools effectively requires more action**



The survey also reveals an interest in participating in hackathons—events in which computer programmers and others collaborate on software design—or similar events (54%), even though few citizens have ever done so. Some cities are responding, but according to Léan Doody, associate director at Arup, a London-based global design, planning and engineering firm, they need to do more than organize idea-generating events. "You have to have the infrastructure to [turn those ideas into initiatives] in a sustainable way and make sure it's targeted at specific city problems," says Ms Doody, who leads Arup's consulting work on smart cities. "It's not just thinking of tech as one click fixes all."

While cities are making their data publicly accessible, open data portals have yet to take off, with a relatively small group (10%) selecting these. Even so, while citizens are not interacting with these data directly, many use them via apps for everything from finding schools to checking the status of local transportation. "There's a limited number of people who love data for their own sake, but they will use the services that are built on top of them," says Ms Doody.

• **Business is a willing partner for smart city initiatives**

Businesses are keen to facilitate citizen engagement in strategic long-term planning: almost three-quarters of executives (73%) say their company would be interested in sponsoring or participating in hackathons and similar initiatives designed to improve city infrastructure and services. They are also demanding more smart city developments as they see the direct and indirect benefits—more than half (53%) of businesses believe smart cities can help to attract top talent, which they believe can impact the bottom line.

And like citizens, businesses call for more transparency and more channels of communication when it comes to smart city initiatives. Most executives urge the government to do more to engage businesses in public decision-making around improvements to urban infrastructure and services (58%) and believe that it should be investing more heavily in digital technologies that enable businesses to play a role in urban improvements (63%). The majority of executives (52%) also say that improved digital communication channels would encourage them to provide cities with feedback.

What is clear from the EIU research is that citizens and businesses are keen to work with municipal leaders on improving life in the city, with respondents' answers showing a willingness to share personal



data and engage more fully in smart city developments. However, cities could do more to provide the communication channels and transparency needed to build trust among their inhabitants and facilitate their participation in urban development—and demystify city planning in the process. This will not only take more hardware and software but will also require a cultural shift, moving from seeing citizens and businesses as simply consumers or providers of services to engaging with them as active partners. If they can combine new technologies with a change in mindset, cities can harness the imagination and creativity of all stakeholders as well as increase the efficiency of resource allocation and use, thereby creating more sustainable cities. This is the real promise of the smart city.

About this research

Empowering cities: The real story of how citizens and businesses are driving smart cities is a research program developed by The Economist Intelligence Unit (EIU), on behalf of Philips Lighting, to assess the progress of cities toward adopting smart technologies. It brings together the views of citizens, businesses, government leaders and experts, recognizing that the participation of all stakeholders is needed to realize the potential of the smart city. In May 2016 The EIU conducted a survey of 1,950 citizens and 615 business executives in 12 cities: Barcelona, Berlin, Buenos Aires, Chicago, London, Los Angeles, Mexico City, New York City, Rio de Janeiro, Shanghai, Singapore and Toronto. Between 150 and 185 respondents were interviewed from each city; of these, about half were aged 18-34 and the other half were aged over 35. In terms of gender, they were evenly split. Business respondents were drawn from a range of seniorities, functions, industries and company sizes.

The report also includes insights from the following experts. We would like to thank all participants (listed alphabetically):

- **Rohit Aggarwala**,
chief policy officer, Sidewalk Labs
- **Maxwell Anderson**,
executive director, New Cities Foundation
- **Diego Canales**,
tools and data innovation associate, WRI Ross Center for Sustainable Cities, World Resources Institute
- **Ani Dasgupta**,
global director, WRI Ross Center For Sustainable Cities, World Resources Institute
- **Tomas Diez**,
director, Fab Lab Barcelona
- **Léan Doody**,
associate director, Arup
- **Ingrid van Engelshoven**,
deputy mayor, knowledge economy, international affairs, youth and education, The Hague
- **Jarmo Eskelinen**,
chief innovation and technology officer, Future Cities Catapult
- **Vicente Guallart**,
former chief architect, Barcelona City Council
- **Peter Hirshberg**,
chief executive, Re:imagine Group
- **Rizwan Khaliq**,
chief marketing officer, IBM Global Public Sector
- **Debra Lam**,
chief of innovation and performance, City of Pittsburgh
- **Patricia McCarney**,
president and CEO, World Council on City Data
- **Sonja Miokovic**,
co-founder and global director, YouthfulCities
- **Jacqueline Poh**,
managing director, Infocomm Development Authority of Singapore
- **Carlo Ratti**,
director, SENSEable City Lab, Massachusetts Institute of Technology
- **Minerva Tantoco**,
former chief technology officer, New York City
- **Anthony Townsend**,
senior research scientist, New York University's Rudin Center for Transportation Policy and Management
- **Sarah Williams**,
assistant professor of urban planning and director, Civic Data Design Lab, School of Architecture and Planning, Massachusetts Institute of Technology

The findings and views in this report do not necessarily represent the views of the sponsor. The author was Sarah Murray and Victoria Tuomisto and Monica Woodley were the editors.

Introduction

Technology is changing cities in a multitude of ways. Part of what it takes for cities to become “smart” involves investments in the information and communications technologies that underpin the functioning of everything, from the power grid to the transportation systems. But this is only part of the story. Equally important are the kinds of technologies that enable stakeholders—residents, visitors, daily commuters and tourists alike—to derive more value from their cities’ infrastructure and services and to contribute to their planning and design. Armed with little more than a smartphone and some apps, engaged stakeholders can provide direct feedback on services or submit their ideas for improvements. As digital technologies facilitate the “crowdsourced city”, the question for policymakers is how to adapt to a new culture in which residents are no longer passive consumers of services but active participants in efforts to improve the planning and operation of their cities.

It is hard to overestimate the impact of digital technologies on urban life. Over the past decade they have invaded every aspect of urban infrastructure. Fiber-optic networks and wireless telecommunication grids support mobile phones, smartphones and tablets. Sensors can collect and transmit large amounts of data on everything from pollution to traffic congestion. And open databases that permit the two-way flow of information mean that anyone can gain access to—or contribute

to—information about the city. Furthermore, smart technologies to manage issues from traffic congestion to lighting infrastructure can be directed more effectively according to the information derived from the analytics built into these systems.

These technologies form “the backbone of a large, intelligent infrastructure”, according to Carlo Ratti, director of the Massachusetts Institute of Technology’s SENSEable City Lab, which investigates how digital technologies are changing urban lives. Digital technologies, he says, have turned cities into “computers in open air”.

Changing consumer behavior is also transforming the nature of the relationship between cities and their residents and visitors. With goods, services and entertainment just a click away, people expect the same direct, real-time interaction with their local government that they experience on social media or when shopping online, putting city officials under pressure to connect and respond quickly via digital channels.

“The idea that we elect people who fix things and we go back to our daily lives is being eroded,” says Maxwell Anderson, executive director of the New Cities Foundation, a non-profit organization focusing on urban innovation. “Urban decision-making is going to rest on a much more active citizenry expressing preferences in real time through handheld devices.”



