

ThoughtLab

In partnership with **HATCH**



Building a Future-Ready City

A roadmap for the next phase of urban transformation

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Introduction

Cities are in the throes of unprecedented change.

Still reeling from the pandemic, and now facing economic, social, and climate disruptions, cities must quickly come to grips with the rising expectations of citizens. These run the gamut: wider digital access to public services, medicine, and education; more sustainable and safer infrastructure, mobility, and living conditions; and greater inclusiveness, public health, and affordable housing.

Baby steps won't be enough. To overcome today's urban challenges, cities must become future-ready. They need to morph into sustainable, inclusive, resilient, and safe metropolises—with newly fit-for-purpose digital and physical infrastructure.

This is no easy task. Today's cities face severe skills shortages and budget constraints that make it difficult to keep up with the pace of change. They must contend with onerous political processes, changes in administrations, and regulatory and procurement complexity. Added to that is the need to put out daily fires.

Providing cities with a blueprint for future-readiness

To provide urban leaders with a roadmap for future-proofing their cities, ThoughtLab teamed up with Hatch Urban Solutions and a coalition of business, government,

and academic leaders to conduct this ground-breaking research, titled **Building a Future-Ready City**. To analyze the latest views and strategies, we benchmarked 200 worldwide cities—representing 5% of the global population. In addition, we surveyed 2,000 citizens across 20 cities, interviewed city decision makers across regions, and held discussion groups with urban leaders and experts.

The results of our research, conducted in July-September 2022, are presented in this comprehensive eBook. It reveals how cities will use innovative partnerships, latest technologies, advanced data analytics, new sources of funding, and citizen and community engagement to become future-ready. It also outlines how cities plan to spend an average of \$350 million each on technology investments in seven urban domains over the next five years.

I would like to thank Bob Pell, Dr. Daniel Miles, and their team at Hatch Urban Solutions for their valuable economic analysis, as well as our sponsors, Axis Communications, Cognizant, Dassault Systèmes, Dell, Deloitte, GM, Intel, JLL Technologies, Kearney, NTT, and Visa, which made this research possible. We finished our effort—and now leave the hardest work to city leaders.

Louis Celi
Chief Executive Officer
ThoughtLab



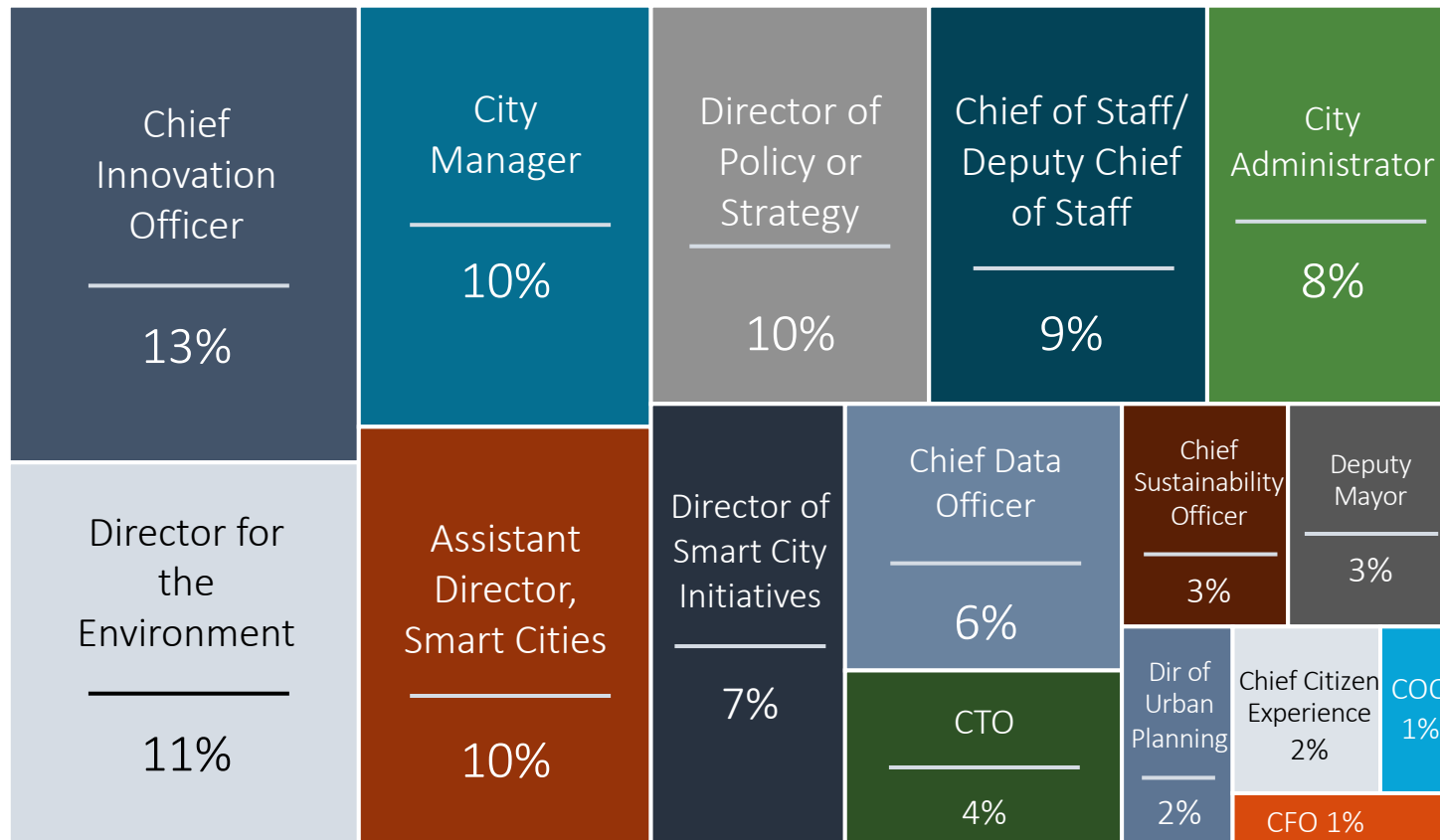
“Our goal is to provide an evidence-based roadmap to future-readiness and to open a valuable dialogue on the future of cities among government, business, and academic leaders.”

Louis Celi
Chief Executive Office
ThoughtLab

The background is a dark blue gradient with a white grid. Scattered throughout are binary digits (0s and 1s) in a light blue color. A line graph with a red line and circular markers is overlaid on the grid. The line starts at the bottom left, rises to a peak, dips, rises to a higher peak, dips again, and then rises to a final peak on the right. There are also some faint, glowing blue lines and shapes, including a large, faint 'X' shape and some rectangular blocks.

Research background

We surveyed decision-makers in 200 cities



We conducted a rigorous benchmarking survey from July to September 2022 through one-on-one phone interviews with city officials from 200 pre-screened cities in 67 countries. The cities are home to over 385.4 million residents, representing 4.8% of the world population.

Forty-four percent of the respondents were in management, policy, planning, or operational roles. Another 42% held positions overseeing technology, data, innovation, and smart city initiatives. The remaining 14% focused on sustainability and the environment.

We followed strict quality control measures to ensure the accuracy of the reported data, including vetting statistical findings with respected third-party research, checking questionable data with cities, and reviewing the output with an advisory board.

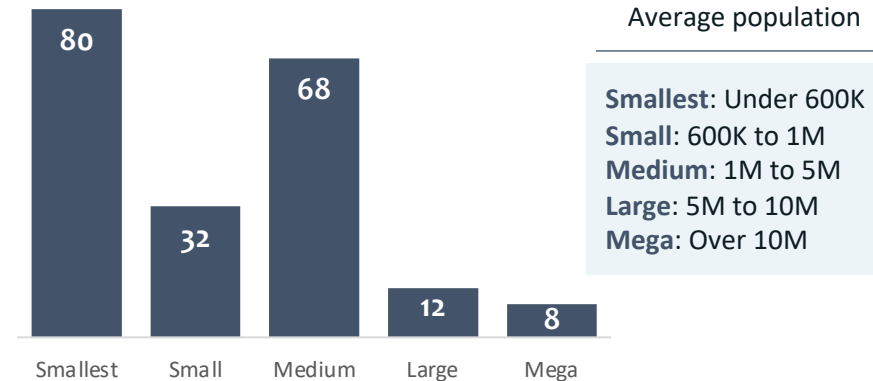
Our city survey covered cities of varying sizes across six regions

To ensure a balanced perspective, we developed a sample of 200 cities that vary by size, location, and level of economic development. The cities range in population from 20,000 to over 21.3 million. Fifty-six percent of the cities have less than one million inhabitants, and 44% have over one million residents. The cities differ by economic development: 47% are in emerging markets and 53% in advanced markets.

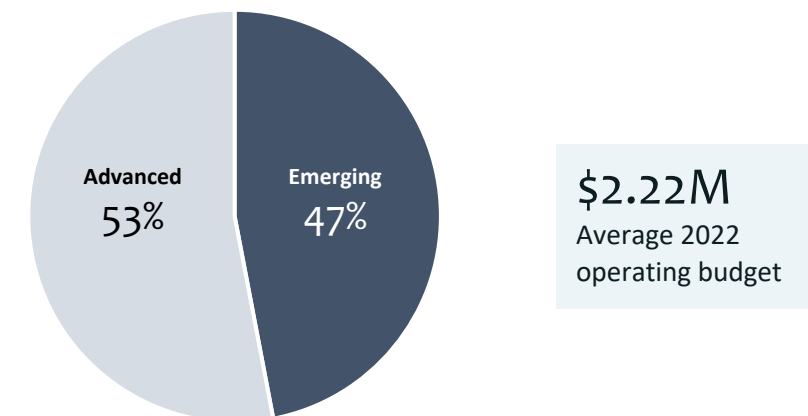
Number of cities by region



Number of cities by population



% of cities by level of development



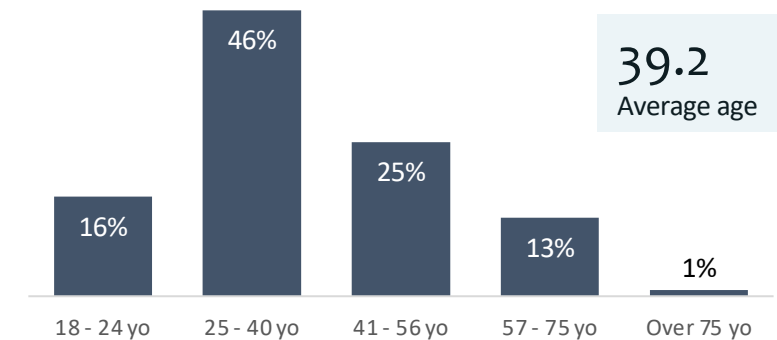
We surveyed 2,000 citizens in 20 cities

To analyze how city plans align with citizen needs, we also conducted a survey of 2,000 citizens in 20 representative cities. These cities range in population from 91,000 to over 12.2 million. Eleven of the cities are in advanced markets and nine are in emerging markets.

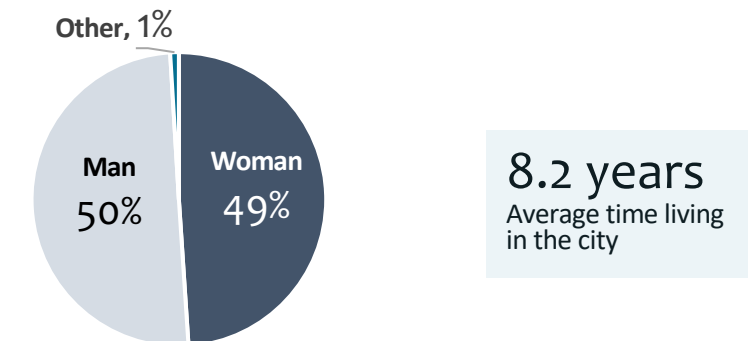
Citizen survey cities



By age



By gender



Our methodology for determining future-readiness

As part of our research, we defined a future-ready city as one that is **smart, sustainable, inclusive, prosperous, and resilient, with the ability to meet the evolving needs of citizens and businesses**. To determine the future-readiness of the cities, we drew on self-reported data from the survey, as well as data from objective secondary sources.

1. Self-reported survey data

We used data from several survey questions to quantify each city's level of future-readiness:

- Q9a: Which of the following domains are included in your vision and action plan(s) to become a future-ready city?
- Q10: How much progress has your city made in addressing the following elements of a future-ready city?
- Q13: What level of transformation is required in the following domains to make them future-ready?

We calculated a score for each question and then aggregated the scores for those questions into an overall score.

2. Data from trusted secondary sources

We supplemented the survey data with objective secondary data on urban performance. The data, sourced from Numbeo, includes statistics on:

- Pollution index
- Traffic index
- Health Index
- Safety index
- Climate index

We normalized each of the indices to be between 0 to 1. The normalized values were then averaged to arrive at an overall performance score for each of the cities.

3. Future-Ready Index

We combined the self-reported data with the performance data to arrive at an overall score for each city.

The cities were classified as follows:

Top 25 percentile: **Future-ready**

26th to 75th percentile: **Progressing**

Bottom 25th percentile: **Developing**

Due to data limitations, we were unable to include 23 cities in the performance analysis. These cities were classified as Developing.

Future-ready cities ranked

Top 10 Future-Ready Cities



1. **Tokyo**
Japan



2. **Hangzhou**
China



3. **Helsinki**
Finland



4. **Tallinn**
Estonia



5. **Taipei**
Taiwan
Province of China



6. **Durham**
UK



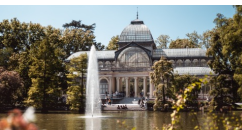
7. **Aberdeen**
UK



8. **Sapporo**
Japan



9. **Boulder**
United States



10. **Madrid**
Spain

Other future-ready cities

11. Amsterdam, Netherlands

12. Christchurch, New Zealand

13. Riga, Latvia

14. Brisbane, Australia

15. Glasgow, UK

16. Salt Lake City, USA

17. Tbilisi, Georgia

18. Oklahoma City, USA

19. Palma de Mallorca, Spain

20. Perth, Australia

21. Santa Clara, USA

22. Edinburgh, UK

23. Cambridge, UK

24. Hobart, Australia

25. Berkeley, USA

26. Valencia, Spain

27. Raleigh, USA
28. Stockholm, Sweden

29. Munich, Germany

30. A Coruña, Spain

31. Denver, USA

32. Ottawa, Canada

33. Cardiff, UK

34. Wellington, New Zealand

35. Dubai, UAE

36. Tampere, Finland

37. Hong Kong, China

38. Daegu, South Korea

39. Porto, Portugal

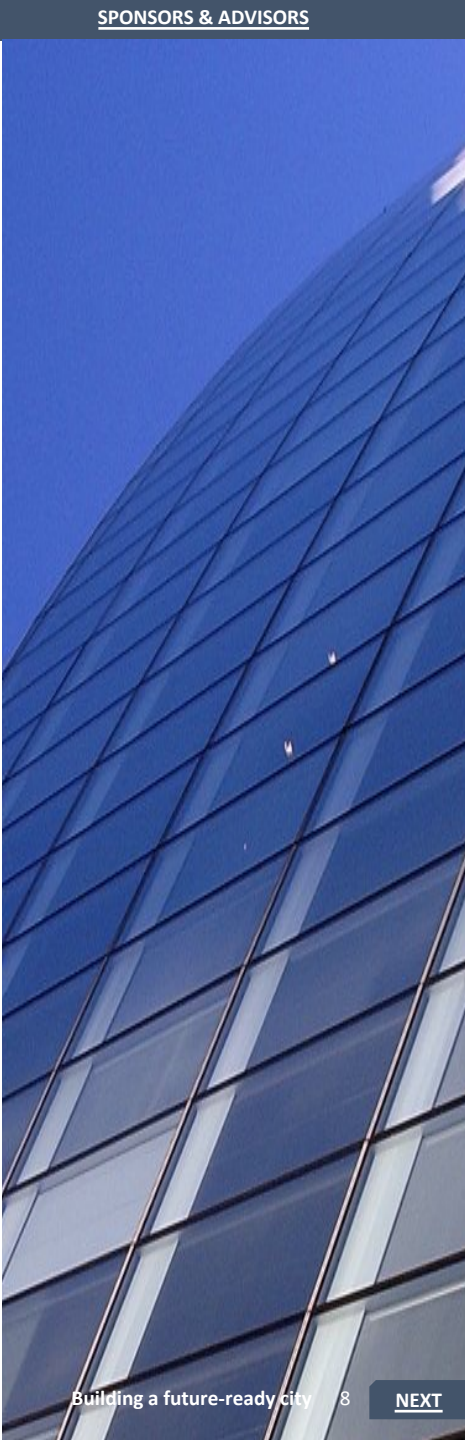
40. Columbus, USA

41. Honolulu, USA

42. Vancouver, Canada

43. Bilbao, Spain

44. Boston, USA



The 10 most future-ready cities by region

North America

1. Boulder
2. Salt Lake City
3. Oklahoma City
4. Santa Clara
5. Berkeley
6. Raleigh
7. Denver
8. Ottawa
9. Columbus
10. Honolulu

Latin America

1. Belo Horizonte
2. Merida
3. Aracaju
4. Pachuca
5. Bucaramanga
6. Curitiba
7. Rosario
8. Guadalajara
9. Quito
10. Buenos Aires

Europe

1. Helsinki
2. Tallinn
3. Durham
4. Aberdeen
5. Madrid
6. Amsterdam
7. Riga
8. Glasgow
9. Tbilisi
10. Palma de Mallorca

Asia Pacific

1. Tokyo
2. Hangzhou
3. Taipei
4. Sapporo
5. Christchurch
6. Brisbane
7. Perth
8. Hobart
9. Wellington
10. Hong Kong

Middle East & Africa

1. Dubai
2. Tel Aviv
3. Kigali
4. Manama
5. Dammam
6. Sharjah
7. Ankara
8. Amman
9. Rabat
10. Istanbul

Full list of 200 cities surveyed

A Coruña	Bologna	Cork	Helsinki	Liverpool	Oklahoma City	Salvador	Tampa
Aberdeen	Boston	Cotonou	Hobart	Los Angeles	Ostrava	San Antonio	Tampere
Abidjan	Boulder	Coventry	Hong Kong	Lucknow	Ottawa	San Bernardino	Tangshan
Accra	Bradford	Curitiba	Honolulu	Lusaka	Pachuca	San Diego	Tbilisi
Addis Ababa	Bridgeport	Da Nang	Houston	Madrid	Palma de Mallorca	San Francisco	Tehran
Adelaide	Brisbane	Daegu	Hyderabad	Maebashi	Pearland	Santa Clara	Tel Aviv
Almaty	Bucaramanga	Dakar	Indianapolis	Makassar	Perth	Santa Cruz	Thessaloniki
Amman	Bucharest	Dammam	Istanbul	Manama	Phoenix	Santa Fe	Tokyo
Amsterdam	Buenos Aires	Dar es Salaam	Izmir	Manchester	Pittsburgh	Sao Paulo	Toronto
Ankara	Byblos	Delhi	Jacksonville	Manila	Porto	Sapporo	Toyama
Aracaju	Calgary	Denver	Jaipur	Melbourne	Porto Alegre	Seattle	Tulsa
Asuncion	Cali	Detroit	Jersey City	Memphis	Pretoria	Semarang	Tunis
Atlanta	Cambridge	Dubai	Jerusalem	Merida	Puebla	Sharjah	Turin
Baltimore	Can Tho	Duitama	Johannesburg	Mexico City	Quezon City	Shijiazhuang	Ube
Bamako	Cape Town	Durban	Juarez	Miami	Quito	Shimonoseki	Utsunomiya
Bangalore	Cardiff	Durham	Kampala	Milwaukee	Rabat	Shiraz	Valencia
Bangkok	Casablanca	Edinburgh	Kano	Miyakonojo	Raleigh	St Louis	Vancouver
Barranquilla	Charlotte	Ekurhuleni	Kansas City	Montreal	Ramallah	Stockholm	Venice-Padova
Beirut	Chengdu	El Paso	Kigali	Munich	Recife	Sunderland	Vilnius
Belgrade	Chennai	Fukuoka	Kinshasa	Murcia	Rezekne	Surabaya	Virginia Beach
Belo Horizonte	Christchurch	Glasgow	Kohima	Nairobi	Richmond	Susono	Washington
Berkeley	Cincinnati	Guadalajara	Kuala Lumpur	Naples	Riga	Taipei	Wellington
Bilbao	Cleveland	Guayaquil	Lagos	New Orleans	Rosario	Taiyuan	Wroclaw
Birmingham (UK)	Columbus	Hangzhou	Libreville	Niterói	Sacramento	Takamatsu	Yangon
Blantyre	Cordoba	Hartford	Limerick	Oakland	Salt Lake City	Tallinn	Zaragoza

Cities in flux

The pandemic was a defining moment for cities—it heightened citizens' expectations for change in many areas and spurred lasting shifts in their behaviors. It also triggered disruptions that amplified existing challenges and created new ones for urban leaders.

Great expectations

The health crisis and other recent trends have intensified expectations for transformative change in cities. Urban leaders recognize the need for new thinking to keep their citizens happy.

The pandemic raised citizen expectations in all areas: from healthcare and education to digital access and infrastructure. Citizen demands have reached a new crescendo: on average, city leaders report rising expectations in 17 areas.

Emerging market cities are under greater pressure from citizens than advanced market cities, especially to offer higher social equity (51% vs. 32% in the citizen survey), greater access to online education (63% vs. 47%), better economic conditions (58% vs. 40%), and more online services (56% vs. 43%).

There is little divergence by population size. The only notable differences are that more citizens in larger cities expect more equity, open space, and access to digital government services, while those in smaller cities are more apt to seek greater personal safety.

“The pandemic taught cities how quickly they can adapt when their survival counts on it—and how devastating things can get if they don’t. Cities should take the lessons learned from the pandemic and snap forward and embrace the new normal rather than snap back and settle for the old norms.”

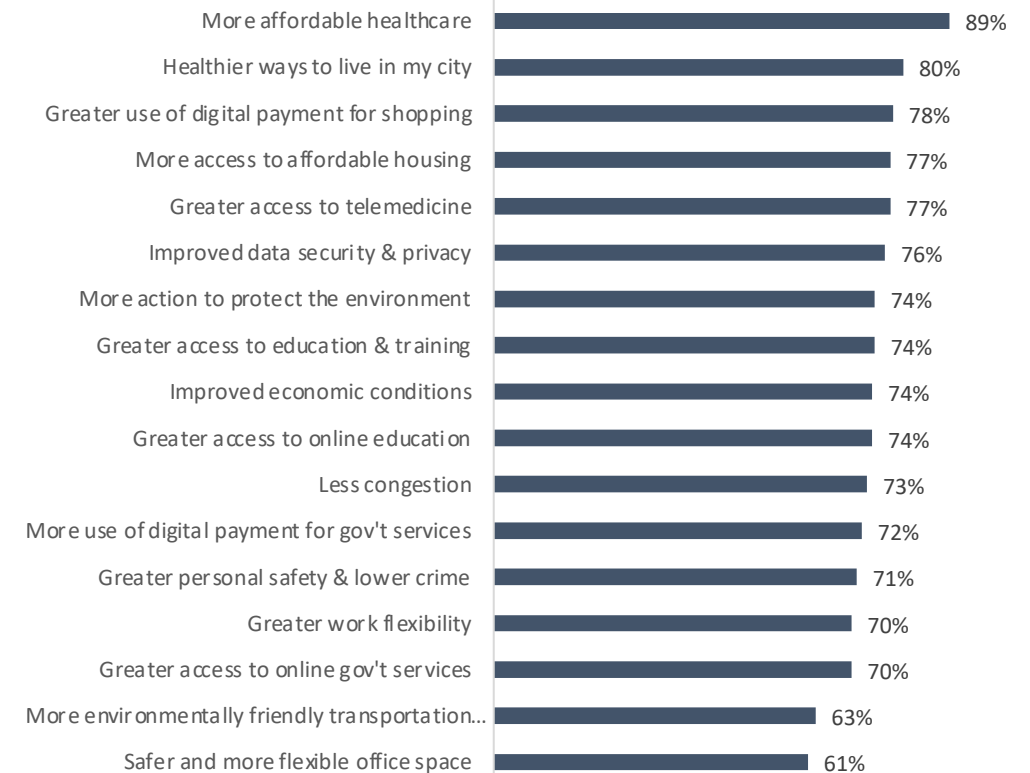
Peter Pirnejad
City Manager
Los Altos Hills, California

Top areas where citizens say they expect more

54%	Greater access to online education
53%	Healthier ways to live in my city
52%	Digital payment for shopping
50%	Digital payment for government services
50%	Environmentally friendly transportation
49%	Greater access to online government services
49%	Greater access to telemedicine
49%	Less congestion

17 = average number of areas (out of 25) where city leaders see higher citizen expectations

Where urban leaders see increased citizen expectations



City survey Q6: In your opinion, in which of the following areas have the pandemic and other recent trends increased citizen expectations? Citizen survey Q9: In which of the following areas has the pandemic and other recent trends raised your expectations?

Cities expect citizens to modify their behaviors

Citizen behaviors are also changing, spurred by several years of social distancing. City leaders expect big jumps in online usage, both for shopping and accessing city services.

Urban leaders also expect that citizens will increase their use of environmentally friendly forms of transportation. They anticipate that citizens will return to work and live in cities, causing commuting between and within cities to increase.

But the jury is still out on working from home. An equal number of respondents think it will decrease as think it will increase. Remote schooling will be less prevalent, with nearly 40% of city respondents expecting it to decrease and 27% foreseeing an increase.

A great majority of city leaders expect online shopping to grow significantly—a lasting effect of the pandemic—but the future of brick-and-mortar commerce is less clear. A third believe citizens will shop less at stores, while nearly a quarter say citizens will shop more.



