From Future Vision to Urban Reality
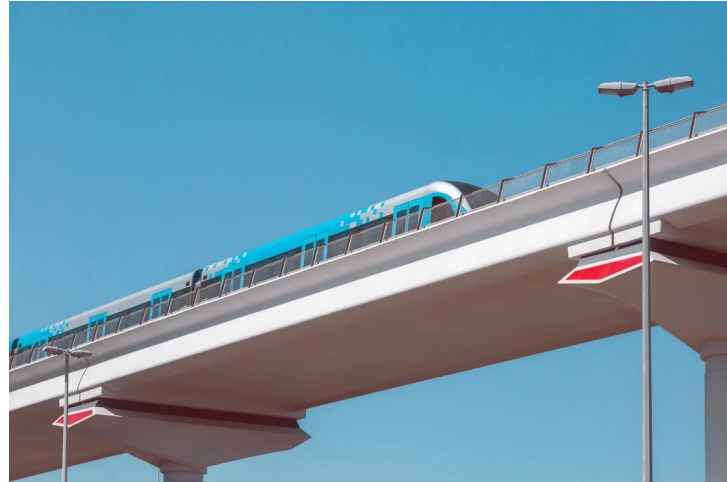
An urban playbook for driving sustainability, resilience, prosperity, and digital change

ThoughtLab

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Introduction

Introduction

Cities are in the throes of transformation as they come to grips with profound environment, social, and technological shifts.

To learn about their progress, in mid-2022, ThoughtLab conducted a pioneering study of 200 cities around the world to analyze how they planned to adapt to citizen needs and expectations heightened by the pandemic.

At that watershed moment for cities, all urban leaders surveyed were actively developing or busy rewriting future-ready plans to become more sustainable, resilient, inclusive, and digitally enabled. These plans outlined how their cities would meet new citizen and business expectations, reinvent and optimize urban domains, and weather future unexpected shocks and urban pressures.

While the plans were visionary, the road map was unclear. To gain greater insight into how cities are achieving their social, sustainability, and economic goals, we conducted a follow-up survey of a wider set of 250 cities in the second quarter of 2024.

That survey examined the progress that cities have made in operationalizing their future-ready plans across five urban domains: environment and sustainability; urban infrastructure; mobility and transportation; safety, security, and resilience; and citizen living, health, and trust. In addition to our quantitative analysis, we conducted interviews with 15 city leaders and held three advisory board meetings with government, corporate, and academic leaders in the city space.

The result of this research is this eBook, which can serve as an operational guide to becoming a future-ready city. We give special thanks to our sponsors, **Axis Communications, Deloitte**, **FTI Consulting**, **GM, Intel**, **Itron**, **ServiceNow**, and **Wireside Communications**. Without their support, this research would not have been possible.

Research background

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A rigorous benchmarking study
of 250 cities in 78 countries

In the second quarter of 2024, we conducted a rigorous study of 250 cities in 78 countries to analyze the progress they made in operationalizing their future-ready plans.
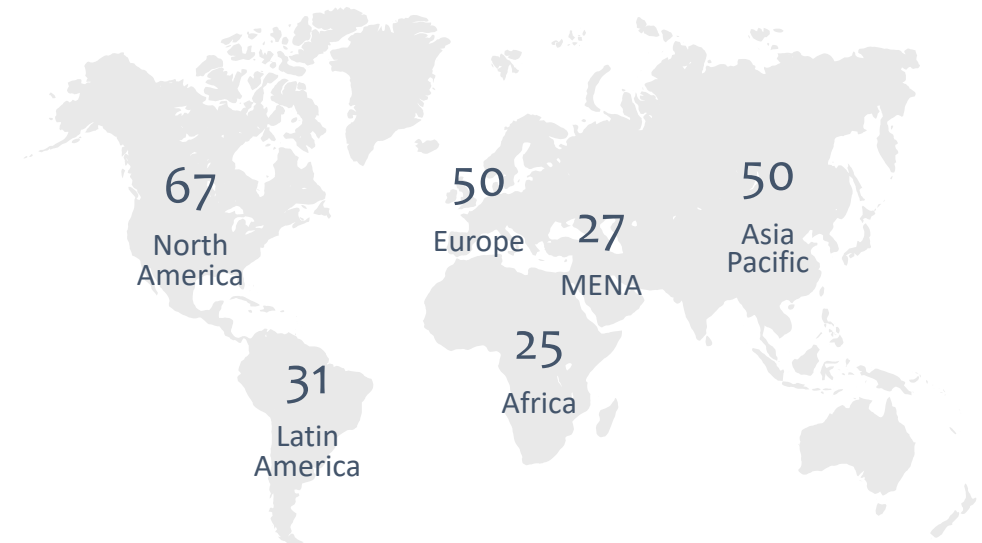
Valuable insights into practices