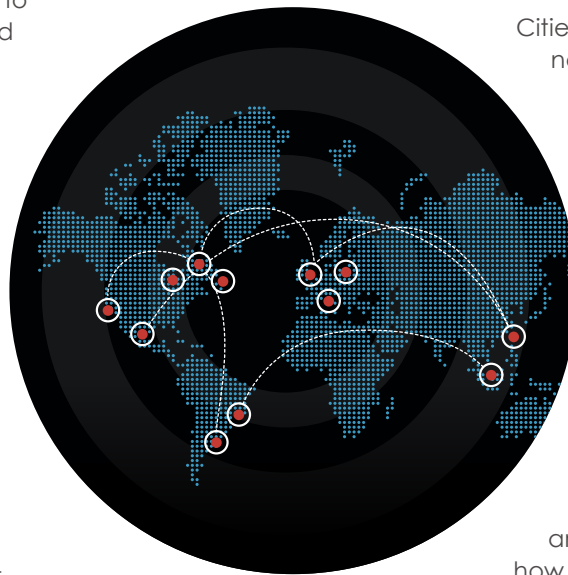
“The idea that we elect people who fix things and we go back to our daily lives is being eroded [...] Urban decision-making is going to rest on a much more active citizenry expressing preferences in real time through handheld devices.”
- Maxwell Anderson, executive director, New Cities Foundation

Of course, in tapping into this active citizenry, municipal leaders must tread carefully. Citizens should not be treated simply as data to be harvested. As online shoppers and consumers of private-sector digital services, they understand the value of their data. This means cities will need to craft new agreements around data collection—agreements that acknowledge the value of personal data and recognize that, in return for using them, they must deliver new benefits to citizens. Building confidence in how the data will be used is also important. “From a historical perspective, people are right when they are suspicious of government mismanaging their data,” says Jarmo Eskelinen, chief innovation and technology officer at Future Cities Catapult, a London-based center for the advancement of smart cities. “Trust is a major issue.”

However, citizens benefit from sharing their data when this enables city governments to act more swiftly in response to demand for new services or the remediation of problems. “Civic engagement is closing the knowledge gap between the types of information people need to make decisions,” says

Sarah Williams, assistant professor of urban planning and director of the Civic Data Design Lab at the School of Architecture and Planning, Massachusetts Institute of Technology.

Perhaps the biggest challenge for cities as they roll out new digital feedback channels is the resulting shift in the traditional relationship between municipal government and its constituents. As technology enables citizens to become increasingly vocal in expressing their views on urban spending decisions, they may start to question types of spending or taxation which they feel are inefficient or inappropriate. “That’s the next big frontier of urban activism,” says Mr Anderson. “You’re watching the questioning of authority over citizens.”



Cities that manage both to navigate this new relationship and to build the right levels of trust can benefit from the community engagement and increased stakeholder awareness of smart city initiatives. Equipped with a steady flow of constituent feedback and a transparent track record for realizing the positive benefits of technology, communities will be rewarded with powerful new insights into the functioning of infrastructure and the demand for city services. Seeing the benefits that sharing their data can bring, citizens will articulate more explicitly and regularly how they want their cities to develop.

In essence, what municipal leaders have at their disposal is a community of stakeholders—whether businesses or citizens—who care deeply about their urban environment. The potential, says Professor Ratti, “multiplies when data are open and citizens, as a community of knowledge, have the power to co-plan and manage their own cities”. City leaders who are able to use technology to empower this new activist citizenry can tap into a potent force to support them as they develop the cities of the future.

1. The connected city:

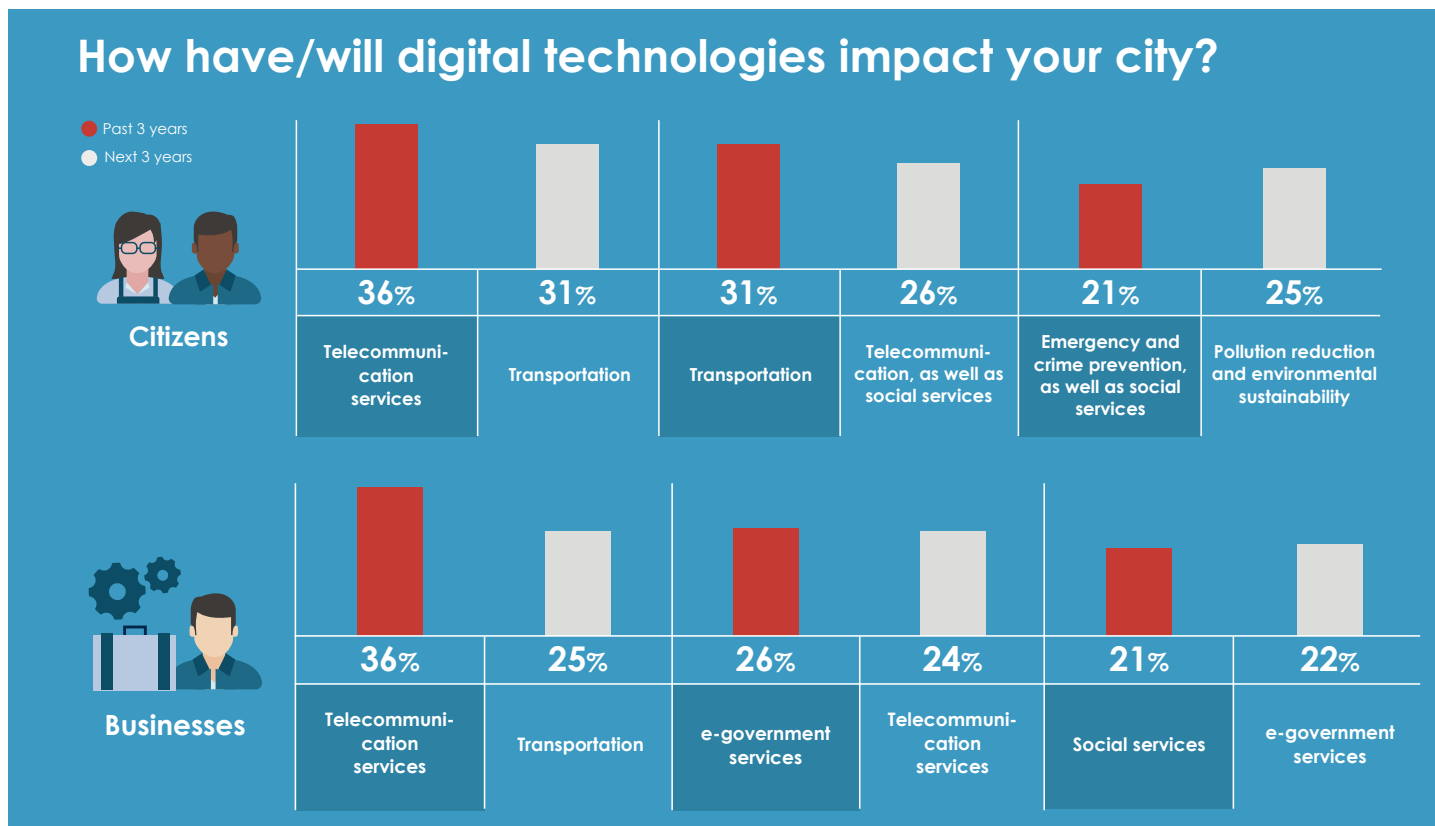
Digital technology as a catalyst for urban transformation

As citizens are generating data in real time, new doors are opening to more responsive ways of managing city services. For example, Singapore's system of privately operated buses uses the Beeline app, a technology that allows residents to book seats on buses run by private operators in areas that are not served by public transportation. But the technology does more than just making it easier to get around: because users can also suggest routes for the buses, the app—developed by the Government Digital Services team at Singapore's Infocomm Development Authority—helps operators to predict demand and in turn improve bus schedules and routes.