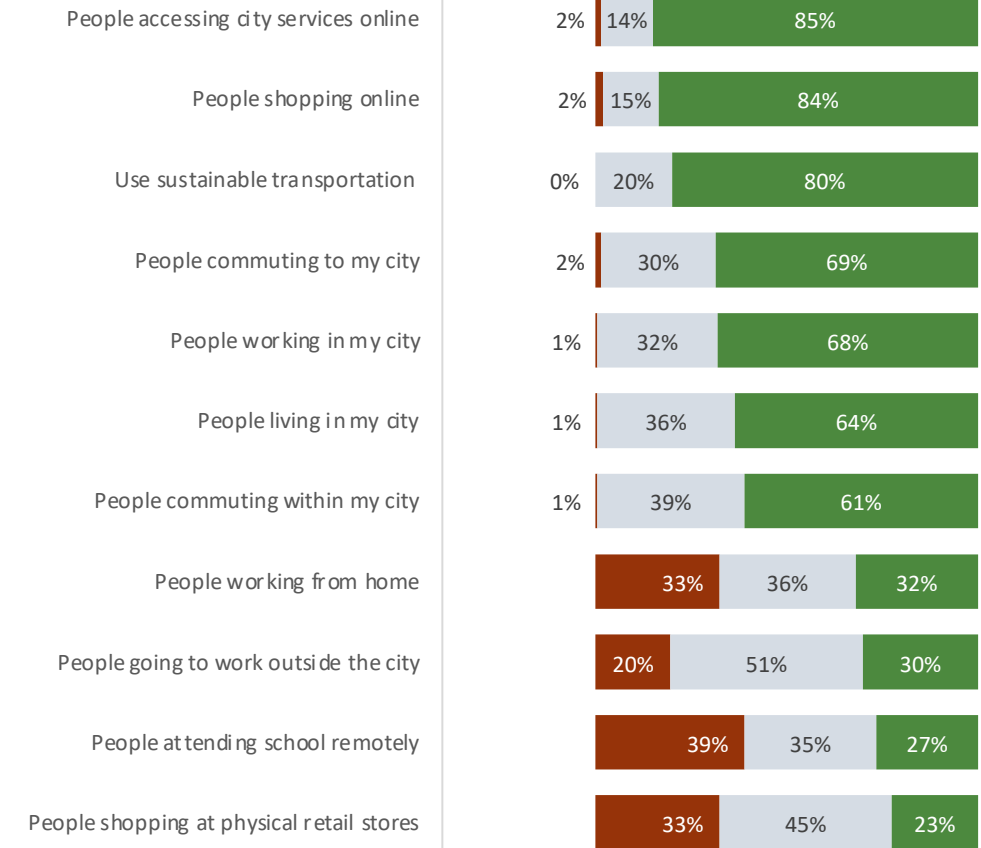
Dublin: Rethinking the city center after the pandemic

Jamie Cudden, manager of Dublin City Council's smart city program, notes that as the pandemic winds down, it's still unclear how many people will return to offices and how hybrid working will play out in the city's business districts.

He is also unsure about the future effects of the growth of e-commerce on traditional retail, which still hasn't returned to pre-pandemic levels.

"Rethinking the city center is a big piece of our change in plans, including stimulating events," he says. "It's become more about the experience, about culture, and about nightlife."

How city leaders think citizen activities will shift



■ Increase
 ■ Stay the same
 ■ Decrease

City survey Q7: Do your city's plans anticipate that the following activities will increase, stay the same, or decrease over the next five years?

What citizens say they will do differently in cities

Like city officials, citizens expect many of their behavior to change substantially over the next five years compared to before the pandemic.

According to our study, the biggest change will be that citizens will shop more online. As part of their move to more online interaction, citizens say they will be using digital payments and delivery services more.

How this will affect brick-and-mortar retail depends on the type of store: 36% of citizens plan to increase their shopping at small local stores, and 43% plan to increase their shopping close to where they live.

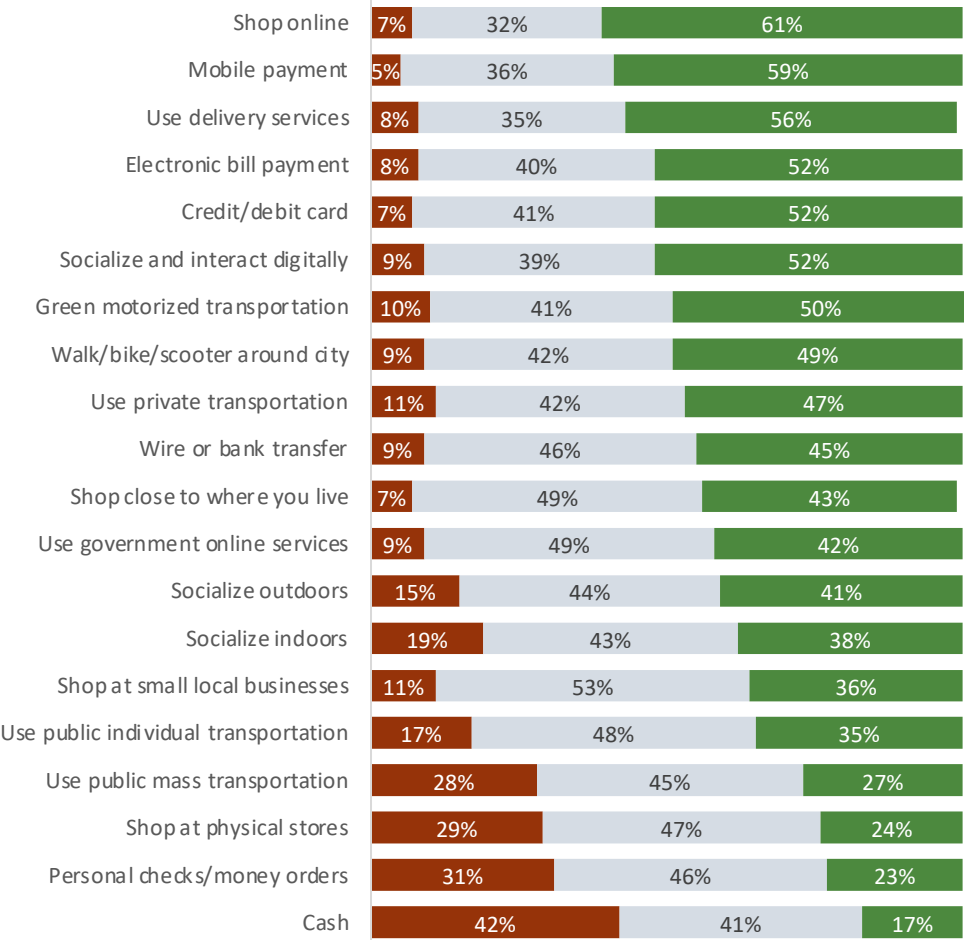
But when they do leave home, they expect to use multi-modal and more environmentally friendly transportation like walking, bikes, and scooters more—as city leaders anticipate—and they also plan to socialize more both outdoors and indoors. On balance, the use of both private and public individual transportation (like taxis) will climb.



Chicago: Biking more around the city

Chicago’s recent environmental bond issue has enabled the city to give away 5,000 free bikes to qualified low-income recipients. “The program has seen a huge response,” says Mary Nicol, director of policy at the Chicago Department of Transportation. “We set the number at 5,000 bikes, but we got over 18,000 applications. We are looking to partner with bike brands and other companies to figure out how we can reach even more residents and provide them with a low-carbon way to get around the city, access jobs, and meet their basic needs.”

How citizens expect their activities to change



■ Increase ■ Stay the same ■ Decrease

Citizen survey Q6: Compared to before the pandemic, are you more likely to increase or decrease the following activities over the next five years?

Climate change is the top problem facing cities

As the world recovers from the economic and social shock of the pandemic, cities will continue to face tough challenges over the next five years.

The biggest challenge for cities is climate change, cited by 94% of urban leaders. That holds true whether a city is small or large, emerging or advanced, or future-ready or behind. Given the climate-related disasters of recent years, and the greater calls to action from federal policy makers and citizens, the environmental imperative is hardly a surprise.

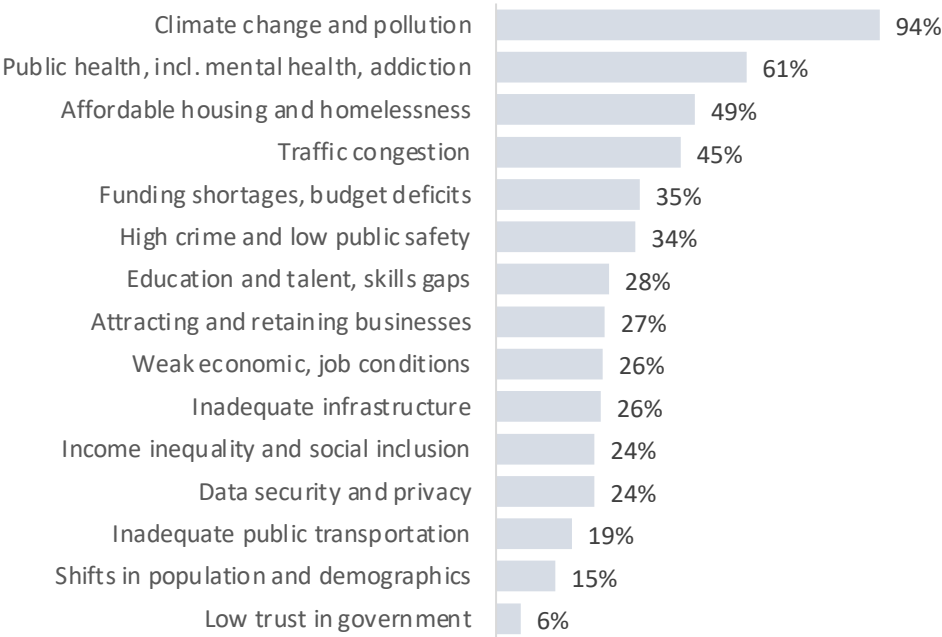
Public health, including mental health and addiction, is the second biggest challenge, reported by 61% of city leaders. The pandemic heightened health concerns, particularly in emerging market cities, where a greater share of officials ranked public health as a daunting task. Affordable housing and homelessness is another top problem, cited by almost half of city leaders and 62% of those in advanced markets, where the gap between rich and poor is striking. Again, COVID-19 played a role: its effect on the economy exacerbated homelessness in many cities.

Future-ready cities face fewer headwinds than cities that are less prepared. For example, they have already acted to reduce crime, traffic congestion, and health problems, which are much bigger problems for others.

Top challenges for others	Others	Future-ready
Public and mental health	64%	50%
Traffic congestion	50%	27%
Affordable housing and homelessness	45%	61%
High crime and low public safety	42%	5%
Funding shortages/budget deficits	38%	23%
Education and talent/skills gaps	29%	23%
Attracting and retaining businesses	29%	16%



Biggest challenges over the next five years: city leaders



City survey Q5: Which of the following are the biggest challenges your city will face over the next five years?

How cities are achieving a sustainable future



Barcelona: Reducing emissions

One of the cities selected for the EU's Cities Mission, a climate-neutral and smart city initiative, Barcelona has pledged to accelerate its decarbonization efforts. The pandemic heightened the urgency for the city.

Despite being a large city, Barcelona consumes less energy and generates fewer emissions per capita than other similar cities. Yet it still has work to do if it wants to reach its goals. Barcelona wants to reduce emissions in a holistic way—in mobility and transportation, in buildings, in the generation and treatment of waste, and in industry.

To get closer to net zero, Barcelona is implementing or improving several programs to trim CO2 emissions. It is prioritizing smart mobility, including expanded use of electric vehicles and development of apps that provide mobility as a service (smart parking, bike sharing, etc.). Reducing transportation speed limits is also key to cutting

emissions, not only of CO2, but also of other pollutants. For most of the city, car speed limits will be decreased to 30 kilometers per hour, and only the main arteries of the city will have a higher limit of 50 kilometers per hour.

Another of Barcelona's goals is to make it more difficult and expensive to park in the city. To transform the city into a low-emission zone, officials are replacing parking spaces with bike lanes. Every car is required to have a mandatory sticker that indicates whether it runs on gasoline or diesel. The city also wants to ban older cars that are more polluting from entering Barcelona during workdays.

[!\[\]\(2bae76de5ebbd5c4d7d47162f1673734_img.jpg\) Read the full case study here](#)



Chengdu: A city within a park

Chengdu, a metropolis of 20 million located in southwestern China, wants to become world famous for being a city within a park, instead of building parks within the city.

Chengdu sees its future as an urban center that considers the natural environment in all aspects of life. Since its launch in 2018, its park city initiative has aimed to sustainably improve Chengdu's urban layout, environmental protection, and industrial development. Rather than simply create green spaces and parks in an urban setting, Chengdu intends to generate a new development model based on balancing environmental sustainability and economic growth, while improving the quality of life for residents.

To advance towards this goal, in 2019 the municipality established the Bureau of Park City Construction and Management to lead planning of the initiative. Already, between parks, gardens, and other protected areas, green zones cover 44% of the city.

Yet while urban beautification is a main goal, another is to foster a greener economy. The plan is designed to strengthen innovation-driven green industries, develop a clean and efficient green resource system, revamp traditional industrial models for rural revitalization, and develop new business models based on the environment. For example, Chengdu developed the Tianfu Greenway, which spans 4,000 kilometers and is intended to eventually reach over 16,000 kilometers. The city has also advocated for low-carbon lifestyles and has built a green mobility network.

[!\[\]\(1ed10657a19f9137278430c48fd18626_img.jpg\) Read the full case study here](#)

Do city leaders and citizens agree on future challenges?

City leaders and citizens largely agree on many of the urban trouble spots they face—but their perspectives on the size of the issues can be at odds.

Both city officials and citizens report that climate change, affordable housing, homelessness, and public health are among the biggest challenges for cities.

But citizens rank some problems higher than their urban leaders: they are far more likely to cite income inequality, low trust in government, and inadequate infrastructure. City officials are clearly overestimating the level of trust of their residents, a perception that could hurt them in the future as they strive to meet citizens’ growing expectations.

City leaders see traffic congestion, attracting and retaining businesses, and talent gaps as tougher issues than do citizens. That difference in opinion may have a simple explanation: city leaders are closer to these issues than citizens.

Other areas of divergence that warrant examination are public health, which city leaders rank higher, and weak economic conditions, which citizens place higher. The latter may be contributing to citizens’ greater concerns about income inequality.



Should cities worry about citizen trust?

Most city leaders in our survey see low trust in government as a non-issue. It was the lowest-ranked challenge across all categories, selected by just 6%.

But citizens think differently: 36% see low trust as a major problem. It was ranked even higher by minorities (40%) and citizens over 75 years of age (53%).

Ranking of biggest challenges over the next five years: city leaders vs. citizens

Challenge	City	Citizen
Climate change and pollution	1	1
Public health, including mental health and addiction	2	6
Affordable housing and homelessness	3	2
Traffic congestion	4	14
Funding shortages/budget deficits	5	9
High crime and low public safety	6	5
Education and talent/skills gaps	7	10
Attracting and retaining businesses	8	13
Weak economic and employment conditions	9	7
Inadequate infrastructure	10	4
Data security and privacy	11	11
Income inequality and social inclusion	11	3
Inadequate public transportation	13	12
Shifts in urban population and demographics	14	15
Low trust in government	15	8

*Red bold signifies biggest differences between cities and citizens

City survey Q5: Which of the following are the biggest challenges your city will face over the next five years? Citizen survey Q13: Which of the following are the biggest challenges your city will face over the next five years?

Urban challenges vary based on city size and economic development

Cities are not cookie cutter. Population size and level of economic development will influence the difficulties they face.

Cities in emerging markets encounter more obstacles than those in advanced markets. Infrastructure is poorer, economic conditions are weaker, and talent gaps are wider. Health, crime, and traffic congestion are also bigger headaches. And attracting and retaining businesses is more arduous in emerging economies.

Similarly, large cities have it harder than small ones. Large urban areas struggle more with traffic congestion, inadequate infrastructure, and ineffective public transportation. Large cities also suffer more from cyberattacks, crime, and homelessness.

Average number of big challenges for cities by economic development



Average number of big challenges for cities by population size



Cities in emerging markets face more problems than those in advanced markets

Challenge	Emerging	Advanced	Pt. difference
Inadequate infrastructure	36%	15%	+21
Weak economy and employment conditions	37%	16%	+21
Education and talent/skills gaps	38%	18%	+20
Public health	69%	54%	+15
Attracting and retaining businesses	34%	20%	+14
High crime and low public safety	41%	27%	+14
Traffic congestion	51%	40%	+11

Large cities face more challenges than small cities

Challenge	Large city	Small city	Pt. difference
Traffic congestion	75%	38%	+38
Inadequate infrastructure	45%	20%	+25
Data security and privacy	40%	21%	+19
High crime and low public safety	45%	27%	+18
Affordable housing and homelessness	60%	48%	+12
Inadequate public transportation	25%	15%	+10

City survey Q5: Which of the following are the biggest challenges your city will face over the next five years?

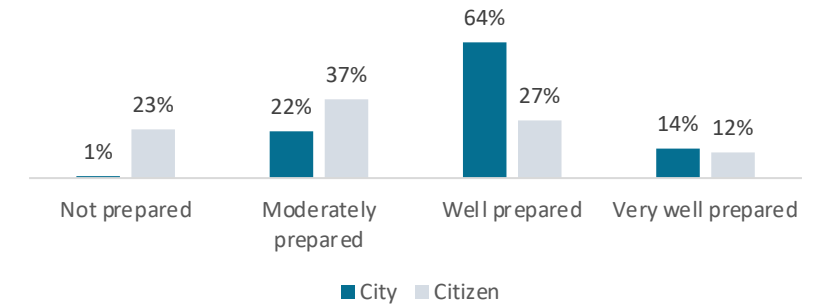
Citizens are less confident about the future than city leaders

City officials believe they are well prepared to overcome the challenges ahead. Citizens are not so sure.

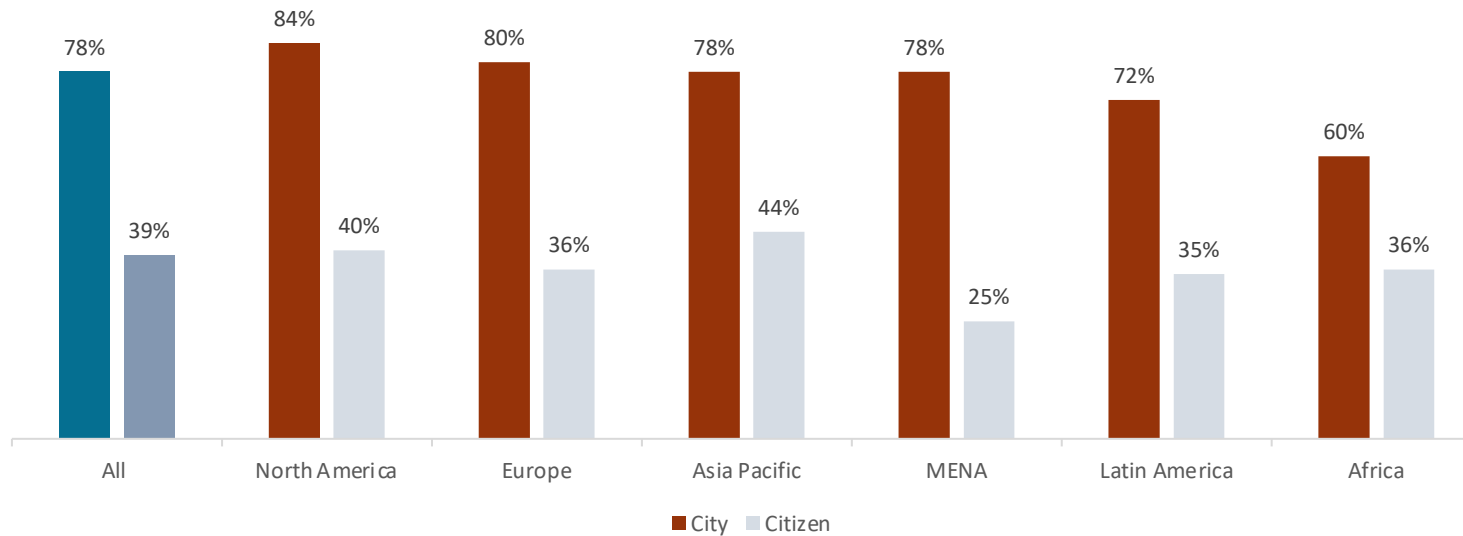
Nearly 80% of city executives think their city is well or very well prepared to vault the hurdles they face over the next five years. More than 90% of future-ready cities in our study think so. City officials in North America and Europe are most confident about their ability to handle future challenges; those in Africa are the least.

There is a wide divergence in views between city leaders and those they serve. Less than half of citizens feel that their city is well prepared or very well prepared to deal with challenges to come. Nearly a quarter of citizens believe that their city is not prepared, something that only 1% of city leaders in our study cared to admit.

How prepared is my city to overcome challenges?



Perceptions of preparedness by region, cities vs. citizens (well prepared or very well prepared)



“To gain trust, city leaders need to step up their knowledge, understanding, and communication. Cities don’t need super-heroes. Instead, they need leaders who are open about the challenges they face and who involve city stakeholders in meeting them.”

Kari Aina Eik
Executive Director
United Cities

City survey Q5a: Overall, how prepared is your city to overcome these challenges? Citizen survey Q13a: Overall, how prepared is your city to overcome these challenges?



All cities in our study have a vision for becoming a smart, sustainable inclusive, prosperous, and resilient future-ready city, with plans covering a variety of domains. Yet many cities don't believe they need significant transformation in most of these domains. Citizens disagree.

Developing a future-ready plan

All cities have future-ready plans, but few cover all domains

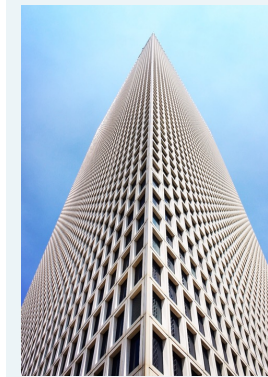
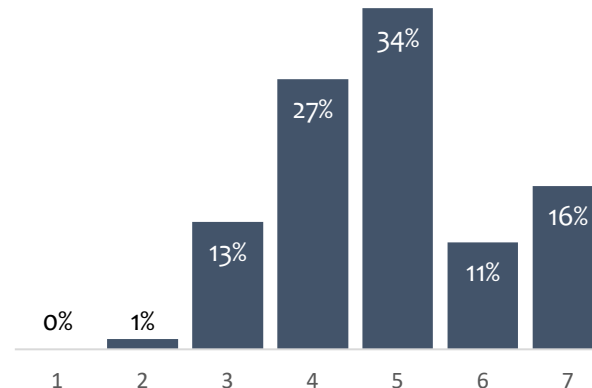
City officials in our study all reported having a vision and action plan for their city to become future-ready—defined as smart, sustainable, inclusive, prosperous, and resilient, with the ability to meet the evolving needs of citizens and businesses.

While all cities in our research have future-ready plans, some of these plans are more comprehensive than others. On average, cities include between four and five domains in their plans. Only 16% include all seven domains covered in our research. Notably, emerging market cities are more likely to have all-embracing plans: 26% include all seven domains, compared to 8% of advanced market cities.

“We have learned from the war that any unrealistic scenario can become realistic, and that you must take this into account in your disaster recovery planning. At the end of the day, you must focus on the main things that your citizens need to survive—food, medications, water, power, shelter.”

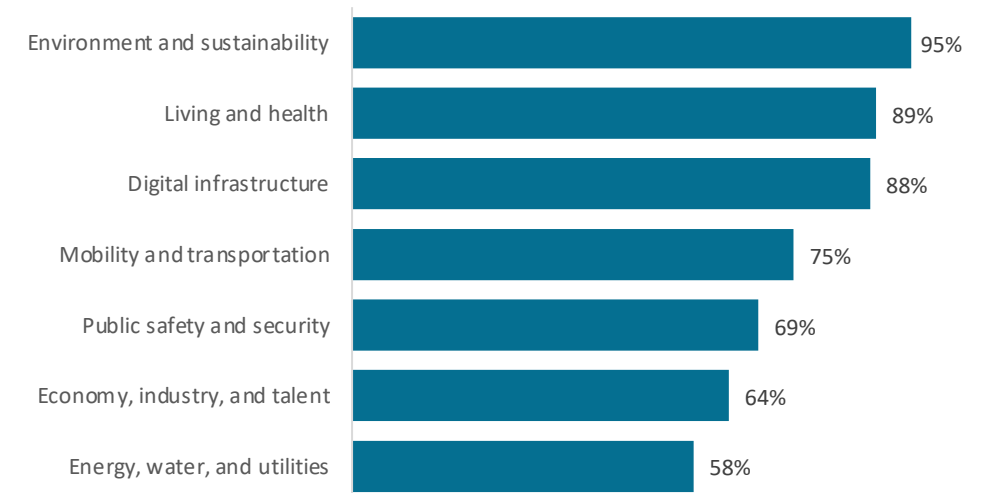
Victoria Itskovych
Deputy CIO
City of Kyiv, Ukraine

Number of domains included in future-ready plans



More than 8 in 10 cities include environment, living and health, and digital infrastructure in their plans. Future-ready cities more often have plans for economy and industry, mobility, and energy and water. Emerging market cities are more likely than their advanced market peers to include all domains in their plans, but particularly public safety—a troublesome area for many.

Domains included in plans



City survey Q9. Does your city have a vision and action plan(s) to become a future-ready city (defined as a smart, sustainable, inclusive, prosperous, and resilient city, with the ability to meet the evolving needs of citizens and businesses)?

Q9a. Which of the following domains are included in your vision and action plan(s) to become a future-ready city?