To provide city leaders with an actionable playbook, the study examined the most effective strategies and digital solutions used by cities to achieve their future goals, along with the challenges they face in achieving results. It also explored investments and implementation steps planned over the next three years.

A rich set of city benchmarking data

To facilitate rigorous benchmarking, our 2024 study analyzed cities across all regions, with a combined 734.2 million residents—or 9% of the world's population. This makes it is one of the most comprehensive studies of smart cities ever conducted.

250 Cities

78 Countries

734.2 million residents

9% of global population

Cities surveyed by region

67 North America

50 Europe

27 MENA

50 Asia Pacific

31 Latin America

25 Africa

The study covered progress across five urban domains: (1) environment and sustainability, (2) urban infrastructure, (3) mobility and transportation, (4) safety, security, and resilience, and (5) citizen living, health, and trust.

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The survey analyzed a diverse set of cities

To ensure a balanced perspective, ThoughtLab surveyed a range of cities varying in size, location, and level of economic development.

Our sample included cities of different population sizes, ranging from 50,000 to over 37.1 million. Forty-five percent of the cities had less than one million inhabitants, and 55% had over one million residents.

The cities also varied by level of economic development: 46% were in developing markets and 54% in advanced markets. In addition, the sample included a cross-section of cities by income level.

We surveyed a mix of respondents, all of whom had intimate knowledge of their cities' future-ready plans. About a third worked in the mayor's office, and another third filled management, strategy, planning, and operating roles. The rest were involved in technology, innovation, sustainability, and finance.

Respondents by title

City manager/administrator	20%
Finance/budget	15%
Mayor	15%
Deputy mayor	12%
Technology	11%
Smart cities/innovation	6%
Chief of staff/deputy	5%
Chief operating officer	5%
Director of urban planning	4%
Environment/sustainability	4%
Director of policy/strategy	2%
Other	1%

Number of cities by population

Smallest: 84
Small: 28
Medium: 103
Large: 21
Mega: 14
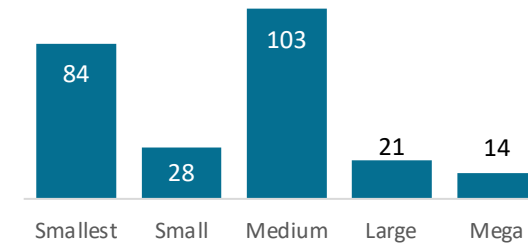
2.95M
Average population

Smallest: 50K to 600K
Small: 600K to 1M
Medium: 1M to 5M
Large: 5M to 10M
Mega: 10M to 37M

Cities by level of economic development

Advanced 54%
Developing 46%

$3.4 billion
Average FY2024 operating budget

We created a model to assess the future-readiness of cities

As part of our research, ThoughtLab economists created a maturity model to show the progress that cities are making in becoming future-ready across key urban domains. We drew on self-reported data on their progress in future-proofing urban domains and in laying the foundation for widescale digital transformation. To ensure the objectivity of our rankings, we combined the survey statistics with data from objective secondary sources that reflected each city's performance in reducing problems around pollution, traffic, health, and safety. That allowed our economists to develop an overall future-readiness score for each city and to classify them into three categories: future-ready, progressing, and beginning (see Methodology appendix). By comparing future-ready cities to others, we were able to identify best practices and create a future-ready roadmap.