Transportation is just one area of city life that digital technology is transforming. According to the EIU

survey, 36% of respondents cite telecoms services as the digital technology that has impacted their life over the past three years, followed by transportation (cited by 31%), crime prevention (21%) and social services such as healthcare and education (21%). (See figure 1.) Interestingly, despite the different challenges the surveyed cities are facing and regardless of the different levels of economic development, respondents to the survey broadly cite the same areas that have seen improvements from the use of digital technologies.

Potential also exists for cities to utilize data to manage issues ranging from traffic congestion to land-use planning. "Cities are just scratching the surface of what can be done with data," says Ani Dasgupta, global director of the WRI Ross Center for



Sustainable Cities at the World Resources Institute. "A lot of information is available through geospatial data and cellphone data, and this can be mined to manage city services better."

"Cities are just scratching the surface of what can be done with data [...] A lot of information is available through geospatial data and cellphone data, and this can be mined to manage city services better."

- Ani Dasgupta, global director of the WRI Ross Center for Sustainable Cities at the World Resources Institute

Even so, harnessing data to improve transportation is often the first step cities take, says MIT's Professor Williams. "Transportation is the low-hanging fruit. If a city can show increased transportation through data analytics, it's instantly going to win people over because everybody cares about transit."

In Boston, for example, residents use smartphones to track road defects. Captured against the driver's GPS location and uploaded to a server for analysis, data collected from the Street Bump app allow municipal authorities to detect potholes and other road issues, enabling them to make better decisions about investments in the road network. The app—developed by the Mayor's Office of New Urban Mechanics—demonstrates how digital technologies can transform the task of maintaining urban infrastructure by capturing and analyzing large amounts of information.

Transportation is particularly well suited to these kinds of innovations, as users of cars and bus and rail networks generate data through the apps they use, as well as through GPS trackers on vehicles.

"We have far more data freely available about transportation that can be used, while some other sectors don't," says Professor Williams.

The myriad urban uses of digital technology

When it comes to other types of infrastructure, such as power distribution and water supply, a range of technologies can be used to optimize these resources and maintain them more efficiently. Sensors that can receive and transmit information facilitate near real-time monitoring. In the case of water systems, for example, real-time monitoring enables the city to detect leaks and address vulnerabilities far more quickly than manual inspections. Of course, being able to monitor city conditions and managing them are two very different things. Deploying sensors can only enhance city systems and services if the various organizations managing them have the capacity to respond to the data and work across departmental boundaries. Where different departments can achieve their different goals using the same infrastructure, co-operation should be easier to accomplish.

As conventional devices turn into connected devices, city services, environmental conditions and security no longer need to be monitored separately. For example, cities are starting to use their urban lighting infrastructure to do far more than illuminate urban spaces. Take street lights: when enhanced with sensors, intelligent applications, connected electronics and software controls, they can become monitoring systems, collecting and transmitting data on everything from energy efficiency and pollution levels to traffic congestion. Motion and noise detectors installed on poles can track changes that could indicate incidences of crime or violence.

Being able to collect and analyze urban data is a big step forward. Technology can make a city a safer place at times of natural disasters. Last year one of the Global Urban Innovators supported by the New Cities Foundations developed PetaJakarta, an online open-source platform to collect information about flooding and critical water infrastructure in



Indonesia's capital Jakarta. The app crowdsources information on flooding from residents so that emergency management services can respond more effectively. Users post reports on Twitter, while geolocation technology adds each report to the open-source map.

All this comes at a critical time for cities, which are under growing pressure to find funding for smart city projects that deliver more and better services just as public finances are becoming increasingly stretched. Cities require innovative approaches. Pittsburgh is pursuing philanthropic funding to help pay for some of its technology-focused investments (see case study below).

Technology can help monitor the performance of the suppliers city governments use for the maintenance of public assets such as parks and roads. Madrid has done this by working with IBM to develop a platform that aggregates data from city systems, vendor invoices and citizen feedback to track the performance of suppliers. For example, it can determine whether waste bins in public parks are emptied before overflowing. By tying pay rates for contracts to performance, it creates incentives for improvement.

Meanwhile, with technology at their fingertips, citizens and visitors can interact with the city in unprecedented ways. From booking a car service and finding the nearest bike-sharing depot to reserving restaurant tables, buying theater tickets or locating the nearest coffee shop, hundreds of urban services can now be accessed anywhere, at any time, via apps on mobile devices.

Impact on the quality of city life

Critically, the apps and services and efficiencies made possible by digital technologies contribute to an improved quality of city life. When commuters can book taxis on their smart phone or use apps

telling them when the next train is to arrive, for example, it can reduce some of the stress of daily transit. If drivers can use an app to find out where the next available parking space is located, it not only makes life easier for the driver, it also reduces the pollution generated from cars endlessly circling neighborhoods in search of a place to park.

The data generated by their inhabitants help cities to make improvements to the quality of life, as Boston is doing by analyzing data from a range of transit apps, CCTVs, street sensors, 311 reports [for non-emergency issues] and other data-generating devices. The city has been able to reduce traffic jams by understanding the impact of factors such as lane changes and construction projects on congestion.

The improvements in quality of life that smart cities bring are not only important to individuals. In a world where salaries and benefits are no longer the only factors needed to attract and retain the best and brightest employees, recruiters know that living standards and amenities in the city in which their company is located are also important to prospective employees. In the survey, 53% of executives say that smart city initiatives play a role in attracting and retaining top talent. In general, 46% of them say they see bottom-line benefits to smart city initiatives.

For municipal leaders aiming to foster economic dynamism in their city, the ability to attract and retain top talent is a key consideration. And technology gives smaller cities a means to do this. It allows them to compete with global heavyweights such as New York or London, by using digital technology to drive the kinds of improvements in urban infrastructure and services that will make their cities more appealing to new businesses and residents. "Because of ubiquitous connectivity, citizens are deciding on where to live based on livability and quality of life," says Rizwan Khaliq, IBM Global Public Sector's chief marketing officer.



Case study:**Urban renewal as a catalyst for digital advances in Barcelona**

If making cities smart requires long-term investment, the emphasis of initiatives can shift with changes in government. A case in point is Barcelona, long seen as a leader in the innovative use of technology. In 2015 the city elected a new mayor, Ada Colau, an activist and champion of housing rights. Under her leadership, a more citizen-centric approach is emerging.

"The new government is focusing the smart city strategy on bottom-up processes and distributed decision-making, but with a lot to define yet," says Tomas Diez, director of Fab Lab Barcelona, part of a global education and research network. "I am very positive for what is about to come."

Barcelona's move to embrace technology began several years ago, prompted by the revitalization of the rundown industrial neighborhood of El Poblenou by turning it into a knowledge-driven innovation district. Known as 22@, the district now uses the availability of broadband as an incentive to attract digital industries and tech-savvy residents. "This idea of an innovation district was connected with the idea of having digital infrastructures," says Vicente Guallart, former chief architect of Barcelona City Council.