What is a future-ready city?



A city built on trust

William D. Eggers

Executive Director, Deloitte Center for Government Insights

“A future-ready city deeply understands its citizens and delivers digital services that build trust. Deloitte research shows that a citizen’s digital experience with a government agency strongly predicts that citizen’s overall trust in government. Citizens rate agencies high on trust if they think digital services are easy to use, governments’ web-based services help them accomplish what they need, and the government agency safeguards their data effectively. Improving the digital experience of citizens should be a priority and serve as a main way to enhance trust in government.”



Livable, sustainable, and prosperous

Daniel High

Alliance Manager of Economic Development
Perth, Australia

“To attract more residents and create a more vibrant urban environment, Perth in 2022 launched a 10-year Strategic Community Plan based around three main pillars: making the city livable (safe, socially cohesive, inclusive, and activated), sustainable (with a healthy environment and social and economic systems in balance), and prosperous.

A prosperous city needs to be livable and sustainable as well. We acknowledge that we need to hit those goals by having more people reside within the city. A big livability goal is around housing projects. We need to build on our residential infrastructure and upgrade our cultural facilities so that we have more recreational areas to offer.”



A citizen-centric city with a clear vision

Joan E. Ricart

Professor of Strategic Management, IESE, Spain

“A future-ready city is characterized by being citizen-centric, with a clear vision and strategy. It is innovative and digitally transformed, as well as connected and highly collaborative. Future-ready cities also invest in adequate infrastructure enabled by data and excel in attracting talent.”



Collaboration, communication, infrastructure

Kevin Taylor

Segment Development Manager, Smart Cities
Axis Communications

“Future-readiness revolves around a city’s use of collaboration, modern communications infrastructure, and innovation, and its eagerness to embrace open-architecture solutions.

Collaboration is key because no one local government department or agency has all the skillsets, resources, and funding to address their challenges alone. Modern communications infrastructure is essential because data is the lifeblood of not only future-ready cities, but of Industry 4.0. To make informed decisions, large amounts of data need to be continually transported, archived, and analyzed. Innovation also drives future-readiness. Cities will have to discover new innovative platforms, solutions, procedures, and policies that most positively impact the community.

Embracing open-architecture technology is critical because solutions that serve an entire community will need to grow large in scale, and to assimilate within a city’s technology ecosystem. Sensors will be expected to connect to multiple sub-systems, and data from those sub-systems will be expected to benefit multiple stakeholders.”

Cities draw on a myriad of inputs to build out their plans

As they develop and articulate their future-ready plans, most cities engage with a wide variety of stakeholders and use sophisticated analytical techniques.

Most cities work with the business community and technology firms, use data analytics for evidence-based planning, and set up innovation centers to test new ideas. More than half benchmark themselves against their peers and draw on the views of experts and consultants.

Future-ready cities more often drive collaboration among internal stakeholders across urban domains and employ digital twins to support planning and scenario analysis. Cities that are less advanced turn more to experts and consultants.

Yet many cities struggle to incorporate the views of citizens: only 35% use participatory budgeting and 31% directly engage the public. The gap between perceptions of citizens and city leaders on what cities need (next page) reveals that this is a mistake.



Orlando: Relying on stakeholders

When Orlando, Florida, drafted its comprehensive Future-Ready City Master Plan in 2020, city leaders relied on local and regional stakeholders to help guide them, explains Mike Hess, director of the initiative.

“We spent a ton of time interviewing staff across our city departments, consulting with our regional partners, and holding focus groups and public workshops,” he says.

Orlando continues to collect data on citizen views via online surveys, traveling to every district in the city, and doing one-on-one personal interviews.

How cities develop their plans

Inputs and techniques	% of cities
Engage with the business community and technology firms	70%
Harness data for trend analysis and evidence-based planning	69%
Use an innovation hub to test new ideas and prepare for the future	63%
Benchmark against other cities	55%
Draw on the views of experts, consultants, and service providers	52%
Engage with the academic community and non-profits	38%
Collaborate with internal stakeholders across urban domains	38%
Have a digital twin to support planning and scenario analysis	37%
Use participatory budgeting	35%
Consult with government entities and jurisdictions outside our city	33%
Engage with citizens through public and virtual meetings	30%

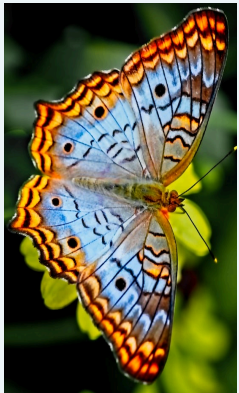
City survey Q11 When developing its thinking and future-ready plans, does your city...?

Do these plans go far enough? Citizens don't think so.

One major point of contention between city leaders and citizens is the need for transformation. Officials don't think they need to heavily transform most urban domains to make them future-ready. Citizens disagree.

Fewer than 1 in 5 city leaders believe that considerable or major transformation is required across most domains. The biggest exception is environment and sustainability, where more than 4 in 10 city officials think they have a long way to go.

That is particularly true for smaller cities, where more than 4 in 10 see the need for a big change in sustainability, compared with 3 in 10 among leaders of larger cities. Mobility and transportation is another area where some city leaders see room for change—nearly a quarter across all sizes believe they need to do a great deal more.

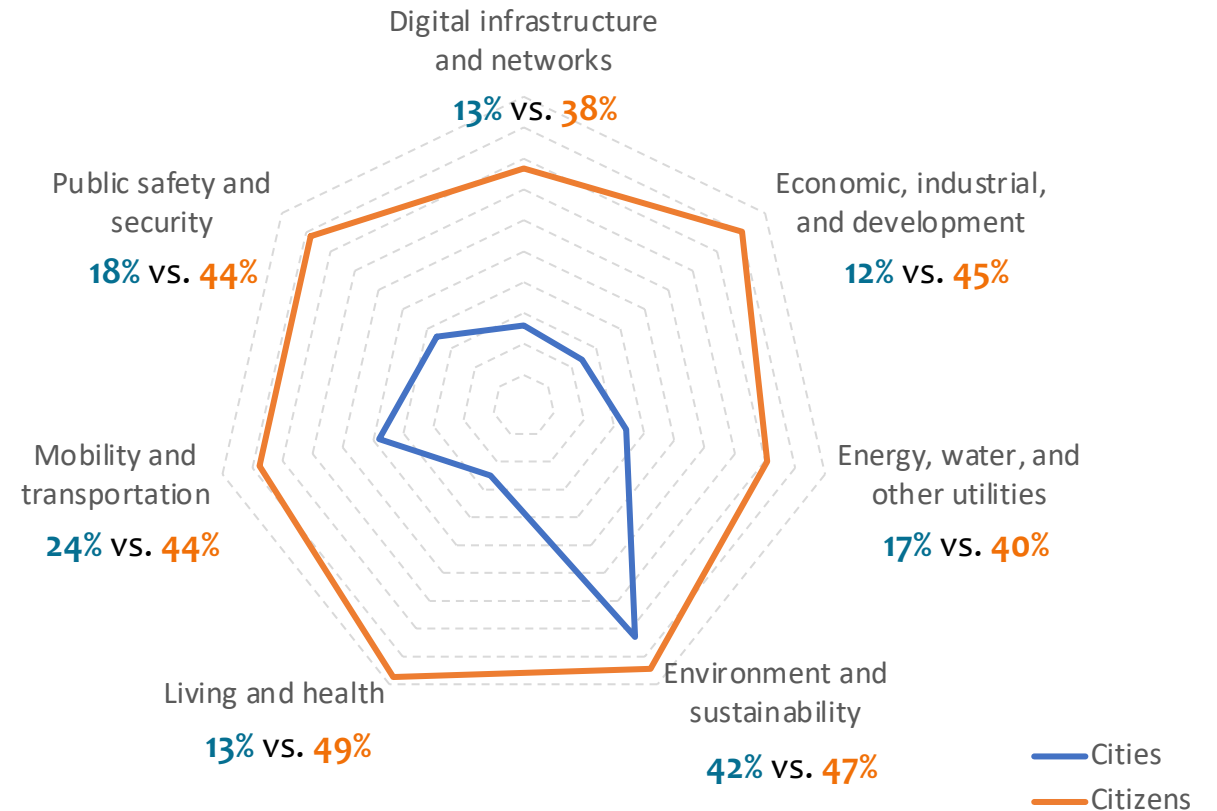


Citizens want cities to go farther

Citizens take a much tougher line than city officials on the need for transformation: across nearly all domains, more than 4 in 10 citizens think cities need to make greater progress. For citizens, the domain most in need of a makeover is living and health (nearly 50% of citizens), while digital infrastructure is currently in the best shape (38%).

Citizens also give city leaders mixed grades on communicating future-ready plans. Only 42% of citizens think these plans have been well articulated.

City leaders vs. citizens: considerable or major transformation/change needed



City survey Q13: What level of transformation is required in the following domains to make them future ready? Citizen survey Q17: How much change will your city need to make in the following areas to ensure they will meet the needs of citizens in the future?

Future-ready cities excel in 12 key areas

Future-ready cities are well out ahead of other cities in every area of readiness. Others need to do more, particularly around resilience, using technology and data to improve decision-making, and responding to citizen expectations.

The cities that are most prepared for the future have made great progress in the areas that will help them succeed in the years ahead. They are much further along in digital transformation and innovation, building resilience and agility, and harnessing technology and data. They also shine at meeting the needs of their citizens: adapting to their expectations, nurturing trust, empowering communities, and ensuring citizen safety. Moreover, they are better at attracting needed talent, collaborating within an ecosystem, and building process and resource efficiencies—other elements necessary to be fit for the future. And they are in front on other key areas, such as inclusiveness.

To stay relevant in today’s fast-changing environment, other cities will want to pick up the pace in these 12 areas of future-readiness.



12 top areas of future readiness*	Future-ready	Other	Pt. diff.
Drive digital transformation and innovation	77%	47%	+30
Build resilience and agility to manage change	75%	40%	+35
Use digital tech and data to improve decision-making	75%	40%	+35
Adapt to citizen expectations around health, safety, etc.	73%	38%	+35
Build trust and transparency	73%	64%	+9
Empower communities and citizens to drive change	70%	46%	+24
Build global economic, political, and trade connections	68%	38%	+30
Ensure citizen safety and health	68%	42%	+26
Attract needed talent and skills	66%	45%	+21
Develop an ecosystem of collaboration	66%	40%	+26
Build efficiencies across processes and resource usage	64%	40%	+24
Foster inclusiveness and equity	64%	38%	+26

* Percentage of cities showing good or very good progress

City survey Q10: How much progress has your city made in addressing the following elements of a future-ready city?

What future-ready cities do differently



1 Have greater autonomy in making decisions

Future-ready cities have greater decision-making autonomy from national, state, and provincial control. On average, 36% of future-ready cities have significant or full fiscal, functional, personal, regulatory, and structural autonomy, vs. an average of 17% of other cities.



2 Extract more value from data

Future-ready cities extract greater value from data (84% vs. 76% of others). They also have made greater progress on using data to achieve their goals by domain (50% vs. 30%).



3 Nurture citizen engagement

Future-ready cities do more than others to develop new roles, such as CCOs and CCXOs, to nurture citizen engagement (52% vs. 44% of others). They also reach out more to stakeholders to demonstrate the value of a project (73% vs. 53%).



4 Partner more with business and government

Future-ready cities partner more with the business community and technology firms (75% vs. 69% of others) and consult more with government entities and jurisdictions outside of their cities (39% vs 31% for others).



5 Invest more in digital technology

Future-ready cities are more forward-looking with technology and understand the importance of digital twins to achieve their plans (66% vs. 50% of others). They also plan to spend more on digital infrastructure (\$150 million vs. \$93 million for others over the next five years).



6 Focus more on cybersecurity

Future-ready cities are better prepared for cyberattacks (86% well or very well prepared vs. 63% of others) and have made greater progress against cybersecurity frameworks like NIST. They also plan to spend more on cybersecurity over the next five years (\$13.4 million vs. \$9.7 million for others).



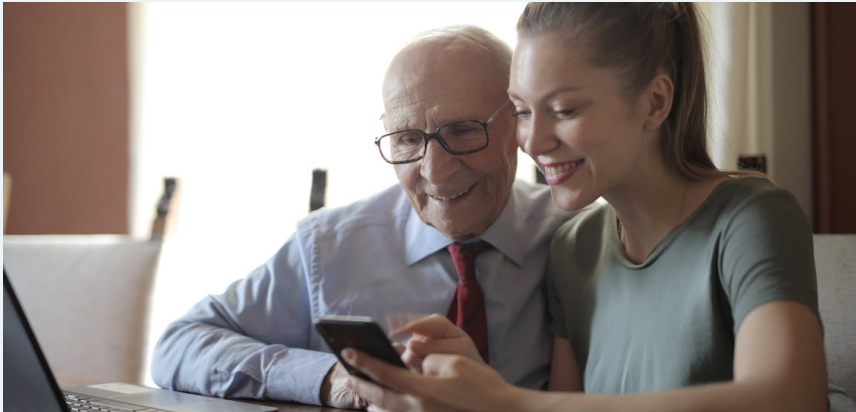
Cities are making progress on citizens’ priorities—but more needs to be done

Cities are addressing citizens’ priorities, such as building better infrastructure, driving digital transformation, and using technology and data for decision-making. But urban leaders may be falling behind in other areas, particularly those of most importance to younger generations.

City officials report making the most progress on trust, digital transformation, and infrastructure. While these are high-ranking priorities for citizens, they often do not recognize the progress their cities say they are making: for example, 42% of citizens cite inadequate infrastructure and 36% low trust as top challenges for their city. Conversely, fewer than half of cities have made enough headway on the two top citizen concerns: ensuring citizen safety and health; and adapting to citizen expectations for health, safety, and urban services. With millennials setting a higher bar, cities will need to aim higher to meet citizen expectations.

Where cities have made the most progress		Where citizens place the highest priority	
Building trust and transparency	66%	Ensuring citizen safety and health	57%
Driving digital transformation	54%	Meeting needs for health, safety, services	55%
Building infrastructure fit for future	52%	Building trust and transparency	51%
Empowering citizens to drive change	51%	Building infrastructure fit for future	47%
Attracting needed talent and skills	50%	Using tech and data for city mgmt.	47%
Using tech and data for decision making	48%	Driving digital transformation	43%
Ensuring citizen safety and health	48%	Driving sustainability	43%
Building resilience and agility	48%	Ensuring economic competitiveness	43%

City survey Q10: How much progress has your city made in addressing the following elements of a future-ready city?
Citizen survey Q16: What level of priority should your city give to the following goals to be ready for the future?



The generation gap

With millennials now the largest cohort worldwide, their views matter. Our study reveals that they give higher priority to some areas than do baby boomers.

Millennials vs. Boomers

- 48% vs. 27% Driving digital transformation
- 46% vs. 28% Building global economic/trade ties
- 40% vs. 26% Making city processes more efficient
- 43% vs. 31% Empowering citizens to drive change
- 46% vs. 37% Driving sustainability
- 44% vs. 35% Developing talent and skills

With new funding available, cities plan to step up investments

Cities plan to materially increase investments across all domains, but their top investment areas are not fully aligned with the investment priorities of citizens.

Cities will be spending more on digital payments and infrastructure and on social programs, including public health, mental health, public housing, and welfare. But citizens would like to see cities invest more in making it easier to get around. Their priorities include maintenance of streets and streetlights, better traffic management, physical transportation infrastructure, and increased mobility options. To their credit, cities are taking decisive steps in public health and welfare services, areas that are also high on citizens’ priority lists.

Investing in education and talent

Future-ready cities recognize the importance of education for building talent and skills. That is why **86%** are materially increasing their investment in educational services vs. **79%** of others.

This also underscores why more future-ready cities can report having made significant progress in attracting or developing talent: **66%** vs. **45%** of others.

Top 10 investment priorities for citizens

Priority area	
Street/streetlight maintenance	57%
Traffic/congestion management	57%
Public health services	56%
Digital infrastructure	51%
Transportation infrastructure	50%
Welfare services	50%
Public information services	50%
Water services	49%
Digital payment systems	49%
Transportation/mobility options	48%

Top 15 investment priorities for cities

Digital payment systems	84%
Public information services	82%
Digital infrastructure	82%
Public health services	82%
Educational services	81%
Water services	79%
Public/mental health services	77%
Public housing/social housing	74%
Fire/ambulance services	70%
Welfare services	68%
Police and law enforcement	66%
Traffic/congestion management	66%
Trash and recycling services	65%
Customer service	65%
Transportation and mobility	65%

City survey Q8: As your city prepares for the future, in which areas will it materially increase spending and investments? Citizen survey Q15: Which of the following services should your city prioritize for improvement?

Where cities are prioritizing investments



Decarbonization

Bill Cashmore

Deputy Mayor
Auckland City Council, New Zealand

“Transport must be a primary target for decarbonization; vehicle kilometers traveled must be substantially reduced. Road congestion pricing could be a key incentive for people to move to public transport. Building heat and cooling systems need to be powered by renewable energy sources. Manufacturing also needs to transition to renewable energy.”



Under-resourced communities

Mary Nicol

Director of Policy
Chicago Department of Transportation

“Chicago is currently prioritizing investments in historically under-resourced neighborhoods to create jobs, better housing, and more amenities to foster long-term economic development and neighborhood vitality. The initiative is providing support for small businesses, creating public realm improvements, restoring historic buildings, and fostering equity and resilience where it’s needed most.”



Telecoms for the future

Jamie Cudden

Manager, Smart City Program
Dublin City Council, Ireland

“We are one of the first cities—and among a few in Europe—to set up a telecom unit in the city council. It’s a one-stop shop to provide a single point of contact to support telecoms investments, whether it’s access to assets, or simply to make it easier to get permits and navigate the planning process. Rather than letting things fall into black holes between 15 different sections, we’re proactively saying, we’ll take the investment. This is critical for the future of Dublin.”



Multi-modal mobility

Sharmila Mukherjee

Executive VP for Planning and Development, Capital Metro Transportation Authority, Austin, Texas

“Decision-makers want Austin to become a next-generation, smart, global city, the best in its league. Part of that requires a strategic mobility plan. Austin is transitioning from a car-dependent approach to a more effective multi-modal transportation system. It includes four bus rapid transit routes and two new light rail lines, along with more than four miles of subway tunnels through downtown and South Austin.”

Implementing plans can be a struggle for cities

Preparing for a new world is no easy task. Cities face an array of hurdles concerning budgets and resources, technological change, and political and operational complexity.

Some of the biggest barriers involve budgets and resources: unclear ROI, shortage of skills, and severe budget constraints. Technology also presents challenges, from finding the right suppliers and partners to keeping up with the pace of digital change. Political complexity and transitions in administration add another set of headaches, particularly in larger cities. However, inadequate data and security and inflexible IT systems are lower-order concerns.

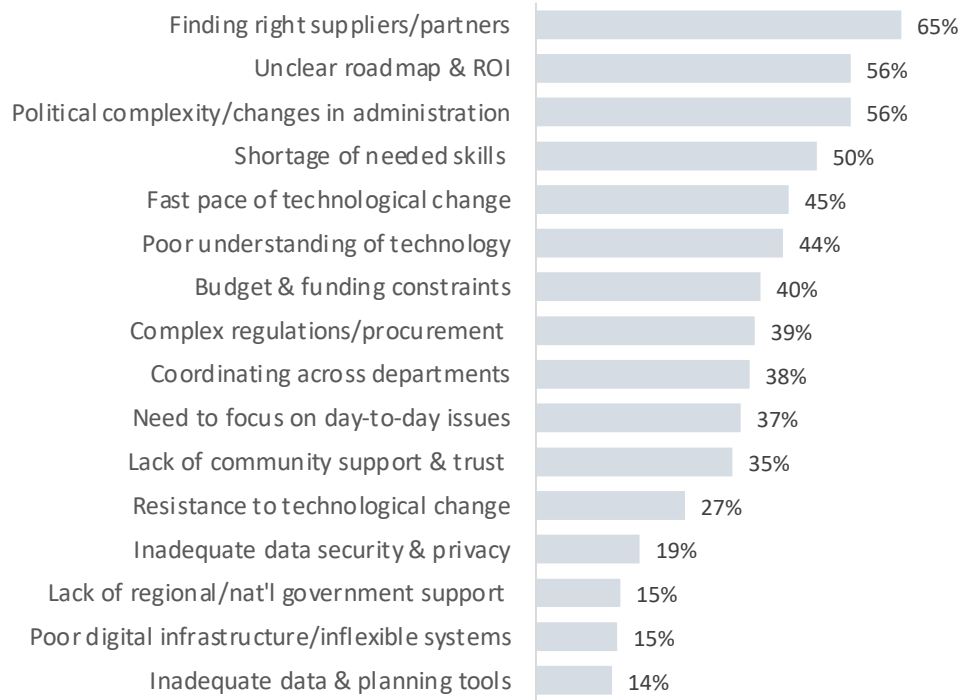
Emerging market cities must navigate a trickier obstacle course. There is greater resistance to technological change and bigger problems keeping up with the pace of technological progress. These cities also face larger talent and skills shortages, and they are frequently operating on older IT systems. Often, regulations and procurement procedures are also more complex.

Challenges to achieving future-ready plans, by market

Challenges	Emerging	Advanced	Pt. diff.
Resistance to technological change	44%	12%	+32
Fast pace of technological change	55%	35%	+20
Shortage of needed skills and expertise	60%	42%	+18
Inadequate data security and privacy	27%	11%	+16
Limited digital infrastructure/inflexible IT systems	23%	7%	+16
Complex regulations and procurement procedures	45%	33%	+12
Inadequate data, analytical, and planning tools	20%	8%	+12
Insufficient support from regional/national governments	21%	9%	+12
Low technology knowledge among decision-makers	50%	39%	+11

City survey Q12: What are the main challenges your city faces in achieving its future-ready plans?

Challenges to achieving future-ready plans



“A strong demarcation in Texas between urban, suburban, and rural areas has made it politically difficult for the City of Austin to extend innovations and new transport options beyond the city limits. And it was tough to get the mobility funding in the first place. It took tremendous efforts on the part of Capital Metro and the City of Austin to get the transport plan to be approved by the voters.”

Sharmila Mukherjee, EVP for Planning and Development, Capital Metro Transportation Authority, Austin

Actions cities take to build citizen engagement and trust

Cultivating citizen engagement and trust is an ongoing process. Over the next five years, cities will take many steps to maintain citizen involvement and confidence.

Increasing both digital and conventional methods of communicating with citizens and enabling them to address multiple needs through one personalized digital platform are the top two ways that cities keep citizens engaged. Over the next five years, developing new roles such as chief citizen experience officer (CCEO) and chief citizen officer (CCO) will become more common, as will the use of gamification and other incentives.

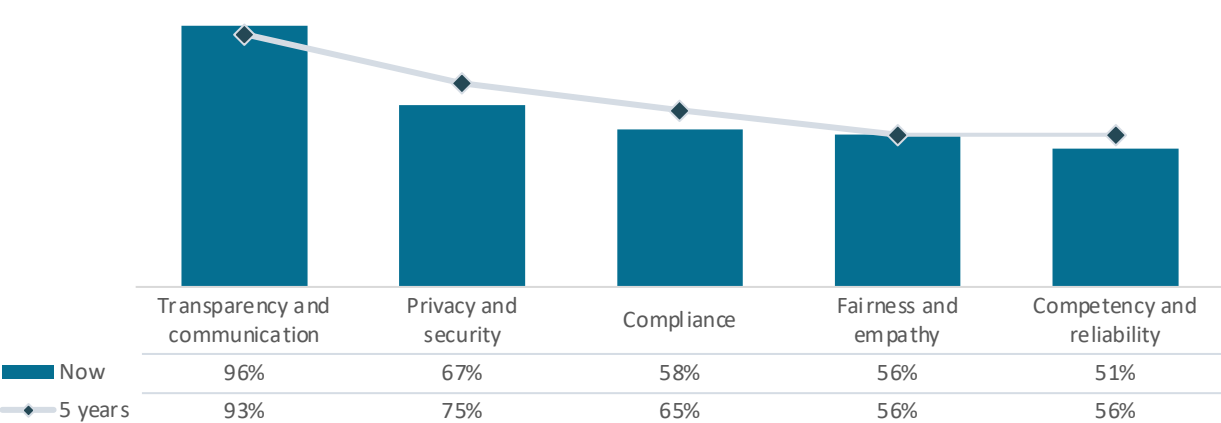
To nurture citizen trust, cities now take steps to drive transparency and communication, privacy and security, compliance, fairness and empathy, and competency and reliability—areas that will remain a focus over the next five years.

How cities build citizen engagement



Future-ready cities focus more than other cities on reaching out to stakeholders to demonstrate the value of a project (73% vs. 53% of others). They also develop new CCEO and CCO roles more than other cities (52% vs. 44%).

How cities foster citizen trust



Future-ready cities are more likely to take steps to enhance privacy and security (77% vs. 63% of others), compliance (64% vs. 56%), and competency and reliability (55% vs. 50%).

City survey Q46: Which of the following actions is your city taking now to foster citizen engagement and which actions will it prioritize over the next five years?
Q47: Which of the following steps has your city taken to build public trust in your future city plans? Which steps will it prioritize over the next five years?

How Orlando and Almaty City are seizing their future



Orlando: People come first

Orlando, Florida has long been a leader in future-ready planning. What also sets it apart is its unwavering commitment to community engagement and citizen participation.

Orlando prioritizes inclusion of residents in the development of its future-ready plans through community meetings, public workshops, and online surveys. “Stakeholder engagement is the most important thing you can do,” says Mike Hess, director of the Future-Ready City Initiative for the city of Orlando. “People think of smart city, and they jump to technology, but that’s not necessarily what it’s all about. It’s about community engagement, trying to figure out what residents need help with the most.”