1. Self-reported survey data

We used data from two survey questions to assess each city's future-readiness:

Q6: How much progress has your city made in preparing the five urban domains for the future?

Q18: Which best describes your city's stage of digital transformation in the following areas?

- Digital-ready organization and skills
- Digitized processes, experiences, and security
- Use of latest technologies and data

2. Performance data from Numbeo

We combined survey data with objective city data from Numbeo, a trusted global database gathered from user contributions, official statistics, and crowd-sourced data:

- **Pollution index**
- **Traffic index**
- **Healthcare index**
- **Safety index**

We normalized the indexes and then averaged the values to set a score for each city.

3. Future-ready maturity rankings

We combined the self-reported data with the performance data to determine a maturity score for each city. We then classified the cities into three groups:

Future-ready: Top 20th percentile

Progressing: 21st to 80th percentile

Beginning: Bottom 20th percentile

Urban challenges on the road to future-readiness

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Cities face persistent urban challenges…

Our current study shows that cities still face most of the same challenges they did in 2022. With the clock ticking for the planet, climate change continues to be the most pressing urban imperative, followed by public health, and housing shortages.

Since 2022, some challenges have receded. The pandemic-related public health crisis has subsided. Cities also have made considerable headway in finding new funding and addressing sustainability issues, such as climate change and homelessness. Yet other urban difficulties persist, and some, like inadequate transportation and infrastructure, have grown worse and new problems have emerged.

New challenges on the radar

One growing urban worry is coping with the refugee crisis. Conflicts in the Middle East, Eastern Europe, and Africa are displacing over 100 million people, now seeking safety in worldwide urban areas. Cities, such as Berlin, Athens, Stockholm, Melbourne, and Chicago are rising to the occasion, taking steps to foster integration, education, and social support. But the influx of refugees, combined with increased migration, is adding to housing, public health, and funding troubles.

These challenges can be daunting: Over a third of cities feel they are not well prepared to overcome them in the future. This is especially true for poorer cities, such as those in Africa. If left unsolved, these challenges can prevent cities from achieving their future goals.

Q5. Which are the biggest challenges for your city over the next three years?
Q5a. Overall, how prepared is your city to overcome these challenges?

Top challenges for cities	% of respondents	% pt change from 2022
Climate change	88%	- 6
Public and mental health	45%	- 16
Affordable housing, homelessness	43%	- 6
High crime	35%	+ 1
Aging infrastructure	28%	+ 2
Weak economic/business conditions	27%	+ 1
Inadequate transportation	25%	+ 6
Funding shortages	24%	- 11
Data security and privacy	23%	- 1
Income inequity	21%	- 3
Skills gap in public sector	18%	- 10
Demographic change, migration	13%	- 2
Insufficient digital technology	10%	n.a.

n.a. – not covered in the 2022 study

Many cities are not well prepared to overcome these challenges

34%

66%

■ Well/very well prepared
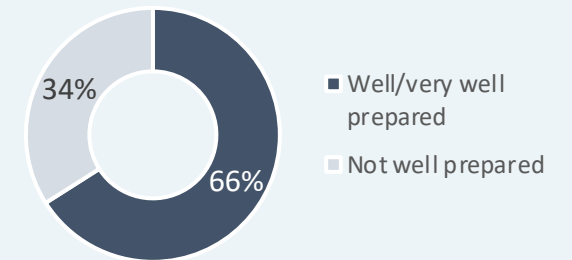
■ Not well prepared

Not well prepared:

62% of low-income cities

52% of cities in Africa

42% of cities in emerging markets

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...which are often entangled and difficult to solve

These urban challenges can be thorny since they are often interconnected and mutually reinforcing. Because of these interdependencies, solving a problem in one area can trigger or exacerbate difficulties in another. Understanding these connections is vital for effective urban planning, often calling for cross-departmental collaboration, community engagement, and policy alignment. Our correlation analysis of city challenges uncovered clusters of problems that often go together.