As Barcelona has sought to establish itself as a major European hub for technology and innovation, connectivity has spread beyond district 22@, with the city using digital technology as a way to transform the whole city. The roll-out of free Wi-Fi across many of the city's neighborhoods has been one of the most important elements of this, giving citizens and businesses free connectivity in public spaces.

Technology has also helped to break down traditional governmental silos, allowing departments that once rarely talked to each other to collaborate on new projects more easily because they are using the same digital platform. "Before, every department had its own IT infrastructure," says Mr Guallart. "But we decided to have an open network of Wi-Fi in public spaces and to integrate this in one platform."



As part of the broader digital transformation of Barcelona, wirelessly connected sensors have been installed in much of its urban infrastructure, allowing the city to collect data on a range of factors, from temperature and air quality to pedestrian traffic, waste bins and parking meters—data which can be accessed by citizens on their smartphones, but which can also help the city to manage services more efficiently and plan new developments and transportation networks.

If Barcelona has pioneered urban connectivity, it has also been a leader in the open data movement, establishing an open data portal in 2011. This may explain the results from the EIU survey, with respondents in Barcelona (22%) more likely than those in other cities—such as Mexico City (18%), Berlin (16%) and Rio de Janeiro (15%)—to use open data portals.

"There's a long tradition of open data in Barcelona, and that's why the process of civic engagement for urban transformation is so important," says Mr Guallart. "People are participating more and more in public debates on the construction of new facilities or the transformation of public spaces."

Investments have continued to be made. Since last year, for example, the city has been testing the ability of fog computing (a decentralized computing infrastructure) to make dramatic reductions in the complexity and cost of running smart city services while cutting the time required to deploy new smart city solutions. The technology—implemented by Cisco, Barcelona City Council, the Barcelona Supercomputing Center and other technology and academic partners—is one example of why Barcelona is often referred to as the world's smartest city.¹

What remains to be seen is the extent to which the emphasis will shift under the new administration. "They are assembling a new team and are now doing research on the stakeholders in the city," says Mr Diez. "There is not much [that has been finalized] at the moment, but the two focuses are the democratic city and smart citizens."

2. The fixable city:

Near real-time feedback on urban services

There was a time when most city residents walking past a pile of uncollected rubbish would simply have shrugged in dismay and walked on. A few might have taken the time to make a phone call to their municipal authorities to complain, but this required considerable effort to track down the right department and phone number. All this has changed. Today, using a mobile app, urban residents in a number of cities can register complaints with city governments by sending in a picture or description of anything from a broken sidewalk to a street-light outage.

Paving the way for this process are social media sites such as Twitter as well as apps like SeeClickFix, which automatically send images or descriptions of problems to the appropriate government agencies, with geolocation technology marking precisely where problems occur. These technologies have important implications for the way city governments manage urban infrastructure, allowing them to receive information that is both timely and accurate directly from citizens. "It's easier to react to this than to other forms of communication because we have a picture and we can see exactly what's going on," says Ingrid van Engelshoven, deputy mayor of The Hague, Netherlands, with responsibility for the knowledge economy, international affairs, youth and education.

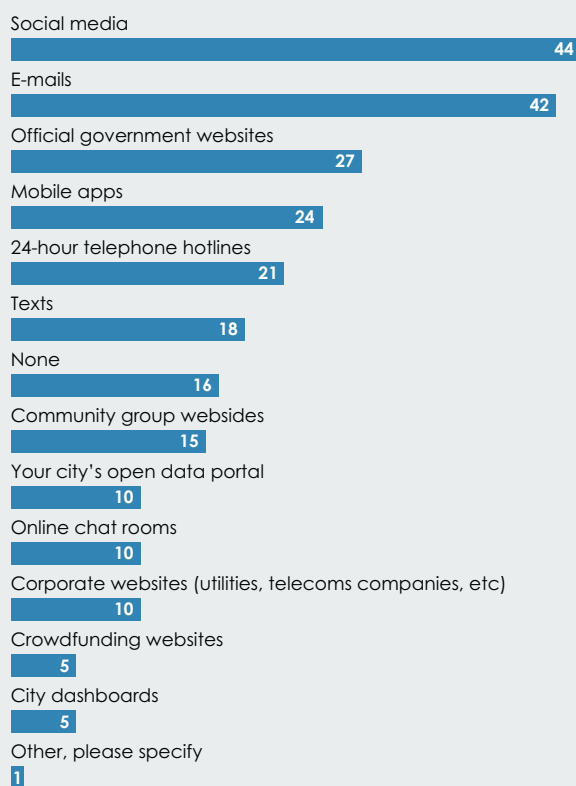
However, digital technologies are also shaking up the traditional relationship between citizens and municipal administrations, enabling citizens to go beyond reporting breakdowns to questioning the way in which urban leaders spend their taxpayer money.

In a world where citizens now have a range of digital tools with which to communicate with city governments, social media (44%) and e-mail (42%) emerge in the survey as the most popular communication channels for citizen participation (see figure 2). Léan Doody, associate director at

Figure 2

The available channels and platforms citizens use for engaging and participating in your community, or the city at large.

(Respondents could select all that apply)



Source: The Economist Intelligence Unit, 2016.

Arup, a London-based global design, planning and engineering firm, believes that among the channels citizens are using, social media are providing powerful new ways for government to connect with urban stakeholders. "That opens up government by giving people a direct channel to them," she says.

Urban residents certainly appear eager to interact more with city authorities. While relatively few citizens

(32%) are currently providing feedback to local authorities, more than half say they would like to do so. City leaders can learn a lot about their city by monitoring social media channels and tracking what citizens are viewing and photographing most frequently, where they are eating out and which amenities they are using regularly.

Ms van Engelshoven notes that responding through these channels requires a cultural shift on the part of government workers. "What we did have to get used to was the fact that it's 24/7," she says. "It's not what civil servants are used to." As her comment suggests, while social media and other mobile communications channels give citizens the ability to provide fast and accurate feedback on their city, those working in city departments also need to make a significant shift in working practices if they are to respond effectively.

"It's a pretty existential question," says Mr Anderson. "For most of history, citizens' response to unhappiness with infrastructure was that they might line up at an office to complain. Today, with social media and websites, it is a constant stream, and cities are struggling to keep up."

"For most of history, citizens' response to unhappiness with infrastructure was that they might line up at an office to complain. Today, with social media and websites, it is a constant stream, and cities are struggling to keep up."

- Maxwell Anderson, executive director, New Cities Foundation



Tracking city performance

Technology is also creating unprecedented levels of transparency into the effectiveness of everything, from traffic management to crime reduction. During the winter months in New York City, for example, the PlowNYC website allows residents to track the progress of snow clearance.

Going beyond their own city, citizens can use the World Council on City Data (WCCD) portal, which launched in 2015, to benchmark their city on 100 service performance and quality-of-life indicators and compare its performance against others. To enable these comparisons, the WCCD developed ISO 37120, the first International Organization for Standardization (ISO) methodology to measure the performance of cities.

"It's extremely usable," says Patricia McCarney, president and CEO of the WCCD. "City leaders, for example, can login to the WCCD Open City Data Portal to assess their city's dependence on property tax compared to other peer cities. Alternatively, a citizen could also login to see how his or her city measures up on bike lanes relative to other cities from around the world."