The city drafted its Future-Ready City Master Plan right before the pandemic hit, with its last meeting held in March 2020. Officials spent months interviewing staff in all city departments, holding focus groups with

regional partners and conducting roundtables and public workshops. City leaders didn’t have a preconceived notion of what their plan should be. Rather, they relied on stakeholder input. Two of the words that city leaders heard most were equity and resilience, goals that were only amplified by the pandemic.

The plan is divided into 11 foundational goals, such as “people first,” “transparent,” “security focused,” and “collaborative.” Second, it comprises seven pillars: connectivity, energy, health and safety, materials, mobility, placemaking, and water. These pillars focus on the major services that Orlando already provides to its citizens, with an eye to assessing and implementing innovations.

[▶ Read full case study here](#)



Almaty: Building a digital foundation

Almaty, Kazakhstan, has devised a future-ready plan out to 2050, designed to make it a highly livable, smart city with modern services, a cosmopolitan atmosphere, and attractive natural environment. First, it seeks to transform itself digitally.

The digital transformation will be based on a three-layer foundation, according to Bayan Konirbayev, Almaty’s chief digital officer: digital infrastructure, data, and services. The **infrastructure layer** includes mobile towers and stations, fiber optics, data processing centers, and IoT sensors installed throughout the city.

The **data layer** includes a unified data governance and data exchange platform and warehouse. Through this platform and advanced data management system, Almaty has brought together a wide variety of previously siloed data from different government departments, such as social services, education, healthcare, and housing. The data warehouse includes personalized data on citizens available only to the city government. There is also a public side to the warehouse that includes non-personalized datasets—an innovation that can serve as a model for other cities.

Both the non-personalized and personalized databases fuel the city’s **service layer**, which includes both mobile and desktop applications for citizens to gain access to services. For example, the city provided more than 11 million health-related services online in 2021 vs. only 100,000 similar services offline. Some 97% of the city’s services—such as reserving a school place for a child or getting water service—are now available online, although there are provisions for those who prefer to go to a physical location. “The service layer is just the beginning,” says Konirbayev. “After that, we want to focus on proactive services.”

[▶ Read the full case study here](#)



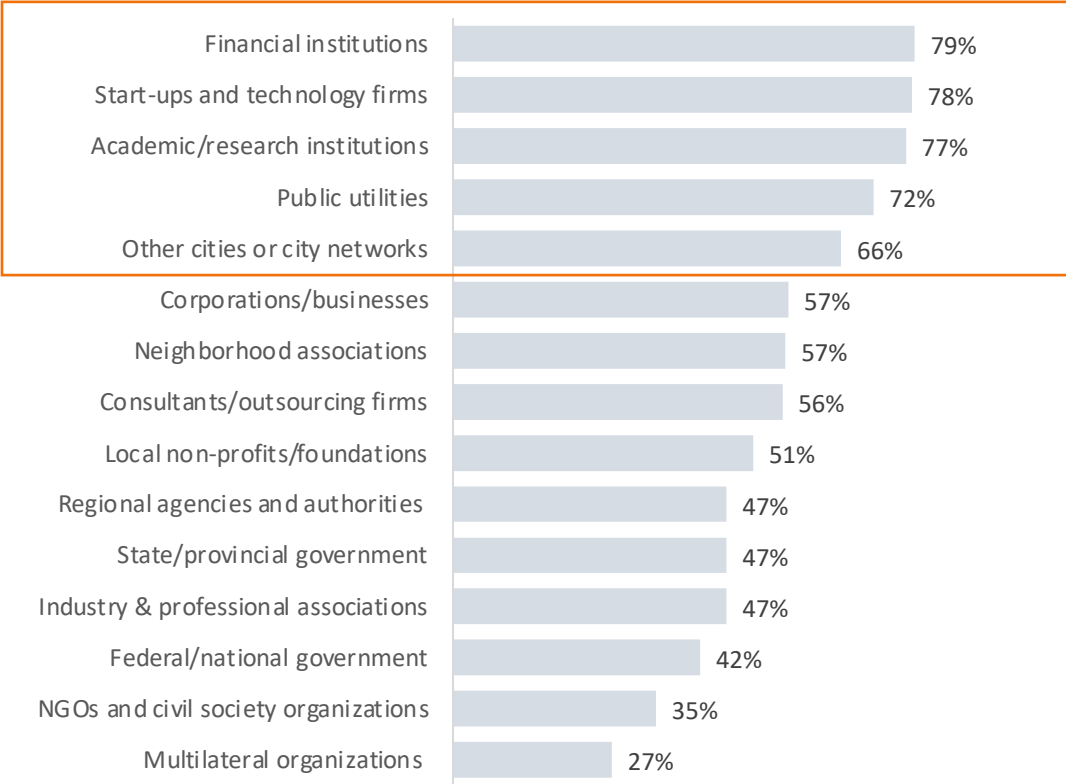
Drivers of change

Urban leaders use multiple levers to achieve their future-ready goals, from partnerships and innovative financing and business models to next-generation technologies, advanced data analytics, and continuous digital innovation.

To prepare for the future, cities will expand their partnerships

On average, cities prioritize collaboration and partnerships with eight types of organizations to achieve their social, environmental, and infrastructure goals. The top partners are financial institutions, technology firms, universities, public utilities, and other cities or city networks.

Partnerships cities prioritize



Future-ready cities give higher priority to certain partners vs. others

Type of partner	Future-ready	Others	Pt. difference
Financial institutions	86%	76%	+10
Corporations/businesses	64%	55%	+9
Local non-profits, foundations, advocacy groups	55%	49%	+6
Multilateral organizations	30%	26%	+4
Start-ups and technology firms	80%	77%	+3



Large cities are more likely to partner with federal government agencies and technology firms, while **small cities** lean toward consultants, outsourcing firms, and non-profit organizations.

Emerging market cities favor national and regional agencies, financial institutions, consultancies, and academia, while **advanced market cities** give greater priority to public utilities and other cities.



City survey Q33: Which of the following partnerships is your city prioritizing to meet its social, environmental, and infrastructure goals?

Leveraging partnerships to achieve goals



Co-develop with partners

Nicole Raimundo

Chief Information Officer
Carey, North Carolina

“We are a small shop. What works well for us is to bring in partners that also need to grow and develop a business model. We partner together to build that model, which lowers the cost for us and is a win for both sides. We get the expertise, and we get to co-develop and build products together.”



Work with your community

Benjamin Branham

Chief Communication Officer
NY & NJ Port Authority

“Having a significant community relations infrastructure at the very outset—as opposed to it being an afterthought—is very important. This helped us to minimize local disruption, as well as to provide contracting and job opportunities locally. You never know where good ideas may come from. By partnering with the community, you can build support and political capital that will be invaluable down the road.”



Pick your partners with care

Clay Pearson

City Manager
Pearland, Texas

“We partner with private investors to get the mobility that we need. We do that with well-researched strategies on economic development, retail trends and gaps, and workforce needs—working with outside experts who care about giving us executable strategies. We think about where and what we can leverage and where we can partner with public schools, business associations, and not-for-profit organizations to achieve success.”



Tap multiple stakeholder groups

Jeremy Kelly

Global Research Director, City Futures
JLL

“The magnitude of the climate change challenge requires the mobilization of resources across multiple stakeholder groups. Ecosystems of partnerships will be crucial in driving progress, pooling resources and knowledge, sharing or copying best practices, and educating and helping scale technology. For example, there is strong potential to leverage the real estate sector’s intelligence, skills, innovations, and financial acumen to help deliver sustainability goals.”

How Cary takes partnerships to a higher level



Cary, North Carolina

The city of Cary sits just outside the research triangle of Raleigh-Durham-Chapel Hill. With three major universities and a wealth of technology firms operating nearby, Cary takes advantage of partnerships to support its efforts to become a smart, data-driven city and to achieve the goals in its 2040 Community Plan.

Cary uses partnerships as well as technology and data to optimize city services, drive economic growth, and improve the quality of life for its citizens. “In Cary, in terms of innovation, we are able to take risks, and partner and try things out easier than other municipalities,” says Nicole Raimundo, Cary’s chief information officer. “We have higher expectations because of the makeup of our population, most of whom work in technology, and we have companies like Apple, Google, and Epic Games in our backyard.”

Cary draws on a network of partnerships with entrepreneurs and businesses, from startups to larger established companies like Microsoft and SAS. The relationship with SAS, a global analytics firm located in the city, has helped its police force, for example, utilize data and analytics to solve complex crimes. The SAS Visual Investigator system has helped detect criminal networks, accelerate information sharing, and facilitate investigations.

In 2021, Cary and SAS, together with Semtech, a global supplier of high-performance analog and mixed-signal semiconductors and advanced algorithms, announced a collaboration to build a Center of Excellence focused on technology solutions, including the development of edge-to-cloud IoT solutions. Cary is also working with Cisco to capture and manage data on a single pane of glass for parking, traffic, facility usage, crowd counting, and other use cases.

Using data and technology to inform future plans

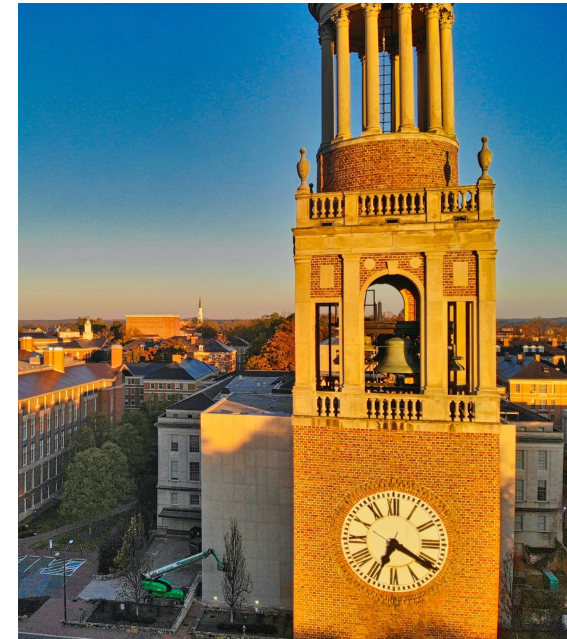
Cary has set up a “Town Hall,” an experimental campus where it can test smart city initiatives before implementing them on a large scale. Testing new applications on a small scale has allowed the city to capture data and understand how initiatives will work. Building out a test lab in its Town Hall campus also has permitted Cary to involve citizens in the testing and decision-making process and to gain their trust. In addition, the city has a small citizen committee that meets once a month to discuss the topics of technology and communication.

Citizen involvement, data, and partnerships are key to Cary’s plans. The city is expanding this approach by working with nearby towns and cities, particularly on stormwater impacts. In another collaboration with SAS, it has installed water-level sensors to monitor stream activity during storms and to act as an early warning system during flooding—a critical use of technology as climate change generates stronger and more frequent flooding conditions globally. The data Cary collects is shared with its surrounding towns.

Data-sharing and collaborations related to floods have proved to be a “breakthrough model” for the future that can help Cary achieve its goals in other areas, such as transportation. “We said, let’s start small, figure it out, get a win, get everyone’s buy in and move forward. And that’s what we did with the floods,” says Raimundo. I think that was a good model for us to move forward with.”



[Read the full case study here](#)

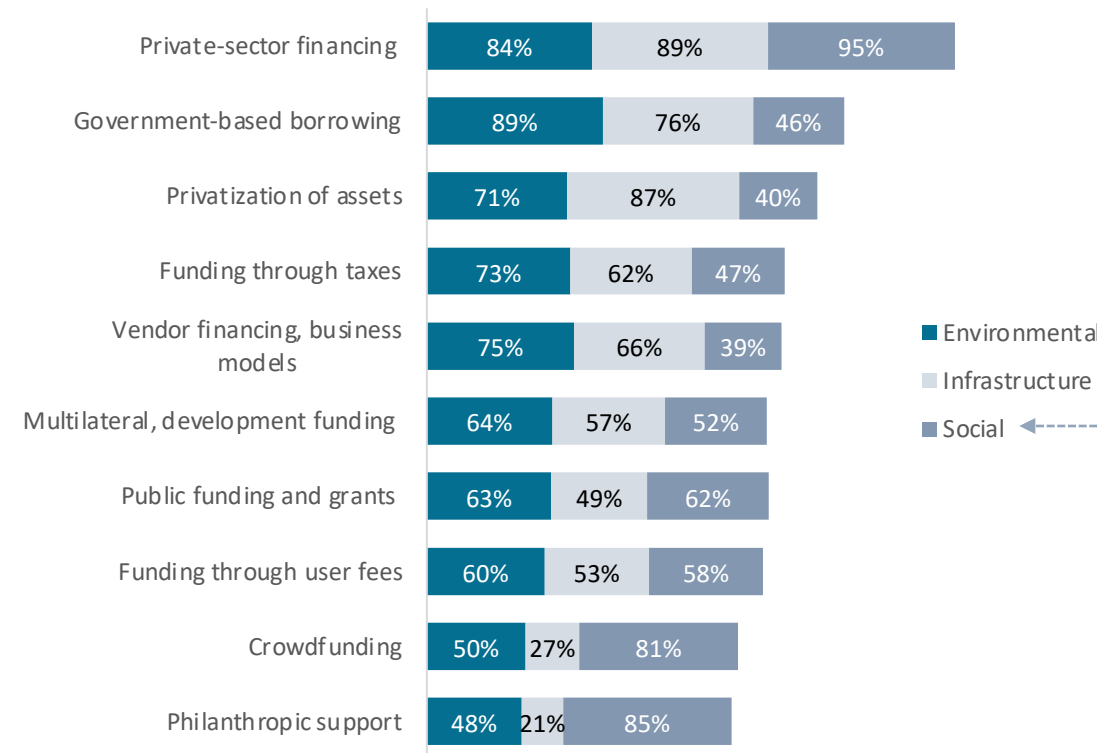


Funding the future requires a richer blend of methods

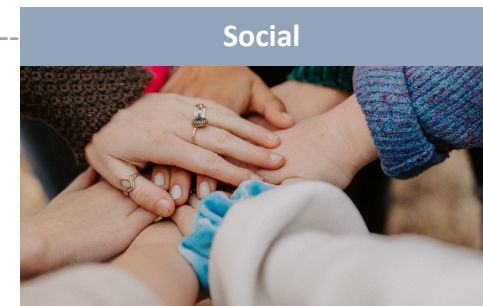
Cities tap a range of funding mechanisms to support their future-ready plans.

Private-sector financing, government-based borrowing, and privatization of assets are the top three ways. Funding through taxes, vendor financing, and new business models are not far behind.

How cities fund social, environmental, and infrastructure plans



■ Environmental
■ Infrastructure
■ Social



Top 3 methods for funding

- ▶ Government-based borrowing
- ▶ Private-sector financing
- ▶ Vendor financing

- ▶ Private-sector financing
- ▶ Privatization of assets
- ▶ Government-based borrowing

- ▶ Private-sector financing
- ▶ Philanthropic support
- ▶ Crowdfunding

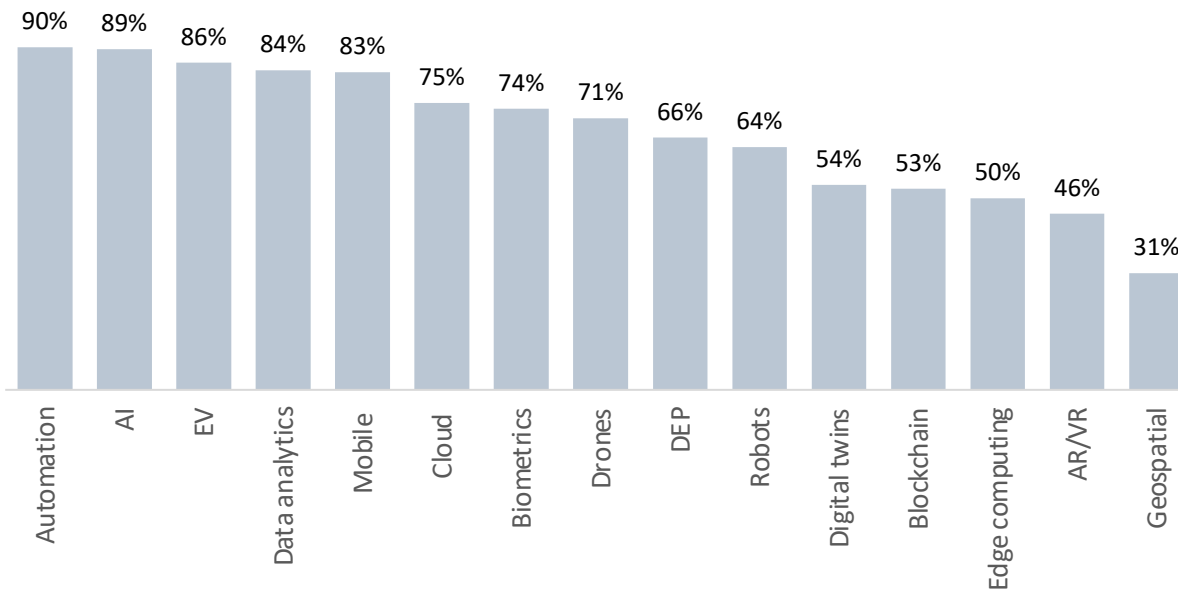
City survey Q35: What are the main sources of capital your city is using to fund its social, environmental, and infrastructure investment plans?

Where cities are placing their technology bets

Cities will draw heavily on technology to achieve their future-ready goals.

Urban leaders have identified an average of 10 technologies that will be most important to them as they develop and implement their plans. Automation, AI, and electric vehicles top the list as cities move to a smarter, more sustainable future. Data analytics, mobile, cloud, biometrics, and drones will also play a central role for most cities.

Technologies cities see as most important for their future



City survey Q36: Which of the following technologies will be most important to help your city to achieve its future-ready plans?

Emerging market cities are leapfrogging those in advanced markets in the use of some game-changing technologies



Biometrics
81% vs. 68%



Blockchain
66% vs. 42%



Edge computing
63% vs. 39%



Drones/AVs
76% vs. 67%



Digital platforms
71% vs. 61%



Geospatial
37% vs. 25%

Future-ready cities rely on digital twins

To prepare for the future, cities are increasingly turning to digital twins. Barcelona, Dublin, Seoul, Chengdu, and Porto are just some of the cities that are forging ahead with these virtual models.

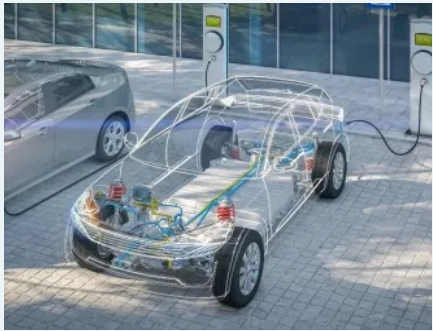
[ABI Research](#) expects more than 500 urban digital twins to be deployed by 2025. The research firm forecasts these models will save city planners US\$280 billion by 2030. Our analysis, which supports that research, uncovered a range of use cases for digital twins:

- **Barcelona** is developing a digital twin of its city to understand the impacts from modifications to energy, mobility, and other urban infrastructure. Drawing on public data, the model tracks facilities and services to identify underserved city areas.
- **Dublin** is piloting the use of digital twins as part of its Smart Dublin initiative. The real-time technology will provide the foundation for planning better use of infrastructure and managing high-risk sites across the city for use in emergency response.
- **Seoul** is developing a digital twin in the metaverse that will enable the city to proactively diagnose urban issues and develop solutions. It will be used to reduce costs and ensure the safety of citizens.
- **Chengdu** is using digital twin modeling to develop plans in connection with a major reconstruction project involving roads, bridges, tunnels, and pedestrian passageways.
- **Porto** uses a digital twin of the water system, called H2Porto, which models water levels based on real-world conditions and weather forecasts. It allows for integrated real-time management of the system as well as remote monitoring and provision of information to the public.

74 cities that are using digital twins for planning and scenario analysis

A Coruña	Charlotte	Hangzhou	Milwaukee	Santa Fe
Abidjan	Chengdu	Hartford	Murcia	Sharjah
Addis Ababa	Christchurch	Helsinki	Naples	St Louis
Almaty	Cork	Hong Kong	New Orleans	Takamatsu
Atlanta	Cotonou	Indianapolis	Oklahoma City	Tampa
Bangkok	Dammam	Jaipur	Ottawa	Tbilisi
Belgrade	Dubai	Jersey City	Pittsburgh	Tehran
Belo Horizonte	Durban	Jerusalem	Porto	Tokyo
Berkeley	Durham	Kampala	Puebla	Toronto
Blantyre	Edinburgh	Lagos	Rezekne	Utsunomiya
Bologna	Ekurhuleni	Liverpool	Salvador	Venice-Padova
Buenos Aires	El Paso	Los Angeles	San Antonio	Vilnius
Calgary	Fukuoka	Lucknow	San Bernardino	Washington
Cambridge	Glasgow	Manila	San Francisco	Wellington
Cape Town	Guadalajara	Mexico City	Santa Cruz	

Our research reveals that **37%** of cities now use digital twins to support planning and scenario analysis. Another **54%** of cities—and **67%** of future-ready cities—said that digital twins will be important for achieving their future-ready plans.



City survey Q11: When developing its thinking and future-ready plans, does your city...? Q36: Which of the following technologies will be most important to help your city to achieve its future-ready plans?

Technologies that will transform urban environments



Informing leaders with sensing infrastructure

Peter Nõu

IT strategist, Smart City Infrastructure & Innovation
Uppsala, Sweden

“IoT is the next technology that will help us track the pulse of the city. Monitoring city processes will inform city leaders and organizations about constraints, risks, progress towards goals, and more. Sensing infrastructure requires access to pervasive digital infrastructure, and our city is in the process of taking a step forward, potentially owning our own black fiber network that we will lease to anyone at transparent rates or utilize ourselves if the need arises.”



Technology tools during times of crisis

Victoria Itskovych

Deputy Chief Information Officer
Kyiv, Ukraine

“We have seven and a half thousand video surveillance cameras covering the whole city. They're used for different tasks, not only for law enforcement, but also for transportation, analytics, and other purposes. Our municipal situation center became handy for us during the war to provide individual emergency services, record incidents, and share information with others. Our citywide network of IoT sensors and surveillance cameras is playing a critical role.”



Digital twins to understand impacts

Barbara Pons

Commissioner of the 2020 Agenda
Barcelona City Council, Spain

“Understanding how the future electricity market will change and develop with the use of solar panels or other technology innovations is essential. Digital twins and simulators will help us understand the impacts of any modifications we make in energy, mobility, or any other infrastructure in the city.”



5G is the platform for digital world

Brandon Branham

Assistant City Manager and Chief Technology Officer
Peachtree Corners, Georgia

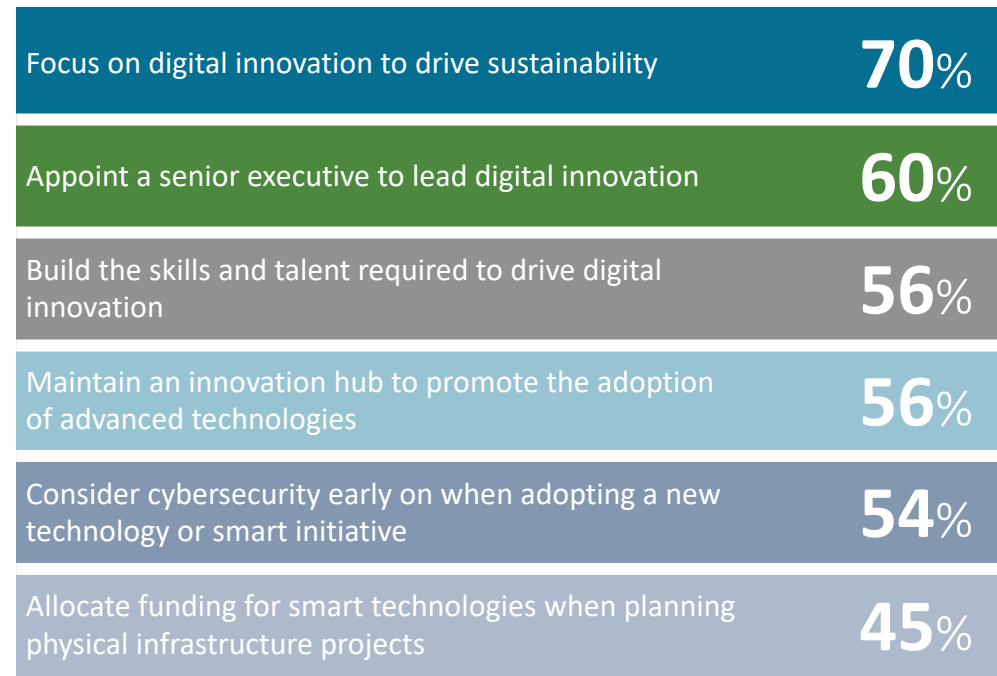
“Use of 5G technology is going to give cities the ability to manage infrastructure in places they haven't been able to before. They will be able to place 5G connected cameras in areas where they run fiber, which can process data with AI or machine learning to send back—or run metaverse applications. It's the platform for a truly digital world.”