Cluster 1: Weak economic and employment conditions

Weak economic and business conditions can have a disproportionate impact on lower-income households. Low employment and income can result in more crime and homelessness as affordable housing becomes out of reach. In difficult economic times, cities often cut transportation budgets, again hurting low-income communities, which are reliant on public transportation.

Cities with a similar nexus of challenges: Cape Town, Kyiv, Nashville, Salvador

Cluster 2: Funding shortages and budget deficits

Funding shortages and budget deficits can lead to reduced spending in cities in many areas, such as public health, affordable housing, and urban infrastructure. Such disinvestment can exacerbate homelessness and increase crime. It can also have cascading implications for pollution because of cutbacks in environmental initiatives and delays in infrastructure maintenance.

Cities with a similar nexus of challenges: Ankara, Brisbane, Coventry, Indianapolis

Cluster 3: High crime and low safety

High levels of crime have a ripple effect across a city. They not only raise the risk of violence and injury, but also increase everyday stress, drug addiction, and mental instability. Crime reduces property values, displaces residents, and adds to evictions and homelessness. As businesses close and citizens leave cities, the economy suffers. Public transportation sees greater vandalism, service disruption, and lower ridership.

Cities with a similar nexus of challenges: Buenos Aires, Chicago, Louisville, Lyon

Cluster 4: Climate change

Climate change is often associated with other urban challenges. Pollution rises as high temperatures hurt air and water quality. Biodiversity and green spaces diminish, and public health risks grow due to the spread of pollutants, infectious disease, and food insecurity and contamination. Skills gaps in the public sector around environmental science, urban planning, and public health add to the problem.

Cities with a similar nexus of challenges: Madrid, Mecca, Mexico City, Ningbo

Q5. Which are the biggest challenges for your city over the next three years?

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Cities are hampered by limited decision rights...

Our research shows that autonomy in decision-making—independent of state or national control—enables cities to achieve their future-ready goals faster.

Unfortunately, most cities do not have such autonomy. Fiscal decision-making, crucial for funding future-ready plans, is the area of least autonomy. Only 34% of cities have significant or full autonomy in raising revenue and funding. This leaves most cities to vie with state and national officials for the resources they need to implement their plans.

Cities have greater independence when making other decisions. Over six out of 10 have significant or full autonomy in setting up public-private partnerships (P3s) that are critical for delivering the know-how, funding, and support needed to future-proof urban domains. Over half of cities have significant or full autonomy in creating regulations and policies tailored to their urban needs and challenges.

Regional differences

The degree of autonomy varies depending on a country's legal, political, and administrative framework. Cities in the Middle East and Africa enjoy greater freedom in establishing environmental, social, and other polices and regulations, whereas cities in Latin America have less. Cities in the Middle East enjoy a high degree of autonomy in fiscal matters, whereas cities in North America, Asia Pacific, and Latin America have the least.

Cities can find workarounds to drive results. For example, they may draw on P3s to offset their lack of fiscal autonomy. Only around a third of cities have significant or full fiscal autonomy, but more than 60% have autonomy to set up P3s.

Q11. How much autonomy from national/state/provincial control does your city have in the following areas?