But as technology shines a light on the performance of urban authorities, cities have to be sure they are equipped to respond. "Everyone can see what you're promising," says Ms van Engelshoven. "So you have to think carefully up front about what you can deliver—because if you don't deliver, you're exposed."

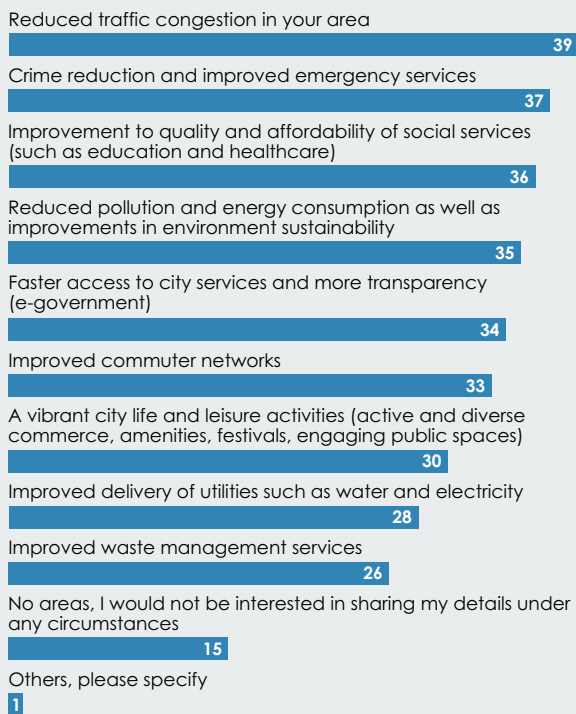
As it becomes easier for citizens to provide feedback to cities, this pressure to deliver is only going to intensify, says Mr Anderson of the New Cities Foundation, particularly as young people expect to be able to interact with service providers. "They're born digital and assume that this is the form of communication that will yield the best results," he says. "That demographic shift will impel cities toward a more responsive approach."

Nevertheless, if technology puts cities under pressure to respond, it also allows for an efficiency that was unthinkable in a world where managing urban infrastructure involved maintaining spreadsheets, juggling phone calls, filing letters from citizens who struggled to find the right department, or sending field workers out simply to review and assess problems. Instead, much of the review and assessment process can take place remotely, leaving engineers more time to fix the problems.

Figure 3

The areas in which citizens would be prepared to share personal data (eg, travel patterns, spending habits) with city government for the express purpose of making improvements to infrastructure and services.

(Respondents could select all that apply)



Source: The Economist Intelligence Unit, 2016.

Transparency vs privacy

Access to data stimulates change. And as governments look for ways to encourage their citizens to become healthier or reduce their environmental footprint, information is a critical tool. Armed with knowledge, citizens are more likely to take personal action, as the survey reveals: 57% of respondents say digital information about utility use would encourage them to alter consumption patterns, and one-half say that it would help them change their use of cars and public transportation—which has potentially huge implications for the sustainability of cities. It could also have an impact on the health of local residents as they utilize transparent data on air pollution to reduce their exposure at peak times.

To capitalize on the willingness of stakeholders to participate in this sort of change, cities must ensure that everyone has equal access to digital channels. And it is often the basics—such as access to the Internet and digital literacy skills—that can have the greatest impact on citizens' ability to interact.

Minerva Tantoco, New York City's former chief technology officer, explains that 22% of New York citizens still lack broadband access at home. This means governments need to think about the types of access to the digital communication channels they create for their citizens. "As we move more and more stuff online, we need to be mindful of the digital divide, because not all residents have equal access," she says.

“As we move more and more stuff online, we need to be mindful of the digital divide, because not all residents have equal access,”
- Minerva Tantoco, former chief technology officer of New York City

Cities should also respect citizens' privacy and maintain data security. According to the survey, citizens are surprisingly willing to share their personal data, particularly for the purposes of improvements to transportation services and traffic congestion (39%) as well as for improving emergency services and reducing crime (37%). (See figure 3.) When it comes to reducing traffic congestion, residents in North American cities—Chicago (47%), Toronto (49%) and New York City (41%)—show the greatest willingness to share their data. Perhaps unsurprisingly,

given its notoriously bad traffic conditions, the residents of Los Angeles (50%) form the biggest group open to sharing their data for a specific purpose.

However, willingness to share personal data could evaporate if citizens were to lose trust in government. "Privacy issues need to be taken very seriously," says Professor Ratti. "The issue is not in 'data collection' but in the way they are used. In other words, the issue is not technological but political: Who has access to the data? What are they used for?"

Case study:**Digital tools help Pittsburgh to forge a new urban identity**

304,391

estimated population 2015

In the Department of Innovation and Performance—home to the City of Pittsburgh's technology initiatives—staff like to joke that the easiest way to reach William Peduto, the city's mayor, is often via Twitter. "He's probably one of the few local government leaders that tweet themselves," says Debra Lam, chief of innovation and performance for the City of Pittsburgh. "He has over 45,000 followers, his tweets are all his and he has his own account, so it's genuinely the mayor when you reach out to him."

A mayor who is active on social media is not Pittsburgh's only form of digital engagement. "We were one of the first cities to have a whole senior leadership that did an 'Ask Me Anything' Reddit," explains Ms Lam. "And before we did our open data legislation, we posted the draft online so people could comment on a Google Doc, and we had an ongoing Twitter town hall when the legislation was being discussed."

For the City of Pittsburgh, technology is a way to showcase its initiatives and investments, but it also allows citizens to have a bigger say in how these projects are designed, and it has given residents a far broader range of channels through which to communicate with the city. Ms Lam cites the recently launched MyBurgh app. "You can log service requests through your phone, you can check for press releases, you can find out about snow in winter," she says. "And there's a social media component, so we also accept service requests through Twitter."

Rather than dwelling on its disadvantages, Pittsburgh

cites its emergence from a troubling time during the late 1980s, when steel manufacturing jobs declined, as an important step in moving toward becoming a nimble, IT-driven city. The fact that it had to work to reverse its deep decline gave the city a willingness to embrace the new—including new technologies. The rise of "Eds and Meds" (education, healthcare and life sciences industries) and the evolution of steel companies into advanced materials producers have given Pittsburgh a more diversified economy.

"We've slowly risen back up and forged a new identity," says Ms Lam.

In addition, being what Ms Lam calls a "small big city" has its advantages, making it easier than elsewhere to cross the departmental silos in city government. For a smaller-scale city, developing IT systems that are interoperable between departments and across functions is arguably less challenging than it is for very large cities. "It's small in the sense that people know each other, and it's not hard to break through the barriers," she says.

The challenge, however, has been financing the new technologies and communication channels. Without the funding to hire specialist technology staff, the city has had to work with existing human resources, training staff to incorporate platforms such as Twitter into their day-to-day work.

Turning to philanthropic funding has helped, and the innovation and performance department has successfully secured foundation funding for a number of additional staff. "We have to be very lean and leverage other resources," explains Ms Lam.

3. The crowdsourced city:

A growing citizen interest in shaping their cities

If social media and other channels give stakeholders the opportunity to provide feedback on city services and infrastructure, digital technology also offers the promise of something even more powerful—the ability to include citizens and businesses in what MIT's Professor Ratti calls the city's "innovation ecosystem".