How cities get the best results from digital innovation

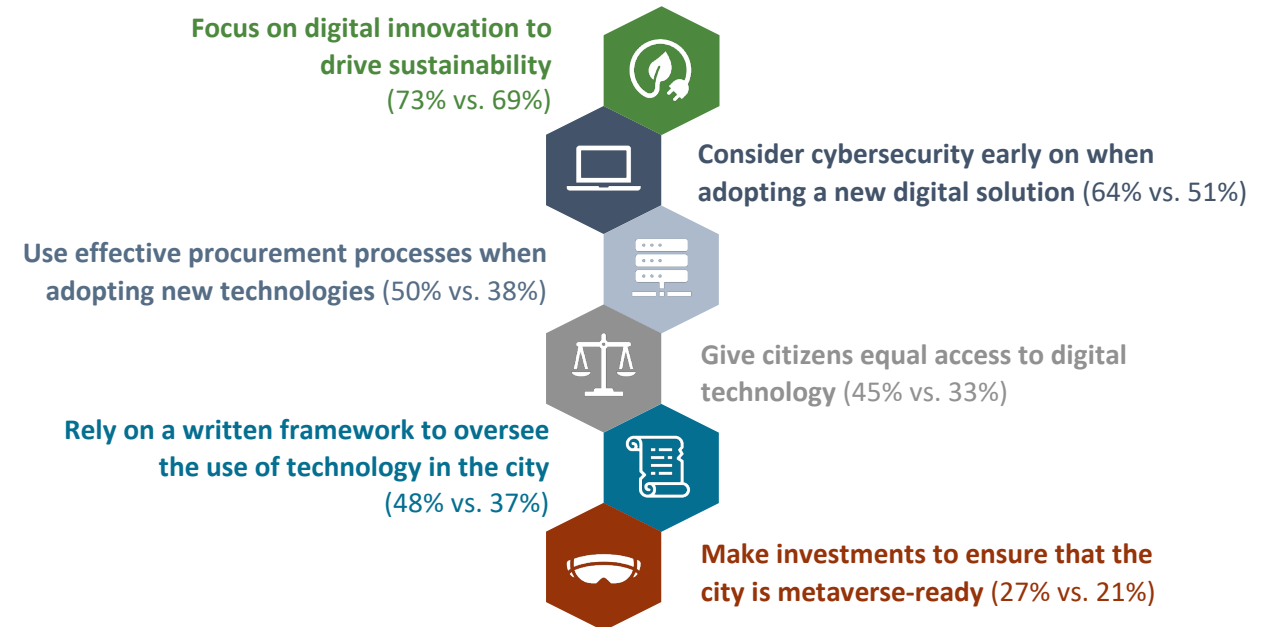
Many urban leaders use digital innovation not only to make their cities smarter, but also more sustainable.

To achieve the best results, most cities appoint a senior executive to lead digital innovation and build the skills and talent to make it happen. One growing trend is to set up an innovation hub to promote the adoption of advanced technologies. Two examples are Peachtree Corners and Toyota Woven City (see next page). While it is still early days for the metaverse, some forward-looking cities are already exploring options to enable their citizens to live, work, and socialize in a virtual world. Seoul will begin to implement its metaverse counterpart later in 2022—the first city in the world to do so (see page 43).

Top six approaches to digital innovation that cities follow



Six areas of digital innovation that future-ready cities do better than others



City survey Q37: Which of the following statements do you agree with relating to your city's approach to digital innovation?

Drawing on innovation labs to test new urban technologies



Peachtree Corners, Georgia

Unlike other testing environments, Peachtree Corners offers more realistic testing conditions than a closed course, with hills, trees, and thousands of cars in and out daily.

Peachtree Corners, a city of 45,000 in the Atlanta metropolitan area, grew around a technology park set up in 1967 to attract high-tech businesses and harness the skills of graduates from Georgia Institute of Technology and other local universities. Since then, the city has turned the park—and itself—into an innovation hub and vibrant living lab that dreams up and tests smart urban innovations of the future.

The innovation hub, Curiosity Lab, includes a 25,000-square-foot corporate innovation space and incubator for tech startups of all types, run in partnership with Georgia Tech. It also offers a facility for testing mobility technology: a “city street of the future” with 5G and fiber optic connectivity, sensors, and

connected streetlights and traffic lights that can communicate with each other and connected vehicles. The street is public infrastructure owned and operated by the city, configured to allow autonomous vehicles to operate in the two outside lanes while human drivers use the middle lane.

Peachtree has created a business model around the lab and testing facility for driving innovation in partnership with the private sector—one that other cities can emulate in their own future-ready plans. Companies are permitted to use the street and facilities for testing their technology and applications without any additional charge.

[!\[\]\(2bae76de5ebbd5c4d7d47162f1673734_img.jpg\) Read the full case study here](#)



Toyota Woven City, Japan

A prototype city of the future, Toyota Woven City will connect people, buildings, and vehicles through data and sensors. It also will allow researchers to test next-generation technologies.

Toyota Motor Corp. is promoting the creation of the Toyota Woven City, a brand-new, fully autonomous community designed as a living laboratory, specifically to test new technologies like self-driving vehicles. Not to be confused with Toyota City, Toyota Woven City will be built on the 700,000-sq.-meter site of a former Toyota plant near Mount Fuji, a two-hour drive outside of Tokyo. The project has been in development since February 2021. Its Phase 1 opening will be from 2024 to 2025, and it will include the necessary infrastructure for its first residents.

Woven City will have three types of streets: one for automated mobility, another for pedestrians, and a third for both pedestrians and personal mobility. Underground, there will be a fourth pathway specifically for the movement of goods, where the city's logistics network will also be installed.

While Woven City only has 360 initial residents, the future population is forecast to reach 2,000. The city's fully connected ecosystem is powered by clean energy sources like solar energy and hydrogen fuel cells. A fleet of Toyota's self-driving electric vehicles, called e-Palettes, will be used for transportation, deliveries, and mobile retail throughout the city.

The goal of the city is to try out technologies like automated driving, artificial intelligence, and robotics in a real-world environment.

[!\[\]\(4c9516d2c24d0d513bc9f84c2e013d65_img.jpg\) Read the full case study here](#)

Cities of the future will operate in the metaverse

The metaverse will offer cities many opportunities for reinventing how citizens live, work, socialize, and interact with government. Our research identifies 44 cities that are making investments to ensure that their cities are metaverse-ready.

A Coruña	Cork	Miyakonojo
Addis Ababa	Daegu	New Orleans
Almaty	Dakar	Oklahoma City
Amsterdam	Denver	Ottawa
Atlanta	Edinburgh	Palma de Mallorca
Baltimore	Ekurhuleni	Rezekne
Bangalore	Guayaquil	Rosario
Belo Horizonte	Hangzhou	Seattle
Boulder	Hartford	Surabaya
Cambridge	Houston	Tel Aviv
Charlotte	Kampala	Toronto
Chengdu	Kansas City	Tulsa
Cleveland	Kuala Lumpur	Venice-Padova
Columbus	Limerick	Washington
	Los Angeles	
	Lucknow	

Seoul: First city to reimagine itself in the metaverse

“Metaverse Seoul is a virtual counterpart of our city. It allows people to experience Seoul anywhere, at any time, as long as they have devices,” says In Dong Cho, first vice mayor of Seoul Metropolitan Government.

“The metaverse will enable people to interact without the limitations of time and space. It is a technology that can fulfill citizens’ needs by allowing an experience of creative content and services that are unimaginable in reality.”

Metaverse Seoul will be implemented in stages over a period of five years, from 2022 to 2026. Stage one is scheduled to launch by the end of 2022. It is being funded with the city’s own budget, as well as with tourism funding from the national budget.

In the metaverse, citizens from all over the world will be able to discover Seoul and socialize. They will have the opportunity to form social relationships through various activities like gaming and cultural events, and to communicate via online chats, voice chats, and video calls. Metaverse users will be able to build their own virtual space and create and share their content.

Seoul is taking the metaverse one step further by linking it to the city’s administrative information system and giving the public access to various city services. For instance, citizens will be able to apply for civic documents and acquire information on topics such as local taxes.

Companies will also benefit. They will be able to promote their businesses and carry out investment consultations at the Metaverse Seoul Fintech Lab, a business assistance entity completely funded by the Seoul Metropolitan Government.

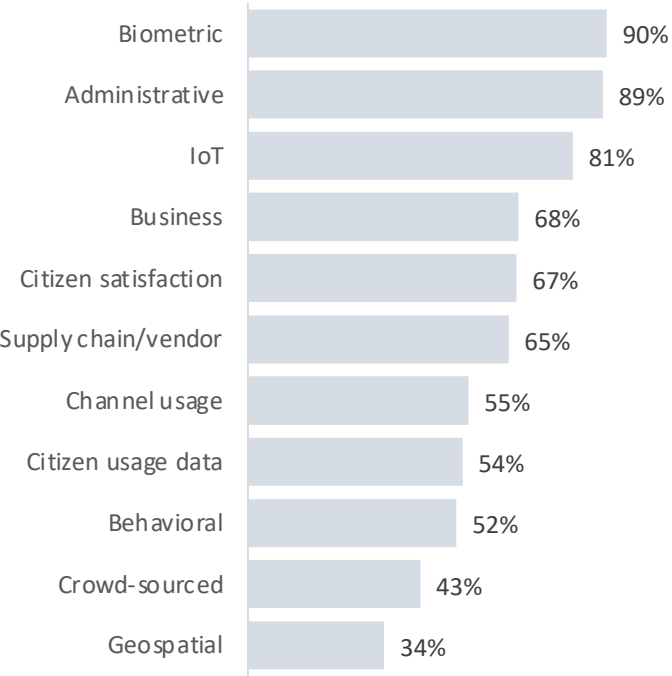


Cities are awash with data: biometric and IoT data are now table stakes

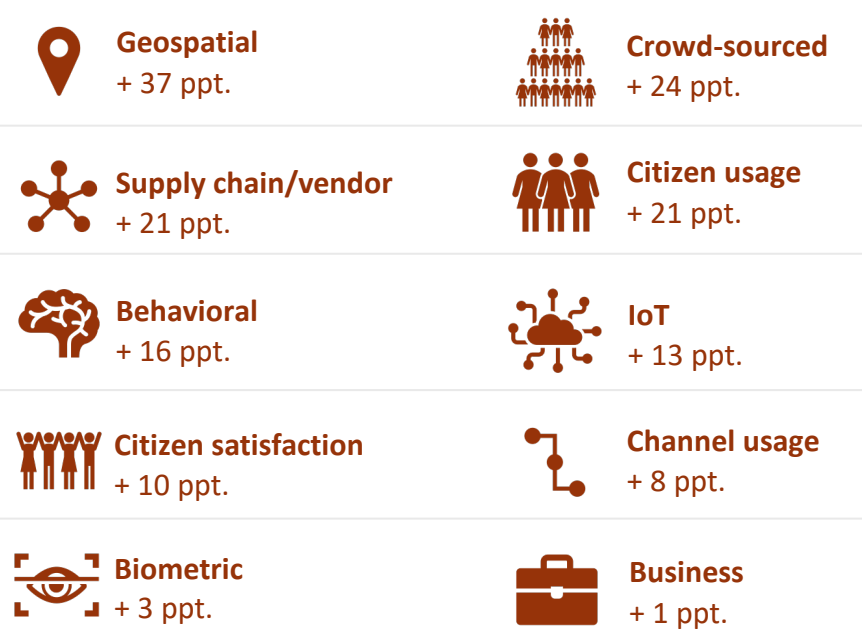
To support digital identity programs, 9 out of 10 cities now use biometric data in the form of fingerprints or facial recognition. About the same percentage use administrative data to help them manage urban programs and services.

Cities also use IoT data widely as they move to interconnect their assets, from roads and streetlamps to buildings and water supplies. They use both crowd-sourced and geospatial data the least today, but they expect their use of such data to see the biggest percentage increases over the next five years. Supply chain data will also grow in favor, as cities take steps to manage escalating supply chain disruptions more effectively.

Data used today to support operations



Data types that will grow the most (in % points) over next 5 years



Types of data that large cities use more than small cities

Data type	Large	Small	Pt. diff.
Geospatial	65%	29%	+36
Channel usage	75%	50%	+25
Crowd-sourced	65%	41%	+24
Citizen usage	65%	48%	+17
Business	75%	65%	+10
Administrative	90%	86%	+4

City survey Q39: Which of the following types of data is your city actively using to support its operations? Which is it planning to use over the next five years?

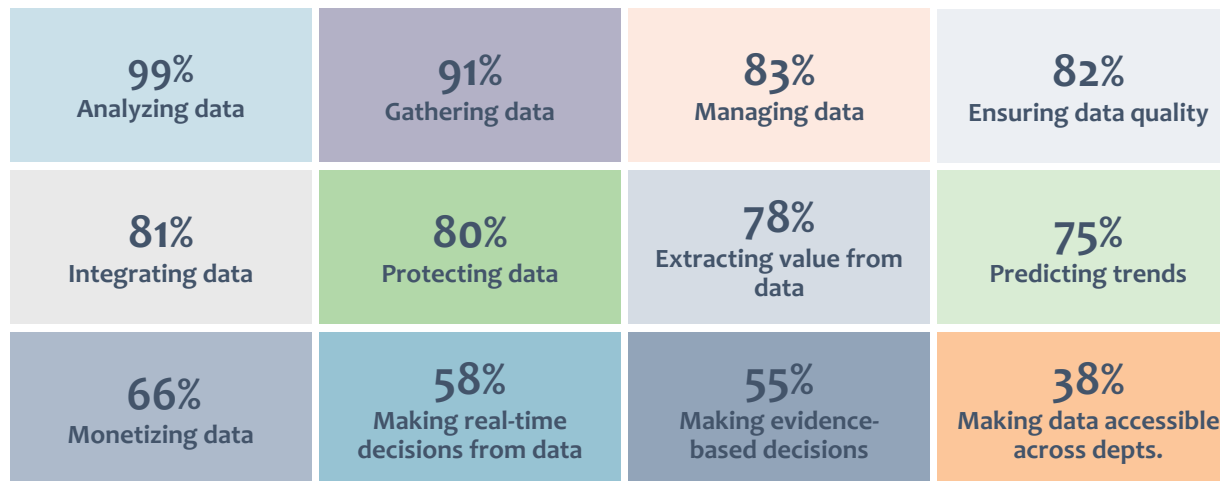
Cities are progressing to the finer points of data management

Cities have made significant progress on the fundamentals of data management. This includes analyzing, gathering, managing, integrating, and securing data, as well as ensuring its quality and value. They are now turning their attention to the finer points.

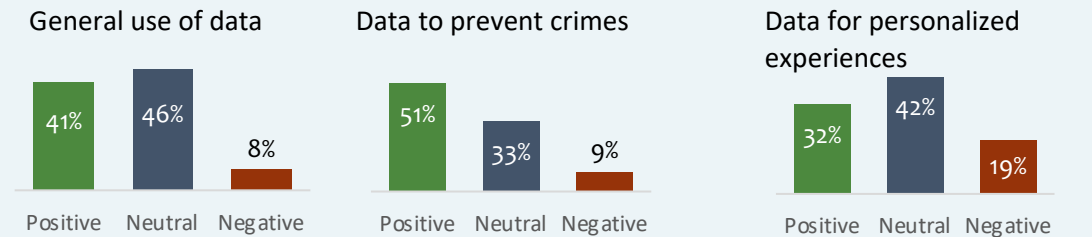
Cities have made less headway on more specialized areas of data management, such as using it to make evidenced-based and real-time decisions, as well as making data accessible across government departments or to the public. But they plan to assign greater priority to these activities over the next five years.

Cities need to make sure that their data doings do not fall afoul of citizen expectations. While citizens are generally on board with how cities use data, they frown on the sale of personal and even impersonal data and on sharing it with other government entities.

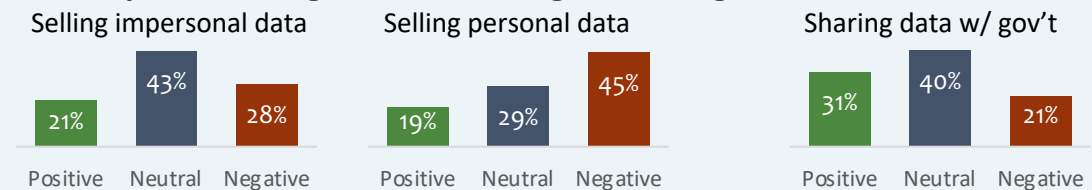
Data activities where cities are making significant progress



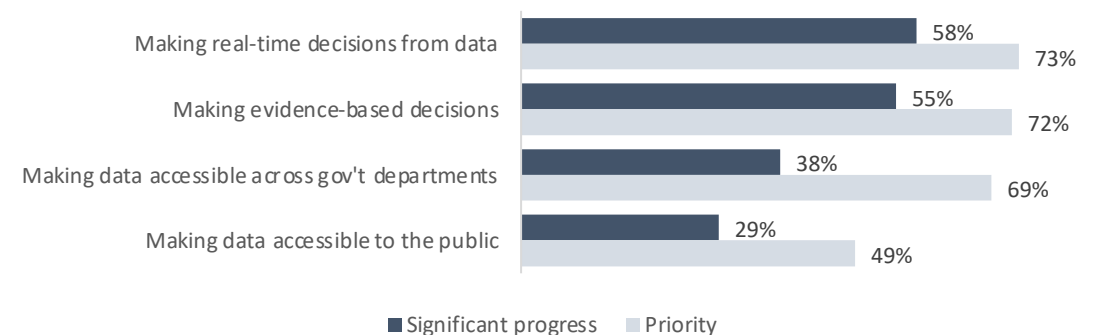
Citizens generally support the use of data in cities



But they are more negative about selling and sharing data



Lower progress activities that will be prioritized over next 5 years



City survey Q40: In which of the following data activities has your city made significant progress? Which areas will you prioritize over the next five years? Citizen survey Q32: How do you feel about your city using data in the following ways?

Nonetheless, many cities are not data-ready for the future

Although data will be the lifeblood of cities of the future, many municipalities are lagging on the data front. Only half have staff with the necessary data analytics skills. Even fewer use data to achieve their social, environmental, and economic goals.

Percentage of cities that agree with statement. My city...	
50%	Has staff with the necessary data analytics skills
47%	Uses data to meet social, environmental, and economic goals
47%	Uses data to support evidence-based decision-making
46%	Has an appropriate budget for data management
45%	Integrates data across departments
45%	Works with companies and others outside government to gather data
44%	Has an open approach to encourage data use and development
36%	Has a chief data officer responsible for data use
35%	Is proficient at utilizing data across jurisdictional boundaries
33%	Has a written policy to ensure the proper management of data
30%	Avoids using citizen data due to privacy concerns



Q38: Which of the following statements on data management do you agree with? Select all statements that you agree with.

Cities are behind in using data for urban domains. That will change in five years.

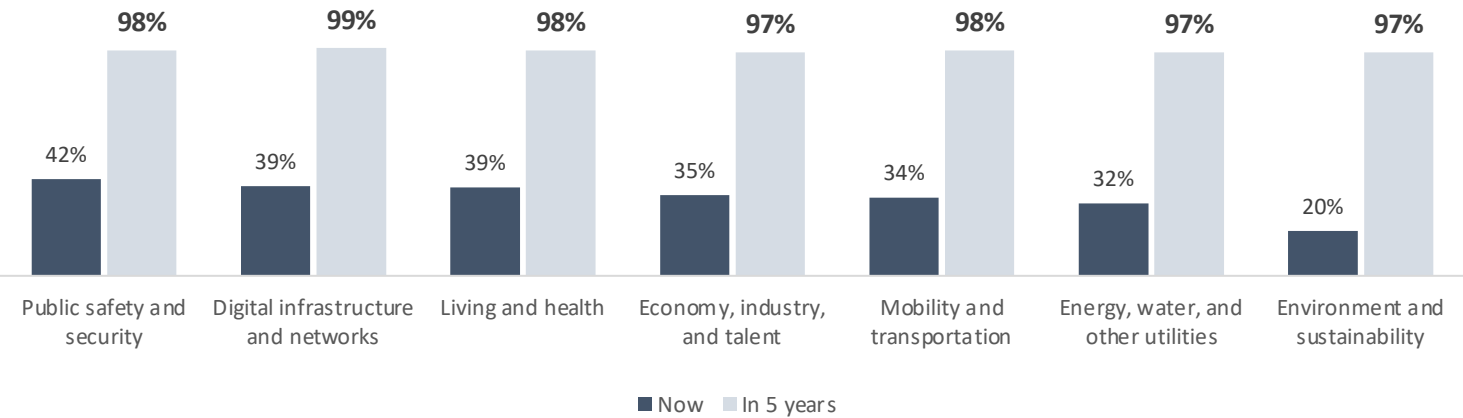
Cities lag in using data to achieve their goals, although future-ready cities do better.

Cities overall have made the most headway in using data for public safety, security and digital infrastructure. Unfortunately, they have made the least progress in both the energy/utility and the environmental domains, which will slow their progress in meeting their biggest future challenge: coping with climate change.

Future-ready cities have made much greater progress across urban domains, particularly in areas such as mobility and transportation, digital infrastructure, living and health, and energy and water. Cities in advanced markets are also much further ahead in using data than those in emerging markets.

City leaders understand the importance of data for cities of the future. That is why nearly all cities foresee making significant progress across all domains over the next five years.

Where cities are making good or very good progress in using data in key urban domains



City survey Q42: What progress has your city made to date in using data to achieve its goals within the following urban domains? What progress does it expect to make over the next five years?

Future-ready cities have made greater progress than others

Urban domain	Future-ready	Others
Living and health	64%	31%
Public safety and security	59%	37%
Mobility and transportation	57%	27%
Digital infrastructure	55%	35%
Energy, water, and other utilities	45%	28%
Economy, industry, and talent	36%	35%
Environment and sustainability	32%	16%

Advanced markets are further ahead than emerging markets

Urban domain	Advanced	Emerging
Living and health	58%	17%
Public safety and security	55%	28%
Digital infrastructure	47%	30%
Mobility and transportation	42%	24%
Economy, industry, and talent	37%	33%
Energy, water, and utilities	34%	29%
Environment and sustainability	28%	10%

“Data is gold for this administration. We have a completely data-focused vision. Our goal is to understand every aspect of a citizen’s life, while respecting their privacy.”

Wilfredo Gomez, Digital Transformation Officer, Bucaramanga, Colombia

Data strategies from urban experts



Build a unified data governance platform

Bayan Konirbayev

Chief Digital Officer
Almaty, Kazakhstan

“Data has become our single source of truth. Through our data exchange platform and advanced data management system, we have brought together previously siloed data from different government departments, such as social services, education, healthcare, and housing.”



Get a complete picture of your residents

Wilfredo Gomez

Digital Transformation Officer
Bucaramanga, Colombia

“We have a completely data-focused vision. Our goal is to understand every aspect of a citizen’s life, while respecting their privacy, of course. We want to know whether they have been vaccinated, whether their kids are going to school, whether they are paying taxes, and whether they are using public transportation.”



Use data to predict and prescribe

Bill Baver

Vice President, NTT Smart Platform
NTT

“Most cities today use data to identify trends and understand what happened and, in some cases, why it happened. Future-ready cities need to move from this approach to learn how to use data in a predictive, prescriptive, and adaptive way. Only by maturing in this journey will they be able to simulate scenarios to forecast likely future outcomes, prescribe actions to optimize performance, and ultimately make decision on how to best take advantage of a future opportunity or mitigate a future risk.”



Collect data on how citizens use services

Andrea Sorri

Segment Business Development, Cities, EMEA
Axis Communications

“Cities are becoming increasingly focused on improving mobility, and reducing congestion and pollution, so it’s more important than ever to base decisions on accurate and reliable data. It’s important when planning and coordinating transport around cities to ensure that any changes and initiatives fit with the way people use services and roadways.”

Cities are optimistic about their cyber defenses. Citizens are less convinced.

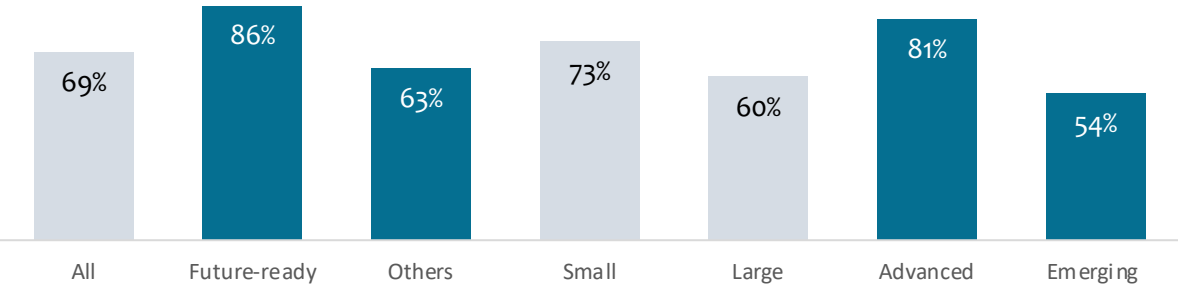
About 7 out of 10 of city officials believe their cities are well prepared for a cyber attack. However, considering the slew of cities hit by ransomware since the pandemic began in 2020, this may be a rose-tinted view. Citizens think so.

Future-ready cities, cities in advanced economies, and cities with smaller populations believe they are better prepared for cybersecurity attacks. In the case of future-ready cities, this may be justified, but not necessarily for others.

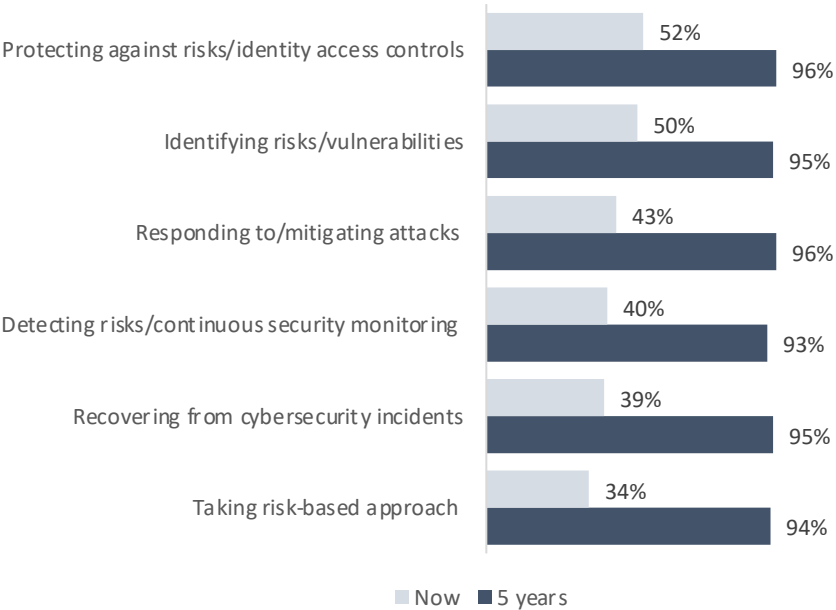
City leaders have an even more sanguine take on the headway that they will make over the next five years. Over 9 out of 10 plan to make significant progress across key cybersecurity activities, and on average they plan to spend \$10.6 million on their efforts, with future-ready cities spending 50% more.