Levels of local autonomy for key decisions
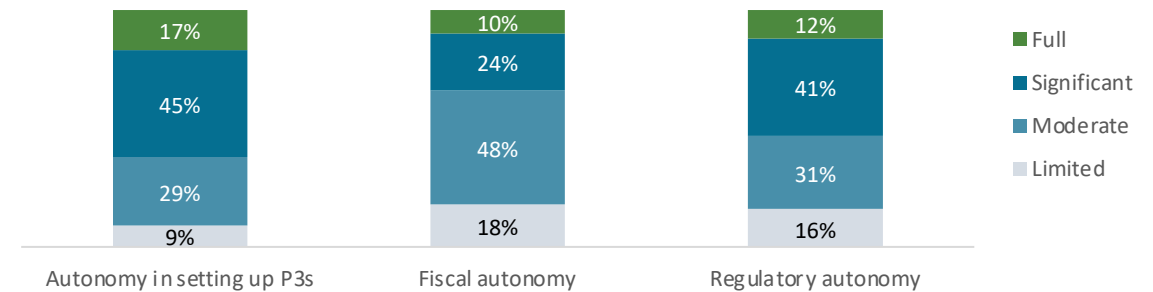
Levels of local autonomy by region (significant or full)

	Africa	Asia Pacific	Europe	Latin America	MENA	North America	All
Setting up public-private partnerships	64%	76%	57%	77%	56%	51%	62%
Determining revenue sources, borrow funds, and other fiscal areas	44%	27%	43%	26%	56%	25%	34%
Establishing environmental, social, and other policies	64%	51%	53%	32%	74%	52%	53%

...and the need to work with other levels of government

Another challenge is the need to coordinate with other government and private-sector entities. While collaboration can often lead to better results, it can be tricky to accomplish. Survey respondents cited coordination among multiple levels of government as one major obstacle to implementing their urban plans. Said a city leader from Barcelona: "Our biggest challenge is coordination between different government departments."

Most urban services, such as public safety, transportation infrastructure, citizen health, and sustainability, are under the remit of city governments. One exception is energy and electricity infrastructure, where the private sector tends to play a leading role in most cities. This may not be the case, however, in countries such as Mexico and Venezuela, where the government controls the energy industry.

Delivering services is a shared responsibility

The problems cities face are rarely the jurisdiction of a single entity. Rather, a variety of local and regional actors, each with their own skills and priorities, provide valuable perspectives and expertise.

Cities partner mostly with state/provincial and national governments. These partnerships allow cities to access the resources, expertise, and political support needed to solve complex issues. Nonprofit organizations are another natural partner for cities, due to their strong community ties and specialized expertise in key urban issues, such as homelessness, public health, sustainability, and social equity.

While the support and assistance from other entities is helpful to bring in additional resources and expertise, the multiple entities involved can sometimes hinder efforts if these are not coordinated effectively.

Domain	Main responsibility for services	Shares responsibility with (top two)
Public safety	City 93%	State/provincial 40% Regional agency 31%
Transportation infrastructure	City 93%	State/provincial 56% National 29%
Citizen living, health, and trust	City 90%	Nonprofit organizations 40% State/province 32%
Environment and sustainability	City 90%	National 42% Nonprofit organizations 32%
Public facilities and green spaces	City 90%	State/province 29% National 25%
Water and sanitation	City 87%	State/province 24% Private sector 23%
Public transportation	City 86%	Regional agency 44% State/province 38%
Digital/communications infrastructure	City 82%	Private sector 43% State/province 27%
Other transportation	City 65%	Private sector 44% State/province 28%
Energy/electricity infrastructure	Private 84%	City 65% State/province 26%

Q10. Which one of the following entities has the main responsibility for delivering the following citizen services in your city?