Here, the results of the EIU survey reveal room for improvement. Few respondents say they feel able to have an impact on smart city projects (15%) or improvements in energy and water services (9%), while one in four executives (the largest group) feel that their company cannot participate effectively in urban improvements (see figure 4).

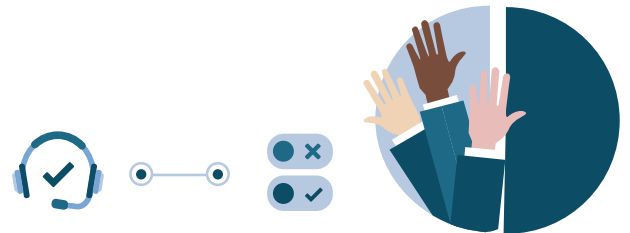
Figure 4
In which areas, if any, can you participate most effectively in order to have an impact on improvements in your city?

CITIZENS' TOP 3	EXECUTIVES' TOP 3
1. Social services such as healthcare and education (30%)	1. My business does not participate in any area (25%)
2. Pollution reduction and environmental sustainability (25%)	2. Smart city projects (21%)
3. Waste collection, treatment, and recycling (24%)	3. Social services such as healthcare and education (20%)

Source: The Economist Intelligence Unit.

Technology has the potential to increase participation, enabling elected officials to solicit far greater input on decisions than would be possible by scheduling public hearings. "Getting 50,000 residents in the neighborhood to weigh in on a zoning change is something you can't do cost-effectively through traditional methods," says Rohit Aggarwala, chief policy officer at Sidewalk Labs, a New York-based urban innovation company.

Aside from the cost and limit on numbers, Mr Aggarwala also points out that the timing of public hearings can create imbalances in the types of



voices being heard. "During the business day you get professional advocates, in the evening you get a certain crowd, and some never engage at all," he notes. The convenience of technology, he says, makes it easier for a far more diverse group of people to participate.

For larger planning decisions, cities are choosing different types of digital channels from the ones they use to allow citizens to submit complaints. "When São Paulo was working on its urban development plan, it hosted a specific website where people could make suggestions and recommendations for the next couple of decades," says Diego Canales, tools and data innovation associate at the WRI Ross Center for Sustainable Cities of the World Resources Institute. "So for acting on real-time data, Twitter is very strong. But if cities want feedback [on a particular project], they'll host a website that's specific to that."

Beyond enabling citizens to have a say in zoning changes or the location of a new subway station, cities can also tap into their innovative capabilities. "It is important to get people excited about creating apps and using data themselves," says Professor Ratti.

The open data movement, embraced by many cities, has enabled the development of citizen solutions to urban challenges. The launch of open data portals in many cities has sparked a wave of new services, notes Peter Hirshberg, chief executive of the Re:imagine Group, a consultancy that helps clients harness emerging technologies. "Suddenly you saw all sorts of software developers and start-ups starting to engage because there was something for them to grab on to," he says.

New forms of engagement

To encourage this kind of innovation, many cities have launched hackathons, appathons and other competitive technology-driven events, as well as online crowdsourcing challenges. And while not all cities appear to be doing this—few respondents to the EIU survey (20%) say they have participated in hackathons, participatory budgeting or similar events—citizens are eager to engage in this way, with more than half of respondents (54%) expressing a desire to participate. In this respect, those who are keenest are from emerging markets, with respondents from Buenos Aires (65%), Shanghai (77%), Rio de Janeiro (73%) and Mexico City (87%) most likely to express a desire to participate in hackathons, participatory budgeting or similar events.

Mr Hirshberg believes younger people are particularly willing to contribute to the development of their cities. “You have the fact that millennials are more service-oriented,” he says. “They feel empowered, and if the city lets them know it has problems, they will flock to it—especially if there’s money in it.”

Sonja Miokovic, co-founder and global director of YouthfulCities, a social enterprise promoting youth-led, data-driven urban regeneration, also sees young people as active innovators. Among the young urban residents her organization serves she sees many who are drawn in by the desire both to shape their city and to become successful entrepreneurs. “Younger generations are first adopters when it comes to the role of apps, not

only in civic engagement and services, but also in creating new markets that have economic benefits,” according to Ms Miokovic.

One question is how to engage older people in the creation of digital city services. Their participation is especially important at a time of shifting demographics, when the urban population is ageing, putting pressure on health- and social-care services in many cities around the world.

For Ms van Engelshoven, a powerful way forward is to demonstrate technology’s tangible benefits. “Show citizens things that can help them improve their lives,” she says. She cites EigenZorg (Self-Care), a website and app for people who need homecare developed by a private enterprise based in The Hague. “If they’re looking for a neighborhood nurse or someone who could help around the house, they can upload their profile and find someone who fits and can provide them with the help they need,” she explains.

Similarly, Cubigo, a cloud-based platform developed by Belgium-based software company Aristoco, helps older people to live independently by connecting them with caregivers, family and businesses via a user-friendly interface.

Some argue, however, that beyond the development of apps that enhance city services, municipal leaders need to engage urban stakeholders in larger infrastructure development. This will not be easy, however, since social media and other citizen engagement channels are not always suited to participation in the planning of large-scale projects that involve long time frames and a broad range of stakeholders.

“The fundamental problem is that the nature of the medium for engaging people online doesn’t lend itself to the kinds of deliberations you have when dealing with longer-term infrastructure investment,” says Anthony Townsend, an urban planner, forecaster and senior research scientist at New York University’s Rudin Center for Transportation Policy



and Management. “Most of the media people are using online are designed for short attention spans and short decision cycles, and they’re not that great for dealing with complex, nuanced issues.”

“Most of the media people are using online are designed for short attention spans and short decision cycles, and they’re not that great for dealing with complex, nuanced issues.”

- Anthony Townsend, senior research scientist at New York University’s Rudin Center for Transportation Policy and Management

Emerging technologies could change this, particularly visualization software that helps citizens understand alternative possibilities in urban planning. “People doing scenario narratives, rather than writing 1,000 words about what a future neighborhood might look like will simply visualize it, often using a computer rendering and fictional artifacts, vehicles or characters,” says Mr Townsend.

It is still “early days”, he says, and these visualizations have yet to become widely accessible via social media and other channels. However, he sees them becoming more widely used in the coming years. “It’s happening in the more conventional practices of open planning, but it is going to spill over into popular discussions,” according to Mr Townsend.

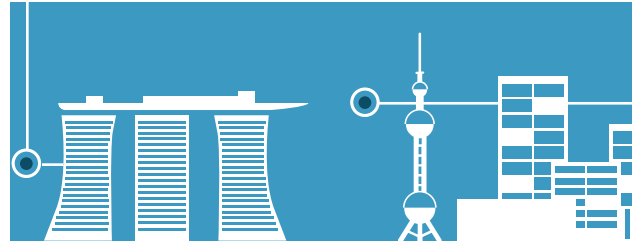
Case study:**From apps to visualizations, technology helps Singapore engage its citizens**

In announcing Singapore's Smart Nation initiative in 2014, the prime minister, Lee Hsien Loong, talked of "a nation where people live meaningful and fulfilled lives, enabled seamlessly by technology, offering exciting opportunities for all". But while the Smart Nation initiative has a single title, like the concept of the smart city itself, it encompasses a wide range of technologies, organizations and objectives.