Citizens have their doubts. Only 34% of them think their cities are well prepared for the digital era, and less than half (43%) believe that their city has taken effective steps to protect data security and privacy

Cities that believe they are well or very well prepared for cyberattacks



Where cities are making the most progress on cybersecurity



What cities plan to spend on cybersecurity over the next 5 years (\$ m)

Future-ready	Others	All
\$13.4	\$9.7	\$10.6

City survey Q43: How prepared is your city for cyberattacks? Q44: How much progress to date has your city made in the following areas of cybersecurity risk management? How much progress does it expect to make over the next five years? Q45: How much is your city planning to spend over the next five years (cumulatively) in US dollars on cybersecurity-related efforts? Citizen survey Q30: How would you rate the job that your city is doing in the following areas of public trust? Q34: Which of the following statements about your city do you agree with?

Results by urban domain

Future-ready cities use digital innovation, partnerships, and new business models to ensure that urban domains are fit for purpose in the years ahead. Crucially, they integrate their plans across urban domains to generate greater economic, social, and sustainability value.

Seven urban domains: where cities focus their efforts

ThoughtLab explored how 200 cities around the world are making their urban domains fit for future purpose.

Our in-depth research shows how cities plan to use partnerships, governance, and new business models and strategies in each of seven major urban domains. It also examines the investments cities are planning to make in technology solutions over the next five years.

The seven urban domains



1. Digital infrastructure

Connecting people, devices, and assets across a city



2. Energy, water, and utilities

Distributing energy, water, and other resources responsibly



3. Mobility and transportation

Enabling people and goods to move faster and safer



4. Living and health

Ensuring well-being and equity of citizens



5. Environment and sustainability

Improving sustainability and environmental quality



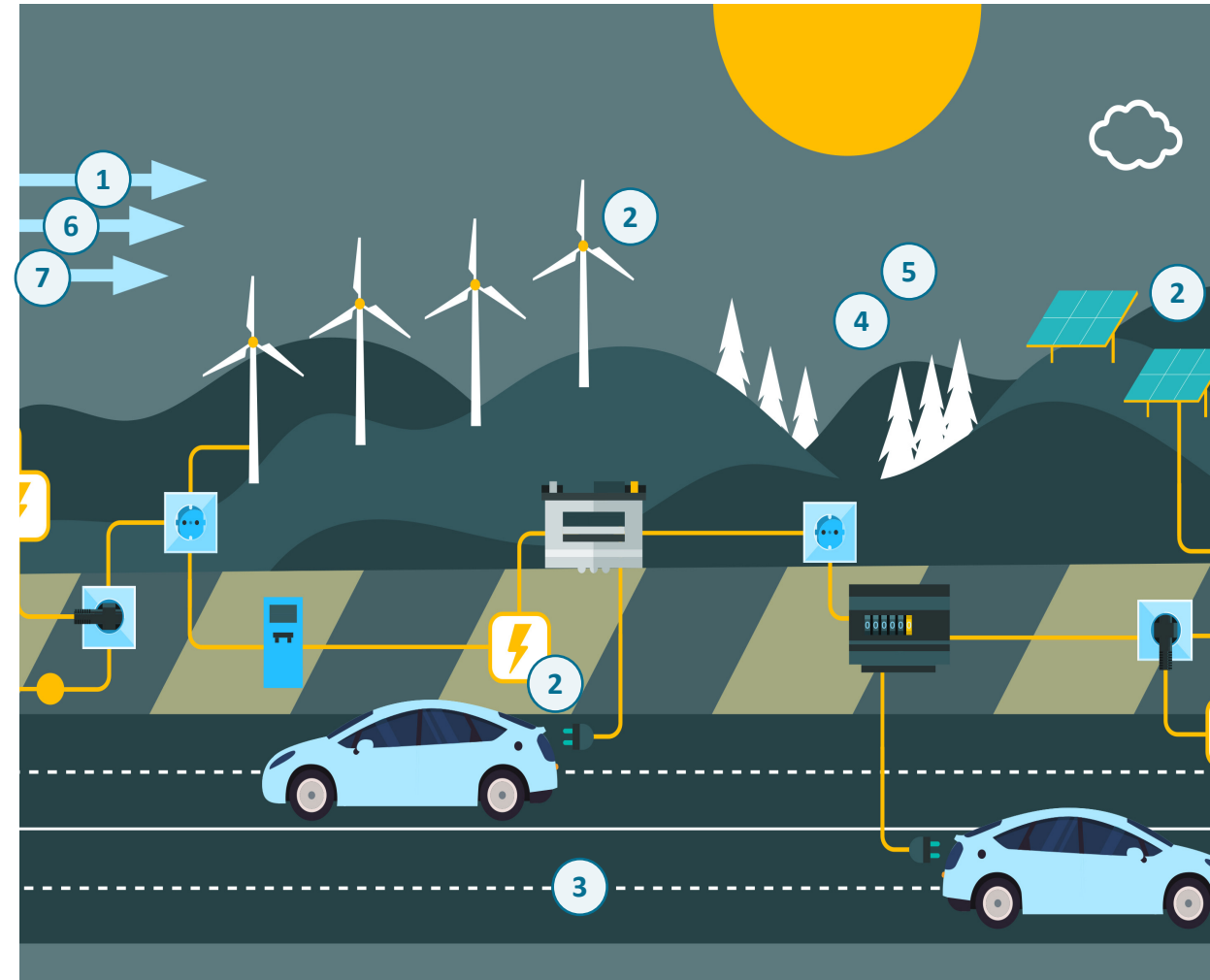
6. Public safety and security

Ensuring citizen safety and preventing crime



7. Economy, industry, and talent

Driving growth and jobs, and attracting business and talent



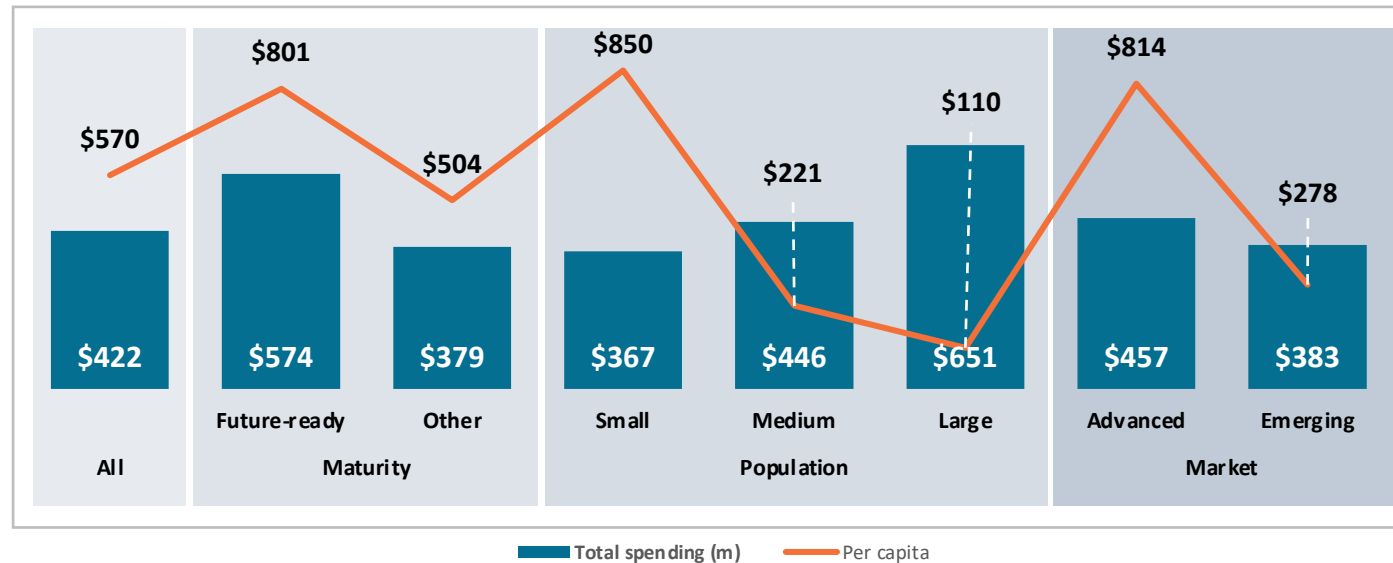
Technology investments across domains

Cities in our study plan to spend \$422 million on average, cumulatively, over the next five years on technologies and solutions across their urban domains. This amounts to \$570 per citizen on average over that period.

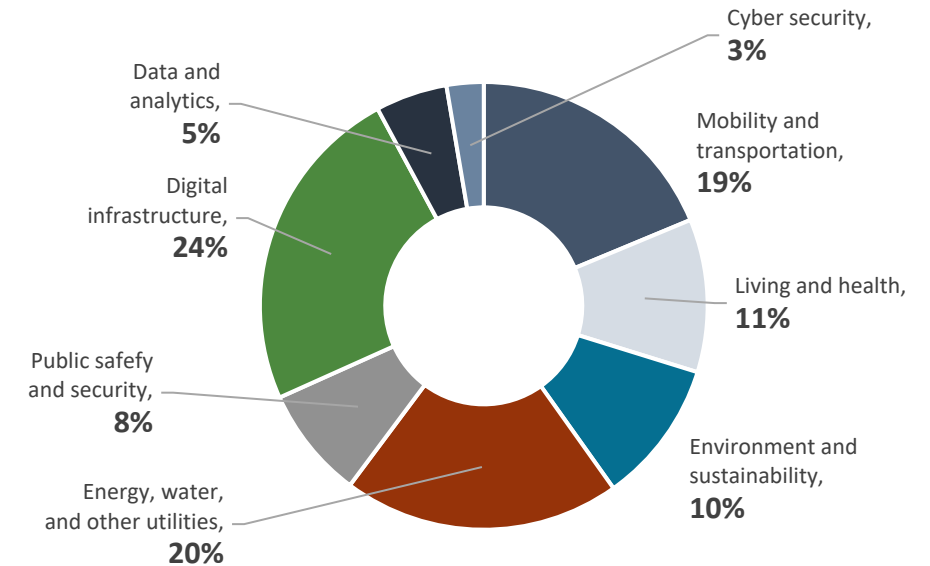
Small cities intend to spend around half that of their larger peers on an aggregate basis (\$367 million vs. \$651 million). However, on a per-capita basis, small cities will spend eight times that of larger cities (\$850 vs. \$110). The reason is the size of the core technology investment that cities must make, which larger cities can spread out over a bigger population base.

Given their more ambitious plans, future-ready cities seek to spend an average of \$300 more per citizen than do other cities.

Total and per-capita technology spending over next five years by type of city



Where cities are making their tech investments (% of total)



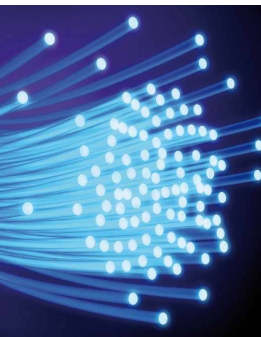
In general, the distribution of spending across the domains is similar regardless of the size of the city, the level of economic development, or degree of future-readiness.

The one area where there is a difference between future-ready cities and their less-ready counterparts is **digital infrastructure**. Future-ready cities spend 31% of their budget on this domain vs. 27% for less-ready cities. This, combined with the larger budgets of future-ready cities, means that the digital gap between future-ready and other cities is only going to widen.

City survey Q15, Q17, Q22, Q26, Q29, Q32 : How much is your city planning to spend over the next five years (cumulatively) in US dollars on the following technologies to improve _[domain name]?

1. Digital infrastructure

Partnerships, governance, and business models



The pandemic revealed the need to bridge connectivity gaps in cities. In the future, cities will focus on providing smart city services such as smart lighting, digitizing citizen services, and furnishing all citizens with affordable and reliable connectivity.

Citizens see provision of free WI-FI and computers at libraries and to low-income communities as top priorities for cities. Large cities put a higher premium than small ones on ensuring that citizens without mobile access can still get government services and that all have equitable access to 5G. In contrast, small cities are more apt to use data to spot inequitable digital access and to do more to address those issues.

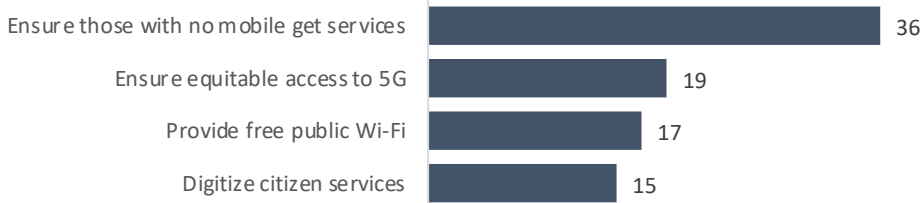
Advanced market cities focus more than emerging market cities on equitable access to 5G and using data to identify digital access gaps. Emerging market cities give greater attention to digitizing city services and even giving citizens without mobile devices access to them.

Top priorities for cities and citizens over next five years

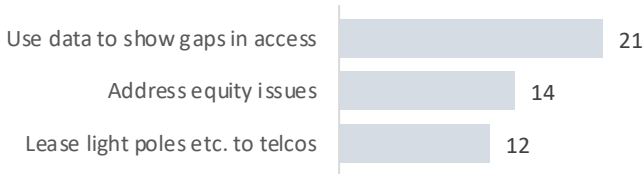
Cities		Citizens	
1. Provide smart city services, such as smart street lighting	75%	1. Provide free Wi-Fi/computers at libraries & public buildings	60%
2. Digitize citizen services	74%	2. Provide free Wi-Fi in low-income communities	55%
3. Address affordability/digital equity issues	71%	3. Provide affordable & reliable connectivity	54%
4. Ensure access to affordable & reliable connectivity	67%	4. Digitize citizen services	43%
5. Provide access to the firms' networks/public infrastructure	62%	5. Provide free or low-cost devices to underprivileged citizens	43%

City survey Q31 & Citizen survey Q23: Which of the following actions will your city prioritize over the next five years to improve digital infrastructure?

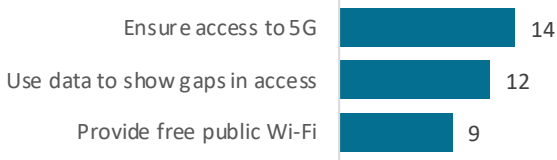
Where large cities are ahead of small cities (% pt. diff.)



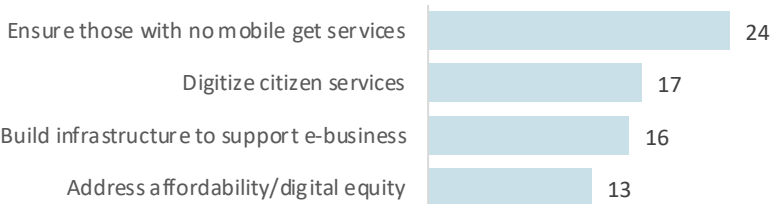
Where small cities are ahead of large cities (% pt. diff.)



Where advanced market cities are ahead of emerging cities (% pt. diff.)



Where emerging market cities are ahead of advanced cities (% pt. diff.)



1. Digital infrastructure

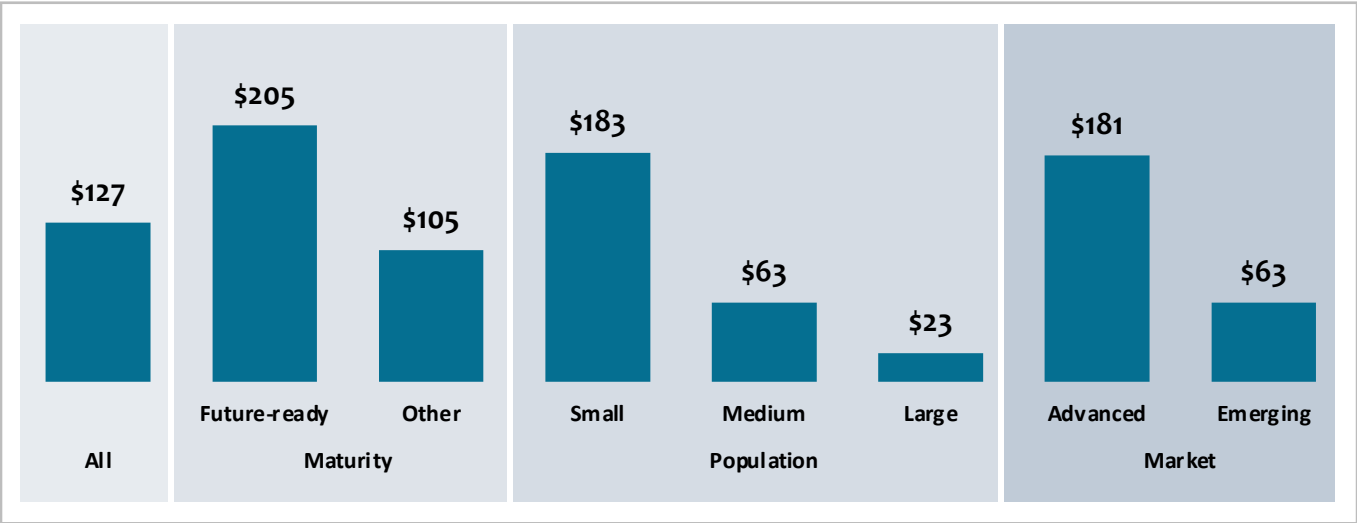
Areas of investment

With high priority placed on digital infrastructure, this is where the largest share of cities plan to concentrate their investments over the next five years. This holds regardless of a city’s size, level of economic development, or degree of future-readiness.

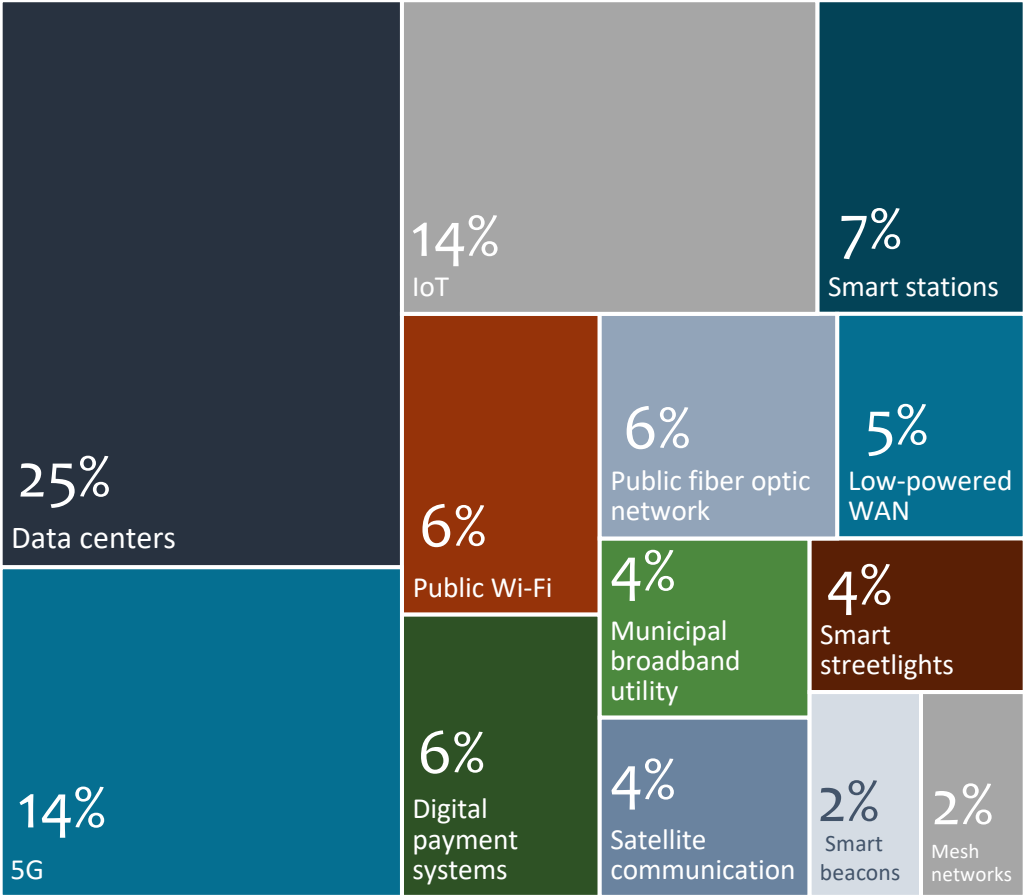
On average, cities plan to spend \$127 per capita over that period. Small cities face a steep cost of admission with regards to digital technologies: they intend to invest 8 times more per capita than large cities. Future-ready cities plan to invest almost twice their less-ready counterparts. Given the importance of digital technologies to future-readiness, this spending gap will make it difficult for less-ready cities to become prepared.

Key areas of investment include data centers, 5G, and IoT. Some of the more advanced communication technologies, such as smart beacons and mesh networks, are struggling to catch on.

Digital infrastructure per-capita spending



Where cities are making digital infrastructure investments (% of total)



City survey Q32: How much is your city planning to spend over the next five years (cumulatively) in US dollars on the following technologies to improve digital infrastructure and systems?

2. Energy, water, and other utilities

Partnerships, governance, and business models



When it comes to priorities around energy and utilities, cities and citizens are on the same page. They both are focused on promoting renewable energy, ensuring the efficient use of resources, and providing universal access to modern energy services.

More large cities than small ones emphasize solar energy, efficient use of water, and universal access to safe drinking water. Smaller cities place a greater priority on gamifying water use and providing universal access to reliable electricity.

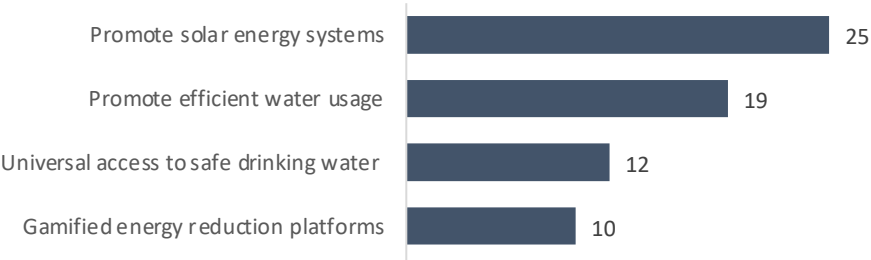
Emerging market cities are noticeably ahead of advanced market cities in prioritizing peer-to-peer electricity sales, promoting solar energy, and providing universal access to sanitation. The latter reflects the urban imperative in emerging markets to address inadequate sanitation and hygiene services.

Top priorities for cities and citizens over next five years

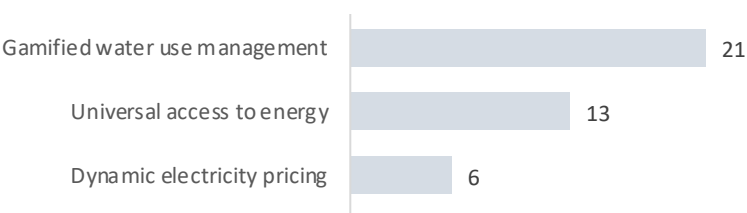
Cities		Citizens	
1. Promote use of renewable/clean energy	74%	1. Promote use of renewable/clean energy	54%
2. Promote efficient water usage	73%	2. Promote efficient use of water & energy	53%
3. Promote solar energy systems	71%	3. Universal access to safe & affordable drinking water	52%
4. Promote efficient energy usage	70%	4. Universal access to affordable, reliable, & modern energy services	50%
5. Universal access to affordable, reliable, & modern energy services	62%	5. Wider use of EVs & localized battery storage	43%

City survey Q25 and Citizen survey Q21: Which of the following actions will your city prioritize over the next five years to improve energy, water, and other utilities?

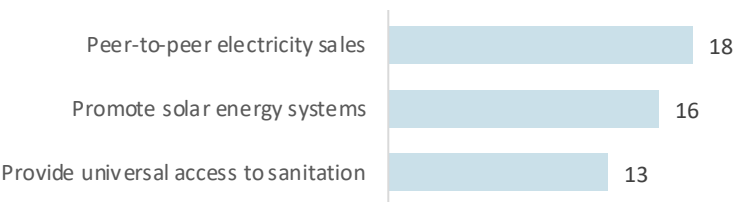
Where large cities are ahead of small cities (% pt. diff.)



Where small cities are ahead of large cities (% pt. diff.)



Where emerging market cities are ahead of advanced cities (% pt. diff.)