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What future-ready cities do differently

Our model identified 50 future-ready cities

North America

Boston	San Antonio
Chicago	San Francisco
Houston	Seattle
Los Angeles	Toronto
New York	

Europe

Amsterdam	Edinburgh	Paris
Barcelona	Helsinki	Stockholm
Berlin	Ljubljana	Valencia
Bratislava	Lyon	Vienna
Bucharest	Madrid	Warsaw
Dublin	Manchester	Wroclaw

Asia Pacific

Beijing
Guangzhou
Kuala Lumpur
Melbourne
Seoul
Taipei
Tokyo

Latin America

Buenos Aires
Caracas
Curitiba
Quito
Rosario
Salvador

Middle East & Africa

Abu Dhabi	Kampala
Ankara	Kuwait City
Damman	Manama
Doha	Rabat
Istanbul	Tehran

Number of future-ready cities by region

Europe	Mid. East/Africa	N. America	Asia Pacific	Latin America
18	10	9	7	6
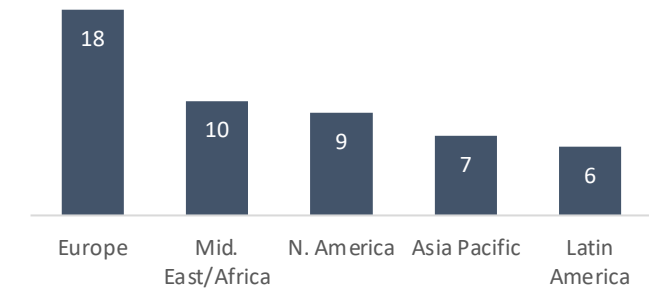
Number of future-ready cities by population size

Under 300k	300k to 600k	600k to 1 million	1 to 5 million	5 to 10 million	Over 10 million
2	3	5	25	8	7
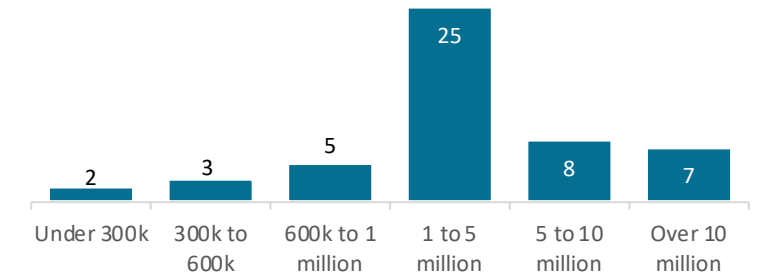
Note: This list only includes cities that participated in our 2024 benchmarking study. (For a complete list of cities surveyed, see Methodology appendix.)

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Future-ready cities are ahead in urban and digital transformation

Future-ready cities have made the most progress in preparing their safety, security, and resilience domains for the future, with nearly three-quarters of them reporting significant progress, compared with just 17% of others. Two-thirds of future-ready cities have also made considerable headway in future proofing environment and sustainability, as well as citizen living, health, and trust—well ahead of others.

Making infrastructure fit for future purpose

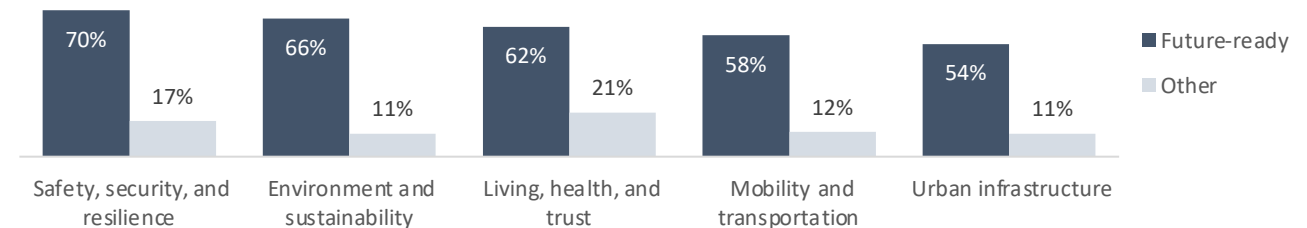Driven by years of inattention, many cities are struggling to improve transportation and urban infrastructure. Despite the challenges, over half of future-ready cities have made significant progress in making their transportation and urban infrastructure fit for future purpose, more than four times the share of others. One reason for their success is the availability of new government funding programs, such as the US's Infrastructure Investment and Jobs Act (IIJA).