An important element of the plan is a technology platform designed to create a continuous digital connection between people and city systems using a common technical architecture that allows a wide range of stakeholders—from companies to residents—to participate in making improvements to the city.

Singapore's open data portal—data.gov.sg—hosts datasets on transportation, healthcare, weather and education, as well as APIs from government agencies to help citizens and businesses to develop applications for public and commercial uses. An API, or application programming interface, is a set of published definitions, protocols and tools for building software and applications.

The city is well positioned to foster this kind of participation: at almost 150%, Singapore has one of the world's highest mobile penetration rates in the world (based on the total number of mobile subscriptions divided by the total population). Reflecting this, the survey shows that mobile apps are more popular in Singapore (38%) for engaging with cities than other channels and platforms. Singaporeans also make up the largest group of



respondents highlighting mobile apps, followed by Mexico City (33%), Barcelona (32%) and Buenos Aires (26%).

Singapore has developed visualization technology that makes it easier for all city stakeholders to contribute to infrastructure planning. Virtual Singapore—developed by the National Research Foundation, the Prime Minister's Office and the Singapore Land Authority and the Infocomm Development Authority of Singapore (IDA)—is an online three-dimensional city model and collaborative data platform that can be used by the public and private sectors, individuals and researchers.

"Virtual Singapore will enable users from different sectors to develop sophisticated tools and applications for test-bedding concepts and services, planning and decision-making, and research on technologies to solve emerging and complex urban challenges," explains Jacqueline Poh, managing director of Singapore's Infocomm Development Authority.

But while the Smart Nation initiative includes everything from hackathons, public-service apps and open data to the S\$8m10 (US\$7.4m) Digital Inclusion Fund established to bring broadband services to low-income residents, Ms Poh stresses the overarching goal for investing in technology: "It is an ecosystem and a roadmap for how we can bring people, businesses and everyone together to co-create solutions."

4. The collaborative city:

The private sector as a partner for advancing smart cities

Cities are dependent on businesses to provide everything, from broadband services to IT hardware, to realize their digital ambitions. However, the EIU survey shows that more could be done to encourage private-sector participation in urban decisions. Many respondents say their companies are not engaged with urban improvements, and three out of five executives believe that city governments should do more to engage businesses in smart city projects.

Room for greater corporate-sector engagement exists. Few of the business executives surveyed have participated in a conference, business roundtable or a one-on-one meeting with government for this purpose. And there appears to be little interest in doing so.

Given this apparent lack of enthusiasm for traditional face-to-face engagement, digital technologies could play a key role. In fact, more than one-half of respondents (52%) say that their company would be more willing to report deficiencies to local authorities and make suggestions for improvements if it had access to a better range of digital communication channels. A majority of executives (73%) are enthusiastic about the idea of facilitating citizen engagement in urban planning and design by sponsoring hackathons, appathons, online crowdsourcing challenges or similar digital innovation events. These types of events can also go a long way toward explaining complex projects whose infrastructure seems convoluted and obscure to residents.



Part of the problem, the survey reveals, is that cities tend to treat companies as suppliers or service providers rather than strategic partners. This is a complaint raised by almost one-third of executives (32%). What will help, suggests Ms Tantoco, is adjusting procurement practices for technology purchases. "They very much want to partner with us," she says. "But it's a very onerous process."

**"Buying existing technology from the shelf isn't that interesting [...] But putting a challenge on the table and inviting the private sector to help us solve it, that makes [business engagement] interesting."
- Ingrid van Engelshoven, deputy mayor, knowledge economy, international affairs, youth and education, The Hague**

Together with their government partners, companies can innovate around new partnership models, shared incubator spaces, smaller pilot initiatives and other approaches to fostering smart city projects that are truly meaningful. Ms Tantoco also thinks that cities could make it easier for businesses—including start-ups—to work with government by running pilots before embarking on large-scale public-private partnerships. Pilot programs also lower the risk for city governments. "We can get to know each other before we get married," she says.

Ms van Engelshoven argues that engaging the corporate sector in this way—rather than simply procuring its products and services—is a means of sparking innovation. "Buying existing technology from the shelf isn't that interesting," she says. "But

putting a challenge on the table and inviting the private sector to help us solve it- that makes it interesting."

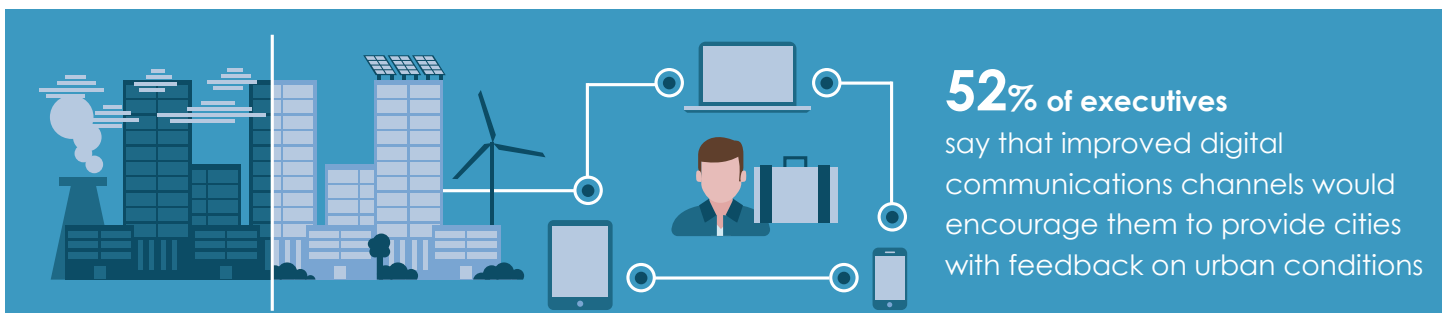
Digital technology will play a key role in engaging the private sector in this way, offering similar—or in some cases the same—channels as those used to solicit ideas from residents, with crowdsourcing encouraging entrepreneurs to bid directly to solve local government challenges.

On CityMart, for example, which sources intelligent solutions for urban and social problems in global cities, challenges are posted online, and proposals can be submitted and are evaluated by city officials and field experts. Examples include Philadelphia's search for new ways to reduce the cost of its green stormwater infrastructure program, a request from Ireland's capital Dublin for a means of monitoring pedestrian flow, and the UK city of Sheffield's interest in finding solutions to capture heat from industrial processes to serve its district's energy needs.

Governments can look to private-sector forerunners for this kind of open solution sourcing. Since the 1990s, for instance, Procter & Gamble (P&G), the US consumer goods company, has used its Connect + Develop website to help external innovators and companies submit their innovations in response to needs posted on the site by P&G.

The use of digital tools by municipal governments represents a shift in the traditional relationship between the business community and the public sector. And their use will become more critical as public-sector resources become increasingly tightly stretched. "We can't do this alone," says Ms van Engelshoven. "We need the private sector to innovate."

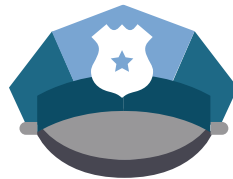
She advises cities to take a broader, more holistic view of the role of the private sector in improving urban services and infrastructure. "It's not about technology companies selling their stuff," she explains. "It's about improving people's lives—and that should always be the goal."