2. Energy, water, and other utilities

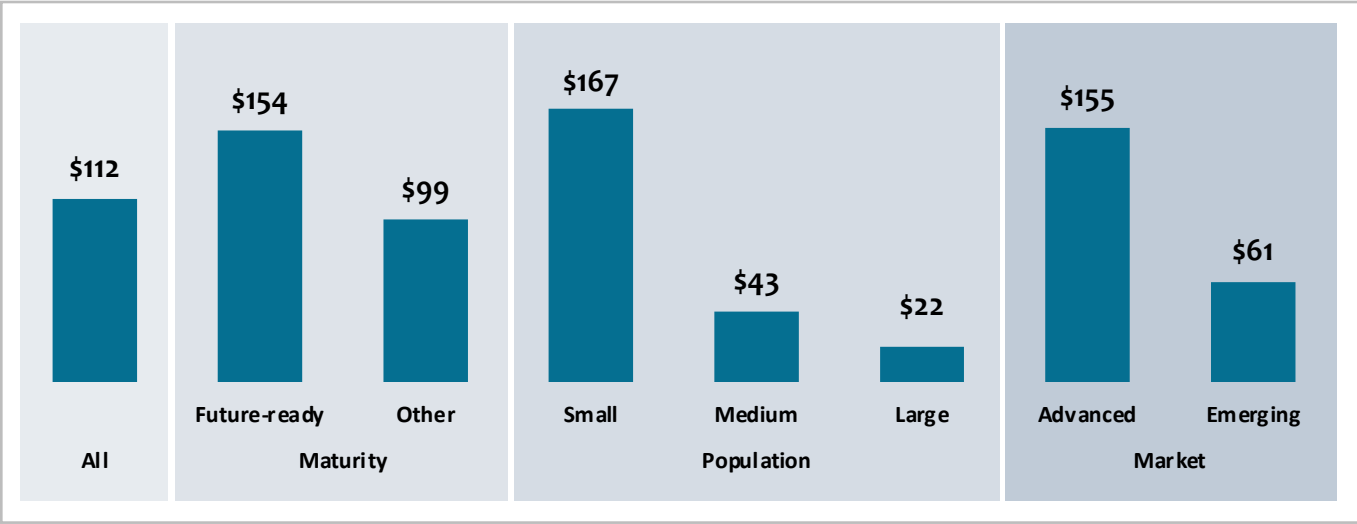
Areas of investment

Advanced market cities plan to invest almost three times that of emerging market cities, on a per-capita basis, on energy, water, and utilities over the next five years. The difference between small and large cities is even greater: small cities plan to invest about 8 times as much as large ones.

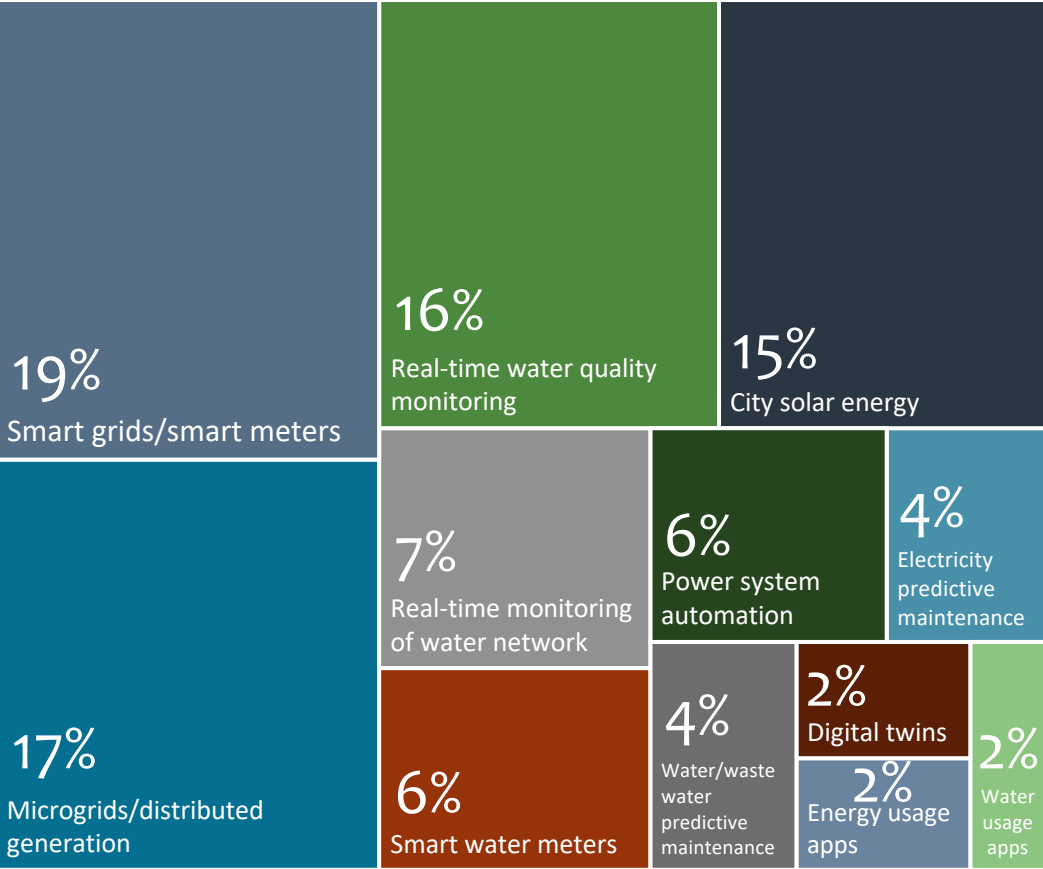
With the clock ticking on climate change, it is little surprise that energy, water, and utilities is the second-most-important area of technology investment for cities. They plan to make the biggest outlays on their electric grid, including smart grids/meters, microgrids, and solar energy.

Technology solutions that are not yet garnering a lot of investment include apps to manage energy and water usage and digital twins. However, future-ready cities are more likely to see the value in digital twins to improve their utility infrastructure. They plan to invest more than three times their less-ready counterparts—\$4.3 million vs. \$1.3 million—on digital twins.

Energy, water, and other utilities per-capita spending



Where cities are making energy, water, and other utility investments (% of total)



City survey Q26: How much is your city planning to spend over the next five years (cumulatively) in US dollars on the following technological solutions to improve energy, water, and other utilities?

3. Mobility and transportation

Partnerships, governance, and business models



Cities across the board are rethinking mobility. They are most focused on providing EV charging infrastructure and implementing congestion pricing—and aligning their transport plans with their social and environmental goals.

Citizens believe their cities should give highest priority to inter-city transit connections, reduced carbon emissions, greater safety, and improved EV charging infrastructure—the latter the top priority for cities.

Areas struggling to gain traction with cities include partnering with transportation network companies (TNCs), land value capture to fund investments, and parcel load pooling. With online shopping continuing to rise, cities would be wise to reconsider load pooling.

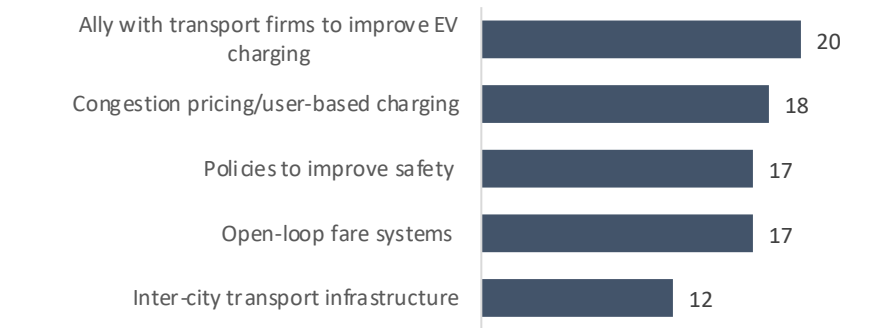
Large cities lead in partnering with firms to provide EV infrastructure, open-loop fare systems, safety measures, and congestion pricing. Emerging market cities lead in all areas of mobility, notably open-loop systems, congestion pricing, emissions reduction, parcel load pooling, amid others.

Top priorities for cities and citizens over next five years

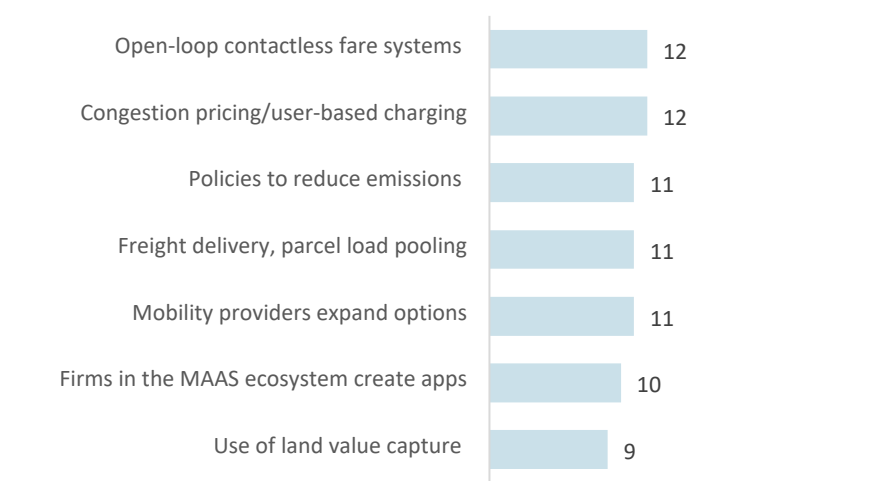
Cities		Citizens	
1. Partnering with companies to improve EV charging infrastructure	76%	1. Inter-city transport infrastructure	46%
2. Congestion pricing/user-based charging etc.	68%	2. Policies to reduce carbon emissions	46%
3. Align transport plans with social & environmental goals	65%	3. Greater safety for pedestrians, micro-mobility, etc.	45%
4. Open-loop contactless fare systems	64%	4. Better infrastructure to support EVs	40%
5. Policies to improve safety	63%	5. Policies to provide equitable & affordable access	40%

City survey Q16: Which of the following actions will your city prioritize over the next five years to improve mobility and transportation?
Citizen survey Q19: Which of the following initiatives should your city prioritize over the next five years to improve transportation and mobility?

Where large cities are ahead of small cities (% pt. diff.)



Where emerging market cities are ahead of advanced cities (% pt. diff.)



3. Mobility and transportation

Areas of investment

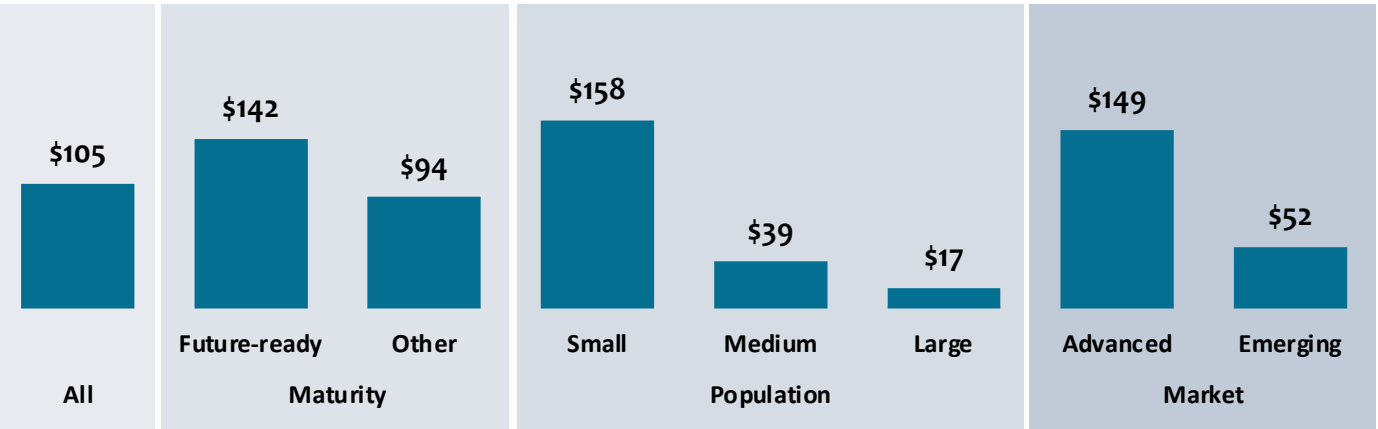
Mobility and transportation is the third-largest investment area for cities. On average, cities plan to invest \$105 per resident over the next five years; future-ready cities will invest \$142. On a per-capita basis, small cities are planning to invest almost 10 times that of their large counterparts.

EV charging infrastructure for the public and the government will comprise over 40% of the investments over the next five years, followed by micro transit and autonomous vehicles.

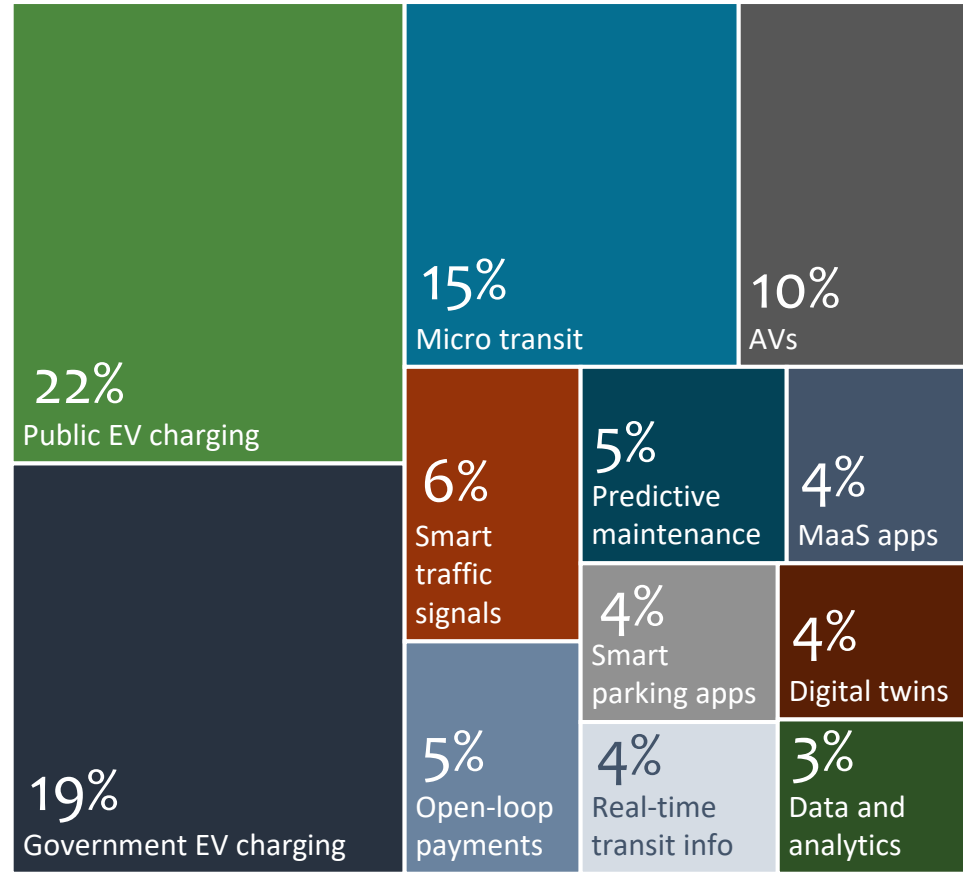
The distribution of mobility and transportation spending across individual technologies is similar regardless of the size of the city, the level of economic development, or the degree of future-readiness.

The one exception is digital twins, where future-ready cities plan to invest a greater share of their mobility budget than their less-ready counterparts (5% vs. 3%). When combined with the greater overall spending by future-ready cities, this results in future-ready cities investing, on average, more than 2.4 times their less-ready counterparts on digital twins.

Mobility and transportation per-capita spending



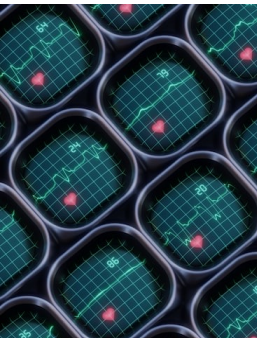
Where cities are making mobility and transportation investments (% of total)



City survey Q17:: How much is your city planning to spend over the next five years (cumulatively) in US dollars on the following technological solutions to improve mobility and transportation?

4. Living and health

Partnerships, governance, and business models



As cities emerge from the pandemic, they are concentrating on preventing and monitoring chronic diseases, improving access to affordable healthcare, and providing or expanding telehealth services. Affordable housing is also top of mind.

Citizens also cite these issues as top priorities, along with access to nutritious food and fighting against discrimination.

Emerging market cities stress a wider range of living and health areas compared to their more advanced counterparts. Large cities focus more than small ones on arts and culture (vital to attract and retain citizens and talent), access to nutritious food, treatment of disease and substance abuse, and the fight against discrimination. Small cities give more emphasis to telehealth services than do large metropolises.

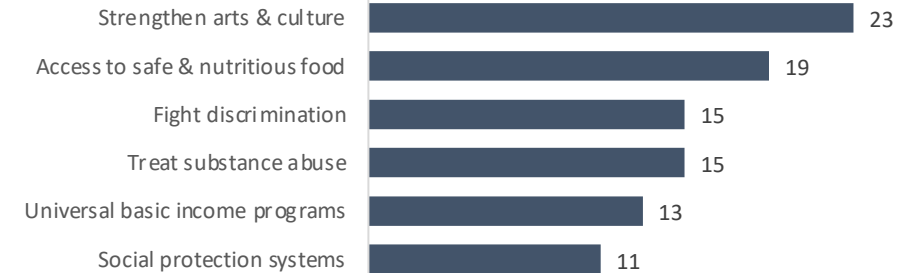
Top priorities for cities and citizens over next five years

Cities		Citizens	
1. Use of apps to help prevent, monitor chronic disease	73%	1. Access to affordable, high-quality healthcare	65%
2. Improve access to affordable, high-quality healthcare	70%	2. Availability of affordable housing	59%
3. Provide or expand telehealth services	69%	3. Expansion of mental health services	48%
4. Increase affordable housing	68%	4. Access to safe & nutritious food	45%
5. Expand mental health services	64%	5. Fighting discrimination	43%

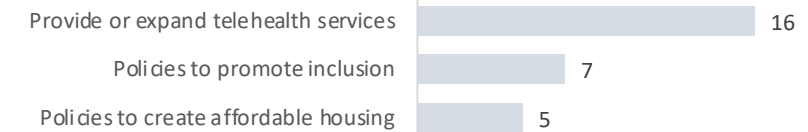
City survey Q14: Which of the following actions will your city prioritize over the next five years to improve how citizens live and stay healthy?

Citizen survey Q18: Which of the following initiatives should your city prioritize over the next five years to improve how citizens live and stay healthy?

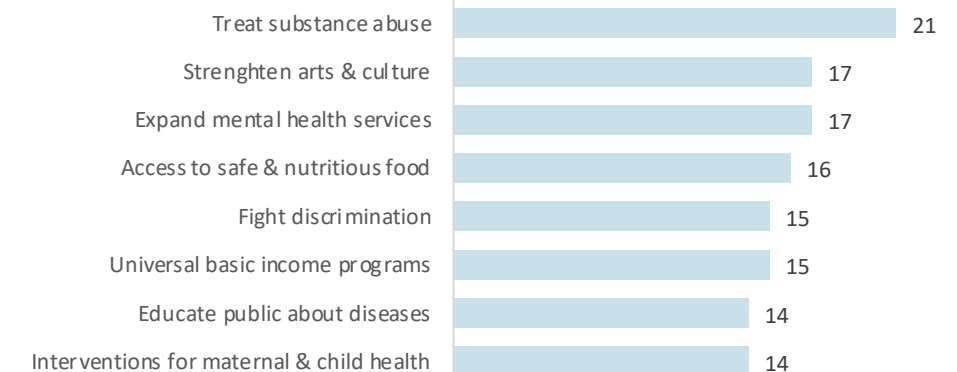
Where large cities are ahead of small cities (% pt. diff.)



Where small cities are ahead of large cities (% pt. diff.)



Where emerging market cities are ahead of advanced cities (% pt. diff.)



4. Living and health

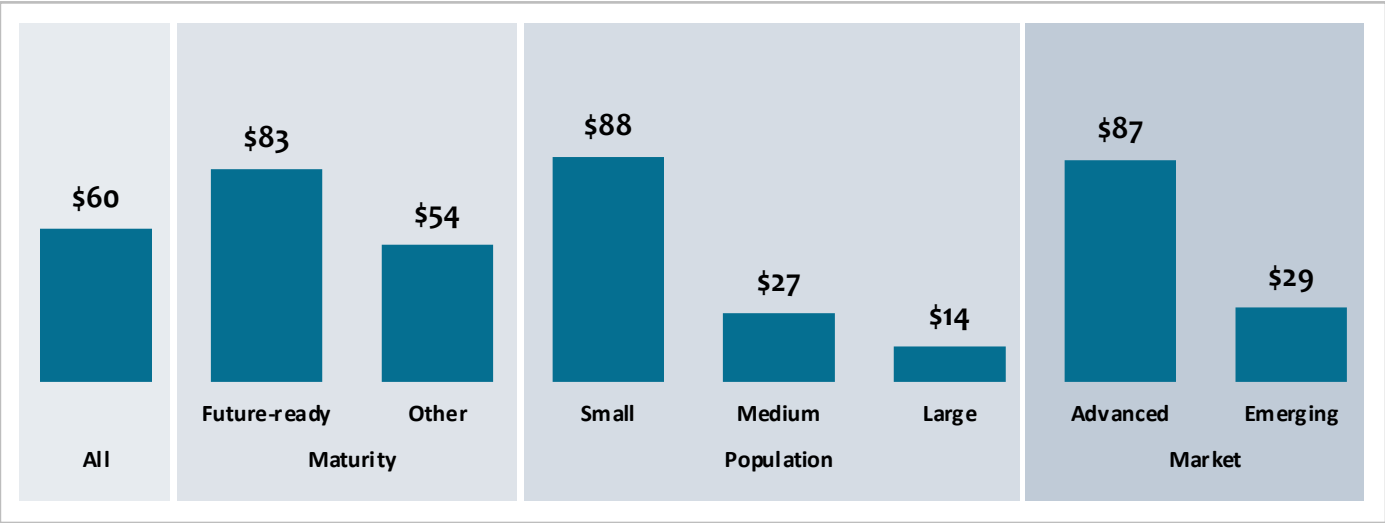
Areas of investment

Investments in living and health rank fourth in terms of the share of technology spending by cities. On average, cities plan to invest an average of \$60 per resident, with future-ready cities investing about 1.5 times that of their less-ready counterparts.

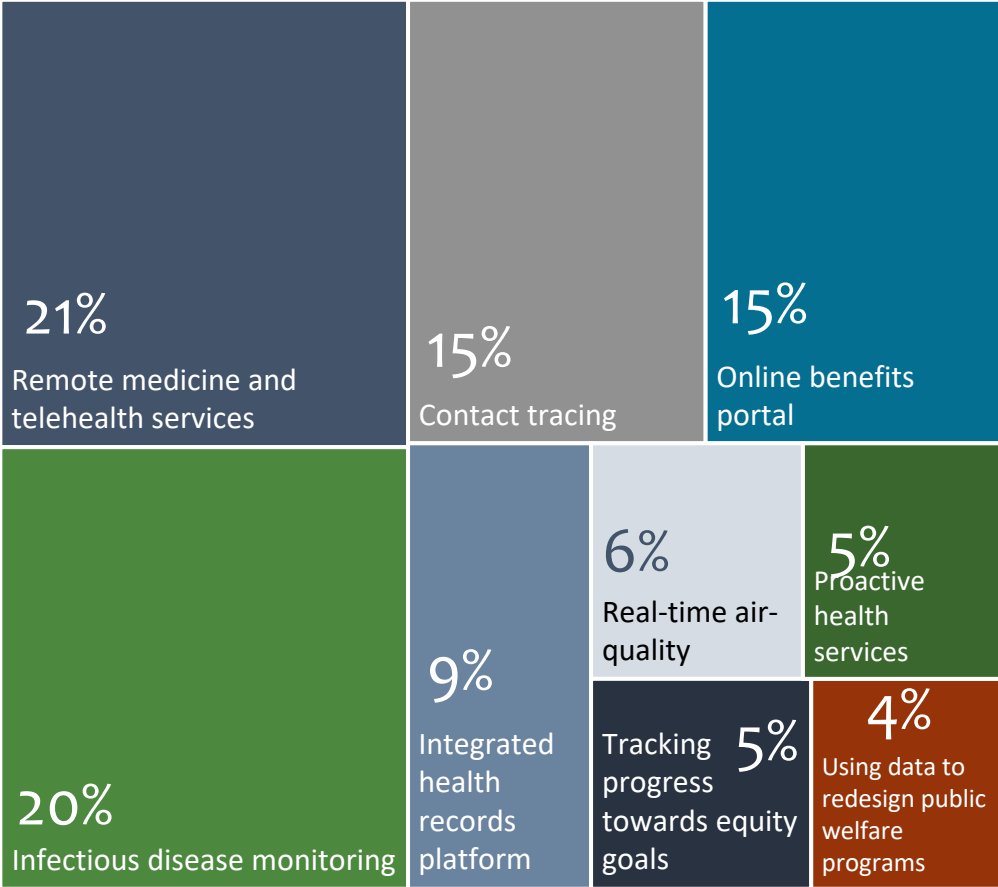
Cities’ experience with the pandemic is shaping their investment priorities over the next five years. Investments in telehealth services, disease monitoring, contract tracing, and online benefits portals top the list. These areas were vital during the pandemic, since they ensured that citizens were able to access healthcare and financial assistance.

The distribution of health and living spending across individual technologies is similar regardless of the size of the city, the level of economic development, or the degree of future-readiness.

Living and health per-capita spending



Where cities are making living and health investments (% of total)



City survey Q15: How much is your city planning to spend over the next five years (cumulatively) in US dollars on the following technological solutions to improve how citizens live and stay healthy?

5. Environment and sustainability

Partnerships, governance, and business models



Keen to boost sustainability programs, three-quarters of cities focus on getting funding from financial entities. They are also building sustainability metrics into planning processes, tracking payments for waste disposal, and developing more sustainable modes of transport. Citizens are most focused on reducing food waste and energy use.