Conclusion:

Implications for decision-makers

For urban leaders, the ability to use digital technology as a channel for citizen engagement comes at a critical time. Finding ways to deliver public services more efficiently and at a lower cost is a key concern at a time when city populations are expanding and public-sector budgets are shrinking. Technology offers a way forward at two levels: top-down and bottom-up. At the top, investments in connected infrastructure enable cities to run more smoothly and at lower cost. But with a bottom-up approach they can harness not only the data that residents generate as they use city amenities and services, but also the ideas they have on how to make cities more livable.



Simply providing digital communication channels and opening up access to data will not build smart cities. Urban leaders must provide the resources necessary to analyze those data, and they must respond to citizens' suggestions. They need to build resources internally and work more collaboratively both across departmental divisions and with private-sector partners. This means thinking beyond software, hardware or social media and re-examining the culture and organizational structures of government itself. Considerations include the following:

• Connect and respond

While citizens are eager to provide feedback to cities via digital channels and are willing to share their data, levels of trust will depend on how well cities respond to service requests from citizens and how they use citizen data to plan and improve city services. "There's a false assumption that if you open things up and people can complain, it will make things better," says Mr Dasgupta of the World Resources Institute. "Cities can only get better if someone is responding to that complaint."

• From consumers to contributors

While technology is clearly a powerful tool in

soliciting feedback from the consumers of city services, its value will only be realized if cities can develop a culture based on partnership and collaboration. As part of this, urban leaders need to make the shift from seeing citizens as passive consumers of municipal services and generators of data on consumption patterns to active participants in shaping the city's future. "If we can develop the right platforms, people can make a crucial contribution to addressing problems such as energy, traffic, healthcare, food distribution and education," says MIT's Professor Ratti. The survey points to a particular appetite for hackathons, but cities also need to provide channels for ongoing collaboration.

• Looking beyond the apps

The majority of survey respondents say they feel less engaged with smart city projects than they do with other city services and areas of urban governance. Municipal leaders, therefore, need to do more to include citizens in these projects, rather than managing them solely through public-private partnerships with large technology providers. Engaging citizens on long-term infrastructure investments is not as easy as engaging them on public services, but as visualization technology becomes cheaper and easier to use, cities will be able to present their plans to a wider range of urban stakeholders. "It's using digital media to show people what the future is going to be like," says NYU's Mr Townsend.

• Protecting privacy

While citizens in the survey show willingness to share their data with cities, this willingness could disappear if they find that their data are being used for purposes of which they do not approve, or if they fall into the wrong hands. Establishing robust governance frameworks for data use is therefore a priority for cities. Mr Eskelinen of Future Cities Catapult proposes a dashboard approach, whereby citizens would control all their data via a central hub from which they could release them



to different entities, whether companies or public-sector agencies. "The question is how to give people tools to manage their data," he says. "It's not a job for lawyers or legislators, it's about building the technical capacity to do that."

• Promoting transparency

If citizens are willing to hand over their data to municipal governments, those authorities must return the favor. Many are doing so through dedicated web portals that track local government performance on everything from the repair of potholes to the removal of snow. Apps can also perform this function, giving citizens channels through which to submit feedback on city services as well as real-time information on the status of those services. But whichever channels they choose, administrators must be prepared to open a window onto their performance and spending patterns—a window that is never closed. "Earning the trust of citizens is a 24-hour job," says Mr Anderson of the New Cities Foundation. "Cities don't stop at 5 pm."

• Across the divide

Technology is a powerful tool, providing different areas of urban management with the means to connect not only with citizens but with each other. Yet internal silos and top-down approaches to urban management, as well as incompatible legacy systems, risk working against new technologies in connecting different functions and departments and could block urban stakeholders from having their voices heard. If these silos are not broken down, investments in software and hardware will not pay off. IBM's Mr Khaliq suggests that cities appoint a "citizen engagement officer" or similar executive, who can work across these silos and is not focused on the technology alone. "I've seen cities starting to introduce chief innovation officers



and some are revisiting the chief technology officer role," he says. "But ultimately, you need a combination of someone who understands the value of technology and also governance—a hybrid person who understands procedurally how to make it happen." Regardless of how cities decide to organize this from a human resources perspective, they will need to ensure that city departments collaborate in new ways.

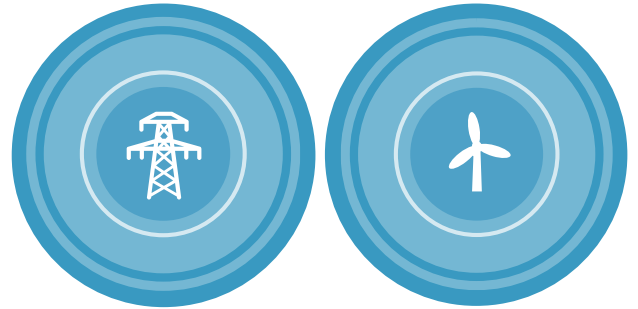
The path toward citizen engagement will not be easy. Digital communication technologies enable cities to engage with citizens and businesses in unprecedented ways, but in doing so they also shake up the status quo, forcing municipal leaders to relinquish their command-and-control approach to running city services and embrace new, innovative approaches such as bottom-up management and crowdsourcing.

Technology also has political ramifications. For if citizens can use digital channels to provide real-time feedback on potholes and monitor and reduce their own energy consumption, their expectations of the speed with which politicians act on their commitments also is changing. "The interesting tilt is one of authority and the whole premise of representative democracy," says Mr Anderson. "The idea of a time lag between an election and things being improved is changing." For politicians who get this right, the rewards are an engaged citizenry and re-election; for those who get it wrong, they may see the negative impact at the ballot box.

Moreover, technology is only part of the answer. A culture of openness and transparency is also needed to encourage citizens to participate in the smart city. To traditional municipal leaders, this kind of openness can be threatening, says Mr Hirshberg of the Re:imagine Group. "The city mentally has to

go from being threatened to recognizing that this can help it. [A transparent culture] is inexpensive and it makes the city smarter," he says. "That's the difference between what a smart city is and what it is not."

For cities that can adapt to this new world, the rewards could be rich. Providing digital tools that help business and citizens participate in urban planning and policy-making promises to create a more engaged set of urban stakeholders. It could allow cash-strapped administrations to do more with less while unleashing a wealth of new insights that will make cities smarter, more environmentally sustainable and ultimately more appealing places in which to live.



LONDON

20 Cabot Square
London
E14 4QW
United Kingdom
Tel: (44.20) 7576 8000
Fax: (44.20) 7576 8500
E-mail: london@eiu.com

NEW YORK

750 Third Avenue
5th Floor
New York, NY 10017
United States
Tel: (1.212) 554 0600
Fax: (1.212) 586 1181/2
E-mail: americas@eiu.com

HONG KONG

1301 Cityplaza Four
12 Taikoo Wan Road
Taikoo Shing
Hong Kong
Tel: (852) 2585 3888
Fax: (852) 2802 7638
E-mail: asia@eiu.com

GENEVA

Rue de l'Athénée 32
1206 Geneva
Switzerland
Tel: (41) 22 566 2470
Fax: (41) 22 346 93 47
E-mail: geneva@eiu.com

While every effort has been taken to verify the accuracy of this information, The Economist Intelligence Unit Ltd. cannot accept any responsibility or liability for reliance by any person on this report or any of the information, opinions or conclusions set out in this report.