Large cities place a greater emphasis on zero waste programs, reducing food waste, and gamification of recycling—compared to small cities. Small cities are more concerned than large cities about sustainable transport, reducing emissions, and sound waste management.

Emerging market cities are ahead in taking action to reduce food waste, reduce heat island effects, and get funding from financial institutions to achieve their sustainability goals. They are also ahead in using environmental metrics in investment decisions.

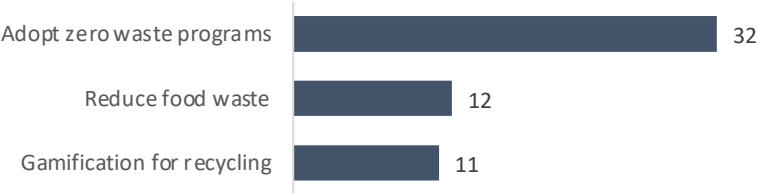
Top priorities for cities and citizens over next five years

Cities		Citizens	
1. Environmental funding from financial institutions	74%	1. Reduce food waste	52%
2. Incorporate sustainability metrics into local planning process	67%	2. Reduce energy use & move to alternative energy	50%
3. Digital tracking & payments for waste disposal	66%	3. Set, track, & achieve carbon emission standards	48%
4. Develop more sustainable modes of transport	64%	4. Develop more sustainable modes of transport	47%
5. Incorporate environmental metrics in investment decisions	59%	5. Manage chemicals & waste more effectively	46%

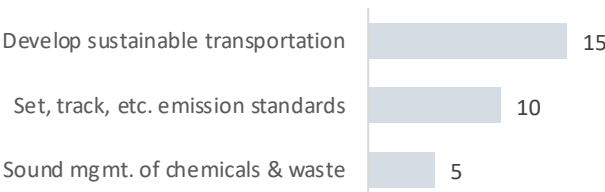
City survey Q21: Which of the following actions will your city prioritize over the next five years to improve environmental sustainability?

Citizen survey Q20 .Which of the following initiatives should your city prioritize over the next five years to improve environmental sustainability?

Where large cities are ahead of small cities (% pt. diff.)



Where small cities are ahead of large cities (% pt. diff.)



Where emerging market cities are ahead of advanced cities (% pt. diff.)



5. Environment and sustainability

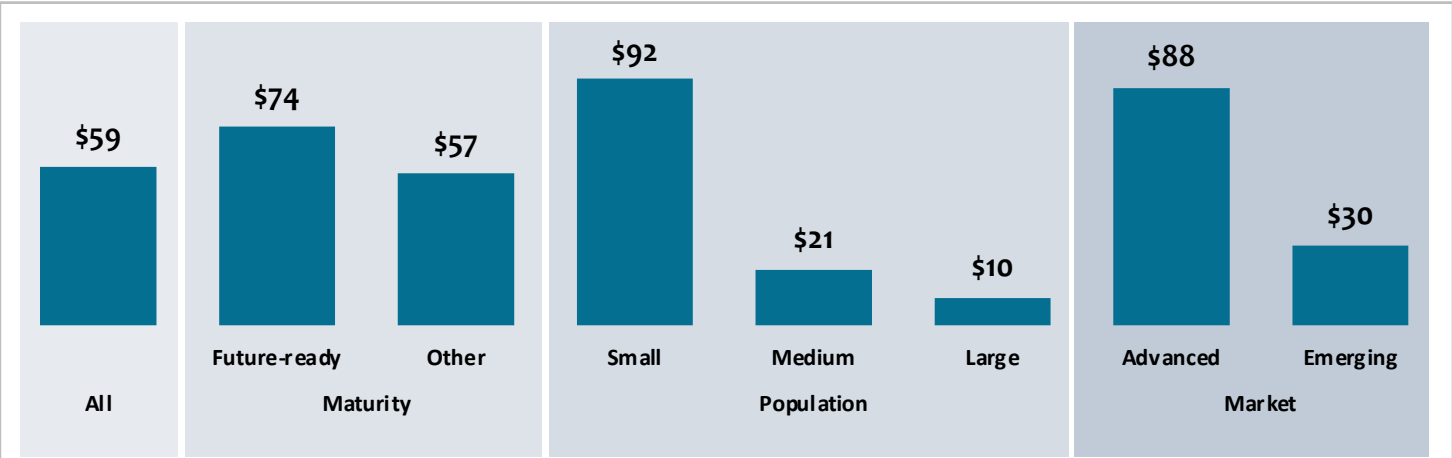
Areas of investment

Climate change was the biggest challenge cited by city leaders, regardless of a city’s size, market type, and level of future readiness. Yet the environment and sustainability domain is not yet garnering the largest share of their technology outlays.

Investments in this domain rank fifth among the urban domains. On a per-capita basis, on average, cities intend to spend \$59 over the next five years. Small cities are investing about 10 times more than large cities and advanced cities are investing 3 times more than emerging market cities.

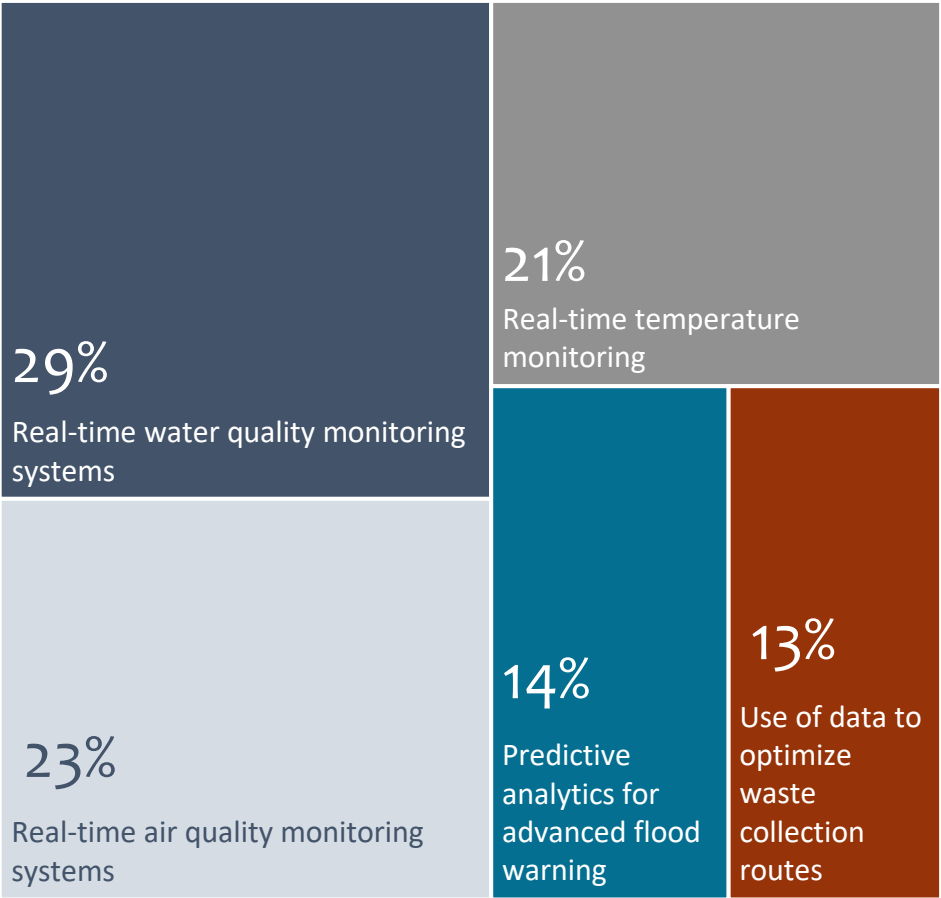
Spending on real-time monitoring of air and water quality and temperature is common across most cities. Other digital techniques—such as data analytics to optimize waste collection routes and provide flood warnings—capture a much lower portion of the budget for this domain. However, the use of analytics to predict floods, while a much lower priority at present, will likely need to grow as climate change exacerbates extreme weather events in many cities.

Environment and sustainability per-capita spending



City survey Q22: How much is your city planning to spend over the next five years (cumulatively) in US dollars on the following technological solutions to improve environmental sustainability?

Where cities are making environment and sustainability investments (% of total)



6. Public safety and security

Partnerships, governance, and business models



Keeping citizens safe and secure takes partnerships. Cities are mostly working with the business community and neighborhood groups to reduce crime and with government agencies to take a public-health-focused approach to community safety.

Citizens place the greatest priority on steps to reduce crime through urban planning and working with neighborhood associations and government agencies to address conditions that give rise to violence. They would also like to see changes in how police interact with citizens, such as using non-police crisis teams and instituting community policing.

Large cities lead in addressing conditions that lead to violence, mitigating socio-economic and other risks, and improving the oversight of police. Small cities are ahead in adopting disaster risk reduction program, safety through urban planning, and addressing vulnerabilities.

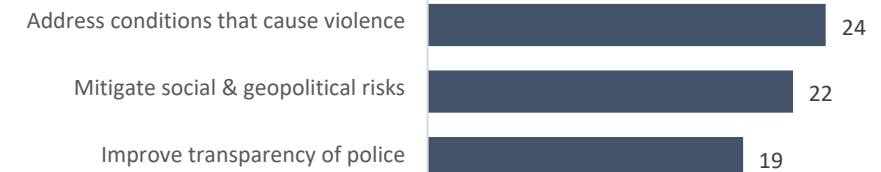
Top priorities for cities and citizens over next five years

Cities		Citizens	
1. Work with businesses to reduce crime	69%	1. Improve citizen safety through urban planning	47%
2. Improve citizen safety through urban planning	67%	2. Work with neighborhood groups & associations	46%
3. Work with neighborhood groups & associations	62%	3. Transfer homelessness, mental health, substance usage to non-police crisis teams	45%
4. Take multi-agency, public health-focused approach to community safety	61%	4. Institute community policing to build trust	43%
5. Adopt disaster risk reduction, preparedness, & resilience programs	58%	5. Work with government agencies to address conditions that give rise to violence	43%

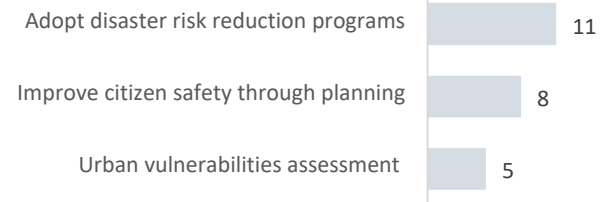
City survey Q28: Which of the following actions will your city prioritize over the next five years to improve public safety and security?

Citizen survey Q22: Which of the following initiatives should your city prioritize over the next five years to improve public safety and security?

Where large cities are ahead of small cities (% pt. diff)



Where small cities are ahead of large cities (% pt. diff)



Where emerging market cities are ahead of advanced cities (% pt. diff)



6. Public safety and security

Areas of investment

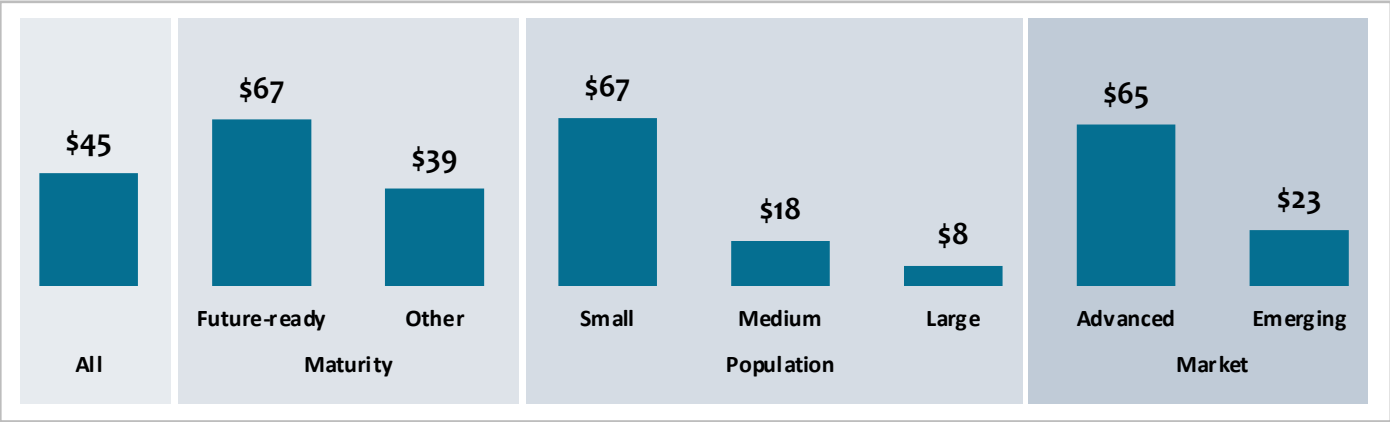
On average, cities intend to spend \$45 per capita on technology for public safety and security. Future-ready cities plan to invest almost twice as much as their less-ready counterparts. Small cities plan to lay out 8 times that of large cities.

Top areas of investment include smart ground surveillance, facial recognition, drones, and digital twins. Facial recognition and biometrics is the second-largest area of investment, despite citizen concerns around privacy and use of data.

The distribution of public safety spending across individual technologies is similar regardless of the size of the city, the level of economic development, or the degree of future-readiness.

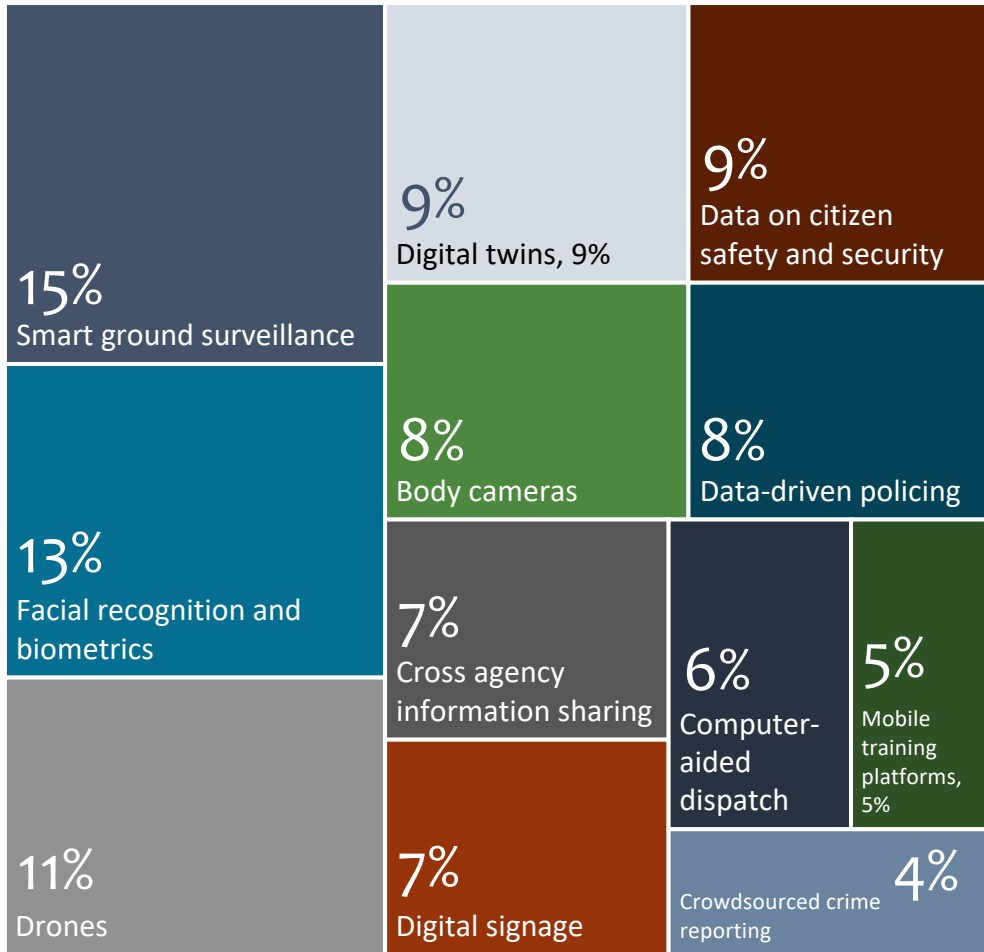
The one exception is digital twins, on which future-ready cities plan to spend a greater share of their budget than their less-ready counterparts (11.5% vs. 8.4%). When combined with the greater spending by future-ready cities, this results in future-ready cities investing, on average, more than 2.3 times their less-ready counterparts on digital twins for this domain.

Public safety and security per capita spending



City survey Q29: How much is your city planning to spend over the next five years (cumulatively) in US dollars on the following technologies to improve public safety?

Where cities are marking public safety investments (% of total)



7. Economy, industry, and talent

Partnerships, governance, and business models



Both citizens and cities see support for small and medium-sized businesses (SMBs) as a vital piece of their economic development strategy. They also want their city to ensure that citizens have the necessary skills and that businesses have access to the talent they need to grow.

Cities also understand the role the fiscal environment within a city plays in attracting new businesses and encouraging existing businesses to expand. Citizens, on the other hand, place a greater premium on higher education.

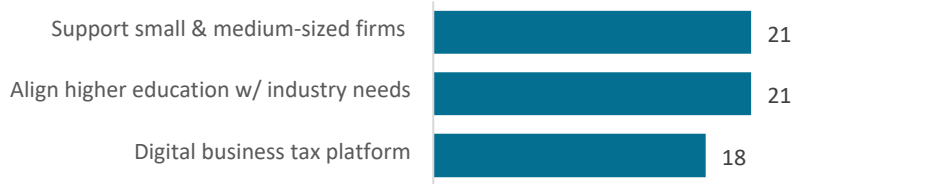
Large cities are more apt than small ones to support SMBs, and to attract businesses by ensuring they have the talent needed to support Industry 4.0. Small cities focus more on using incentives to attract companies, workforce development, and relationships with other cities. Emerging market cities are well ahead in several areas, including supporting SMBs, promoting arts and culture, and offering digital licensing and permitting for businesses.

Top priorities for cities and citizens over next five years

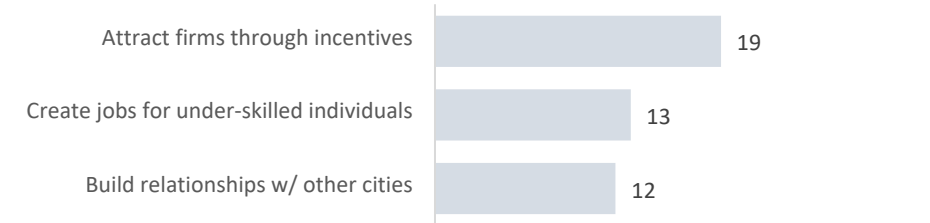
Cities		Citizens	
1. Support small & medium-sized businesses	73%	1. Support small & medium-sized businesses	56%
2. Use data & algorithms to match candidates with jobs	64%	2. Workforce development & job creation for under-skilled individuals	51%
3. Workforce development & job creation for under-skilled individuals	64%	3. Align higher education programs w/ local industry needs	46%
4. Ensuring our business tax structure is competitive with other cities	62%	4. Build talent pipeline for businesses/match skills with demands	44%
5. Develop areas of expertise & innovation clusters	62%	5. Promote use of digital payments by citizens	44%

City survey Q30: Which of the following actions will your city prioritize over the next five years to improve economic, industrial, and talent development? Citizen survey Q24: Which of the following initiatives should your city prioritize over the next five years to improve economic, industrial, and talent development?

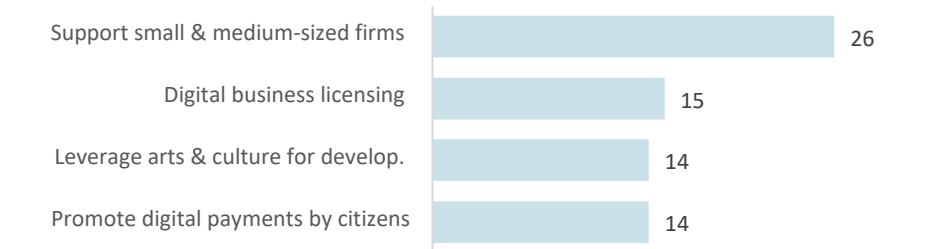
Where large cities are ahead of small cities (% pt. diff.)



Where small cities are ahead of large cities (% pt. diff.)



Where emerging market cities are ahead of advanced cities (% pt. diff.)



Calls to action

Calls to action



Equip leaders with the right resources

Kari Aina Eik

Executive Director
United Cities

“We need to equip leaders with more information and resources to achieve challenging goals. If we are ever going to achieve the goal of net-zero cities, we need to build up trust, then develop new processes, and use tools and measures that everyone understands and accepts. We need to build these processes and tools based on available data and technology. If your facts are known and accepted, you can make better decisions.”



Digitize, integrate, and optimize

Liz Van Dyke

Head of Public Sector, North America
JLL Technologies

“Our clients want to create spaces that engage citizens and provide healthier, more collaborative environments. Many have some or all the IT building blocks in place to facilitate this, such as IWMS systems, reservations systems, and IoT sensors, but often they are not well integrated or optimized to produce these outcomes. We’ve found that digitizing the entire real estate portfolio management process, including space management, is foundational to designing compelling, inclusive public spaces.”



Have a clear vision

Mary Nicol

Director of Policy
Chicago Department of Transportation

“It is critical for city leaders to have a clear vision of the city they are trying to build with and for residents. Chicago has a [citywide vision of trails and open spaces](#) that will contribute to a network of community-led green infrastructure projects to promote the health and well-being of residents and visitors. The city is working closely with community stakeholders to plan each project and identify funding for engineering and construction, including funds recently passed through Biden’s infrastructure plan.”



Take partnerships to the next level

Miguel Eiras Antunes

Global Leader, Smart Cities & Urban Transportation
Deloitte

“Public-private collaboration is key to building resilience to face crises and to meet ambitious climate goals. In our collaboration with the World Economic Forum, we see how important it is for cities to bring in the right partners at the right phase of a project. With Ukraine’s recovery and reconstruction needs estimating €349 billion, this is a clear case where partnerships are needed to deliver a new ‘Marshall Plan’ capable of lifting the country’s infrastructure, towards a more sustainable and smarter future.”

Calls to action



Take the friction out of payments

Nick Mackie

Global Head of Urban Mobility
Visa

“We recognize the critical role urban mobility plays in unlocking the potential of the world’s cities, helping to make them ecologically sustainable, livable, inclusive of everyone, and economically prosperous. We see broad appeal for next-generation ways to pay in urban mobility that are intuitive, secure, hassle-free, and as familiar as buying a cup of coffee. From a transit agency’s point of view, open-loop systems offer a positive rate of return, while improving customer experience and driving ridership growth.”



Tap into technologies and new ways of working

Euan Davis

Associate Vice President
Cognizant Research

“The technology revolution – and added to that, new ways of working post-pandemic – are reshaping global economics and the relationship people have to the places where they live and work. Those cities that are prepared for the challenges of today and tomorrow include them from the planning stages of their policy-making processes to achieve superior quality of life, a healthier environment, and improved access to healthcare and education. They also boost prosperity with an attractive business environment.”



Don’t do it alone

Bob Pell

Managing Director, Urban Solutions
Hatch

“Cities around the world are concerned and challenged by the trends that are literally engulfing them. I am struck that they are seeking help from outside—from partners of all sorts—but still there is a critical shortage of expertise that is affordable, available, and knowledgeable. As we strive to become future-ready, all of us with the relevant skills need to find a better way to come together to work with these cities. Our team will be seeking new alliances to meet this need.”



Partner with the mobility industry

Suzette Malek

Global Research Manager, Global Societal Trends & Innovation Insights
GM

“As mobility progresses further toward sustainable solutions, including electric vehicles, it is important for cities to continue to partner with OEMs to develop infrastructure that supports this future. We are excited to continue to work with cities and other allies to help create a world in which everybody has access to safe, affordable, and sustainable mobility. We encourage cities to support and partner with the industry to develop multi-modal mobility options for citizens seeking seamless and accessible journeys for their mobility needs.”

Calls to action



Bet on “physical + digital” infrastructure

Sajid Khan

General Manager, Smart Cities & Transportation Business Strategy
Intel

“As leaders across the globe work towards making their cities future-ready, they would do well to internalize that future-ready infrastructure—the *New Infrastructure* is a combination of physical + digital. A people-first mindset to creatively combine digital assets with physical infrastructure with a ‘dig once’ approach will deliver positive citizen outcomes across the economy, safety, climate, and equity, benefiting people today and well into the future.”



Rebuild your infrastructure in steps

Bayan Konirbayev

Chief Digital Officer
Almaty, Kazakhstan

“Population growth, especially in big cities, and the lack of infrastructure funding brings new challenges. Cities should first focus on the construction and renovation of infrastructure related to the water and energy supply systems. The second priority should be social infrastructure, like schools and hospitals. The third, the development of digital infrastructure. Finally, to create an attractive environment for talent, cities should focus on the development of creative industries with funding programs and methodological support and grants for creative entrepreneurs.”



Use a technology ecosystem

Kevin Taylor

Segment Development Manager, Smart Cities
Axis Communications

“No single technology, product, or vendor can provide everything a city needs. An ‘ecosystem’ approach is required. Because cities increasingly are relying on data and analytics to make informed decisions, it is reasonable to assume some technologies most critical to the future-ready city are IoT edge sensors like deep-learning enabled cameras and emerging communications networks like 5G millimeter wave wireless. These are foundational technology categories for future-ready cities that enable other platforms like digital twins and visualization dashboards.”



Invest in private-sector relationships

Bill Cashmore

Deputy Mayor
Auckland City Council, New Zealand

“Cities should invest in private-sector relationships. They should incentivize innovation, promote success, and illustrate positive change. They should use real people as examples, average people who have changed their habits and their lives for better results as individuals, families, and communities.”



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