Laying the foundation for transformation

Future-ready cities know that digitally-led transformation cannot happen without the right people, processes, and technological foundation. That is why they are far ahead in creating a digital innovation team, installing a modernized IT platform, and deploying technology solutions.

Progress made by cities to prepare their urban domains for the future (reporting significant progress)

	Future-ready	Other
Safety, security, and resilience	70%	17%
Environment and sustainability	66%	11%
Living, health, and trust	62%	21%
Mobility and transportation	58%	12%
Urban infrastructure	54%	11%

Progress on people, process, and technology for digital transformation (mid- or advanced-implementation)

		Future-ready	Other
People and organization	Technology governance	94%	46%
	Digital skills and talent	94%	44%
	Digital innovation team	90%	32%
Process	Software deployment	96%	40%
	Data security and privacy	94%	64%
	Digital experiences	86%	48%
Technology	Modernized IT platform	100%	40%
	Automation	96%	48%
	Latest technologies	96%	44%
	Data management	96%	63%

Q6. How much progress has your city made in preparing the following urban domains for the future? How much progress does it plan to make in three years? Q18. Which best describes your city's stage of digital transformation in the following areas?

Future-ready cities outperform others on key metrics

Correlation analysis with secondary data from Numbeo, a trusted crowd-sourced global database, confirms that future-ready cities are both safer and healthier.

Future-ready cities are **8.2 points** higher than beginning cities on the safety index, which reflects the absence of crime, and **8.2 points** better on the healthcare index, which gauges the quality of healthcare. Our top 10 future-ready cities have some of the highest scores on these indexes, with Tokyo carrying the highest score for safety and Vienna for healthcare.

Future-ready cities also enjoy fewer traffic headaches and less pollution. They are **2.5 points** lower than beginning cities on the traffic index, which measures the level of traffic, and **11.1 points** better on the pollution index, which reflects local pollution. Helsinki, our top-ranked future-ready city, has the lowest pollution score among cities in our study, and Vienna, has the lowest traffic score.

Importantly, future-ready cities are much better than others at softening the impact of climate change. They are well ahead of others in their net-zero and renewable energy plans.

46% of future-ready cities are already significantly ahead of their net-zero plans vs. just **5%** of others.

Similarly, **39%** of future-ready cities are significantly ahead of their renewable energy plans vs. only **7%** of others.

Average safety, health, traffic, and pollution index values*

City	Safety index	Healthcare index	Traffic index	Pollution index
Ankara	60.5	69.4	36.2	64.5
Edinburgh	68.9	77.5	31	28.1
Guangzhou	70.2	67.3	37.5	69.9
Helsinki	75.6	80	25.3	**12.6**
Lyon	44.1	77	35.8	51.5
Madrid	72.8	79.3	26.7	37
Seattle	46.3	71.5	43.3	32
Tokyo	**75.8**	79	42.5	42.2
Toronto	56.5	74.3	44.7	37.4
Vienna	69.7	**79.5**	**22.9**	16.2
Beginning - average	48.5	59.0	39.5	60.5
Progressing - average	55.1	67.3	35.0	48.1
future-ready - average	56.7	67.2	36.9	49.4
Gap between future-ready and beginning cities	8.2	8.2	2.5	11.1

Source: Numbeo
* Higher numbers on the safety and healthcare indexes denote better performance. Lower numbers on the traffic and pollution indexes reflect better performance.

They are better equipped to cope with challenges

Future-ready cities have eased some challenges…

Future-ready cities in our 2024 study have made greater progress than their peers in addressing some of the problems they face, particularly in areas more directly under their control. For example, because of initiatives they have taken, public health, crime, infrastructure, and economic and business conditions are not as problematic for future-ready cities in general as they are for other cities.
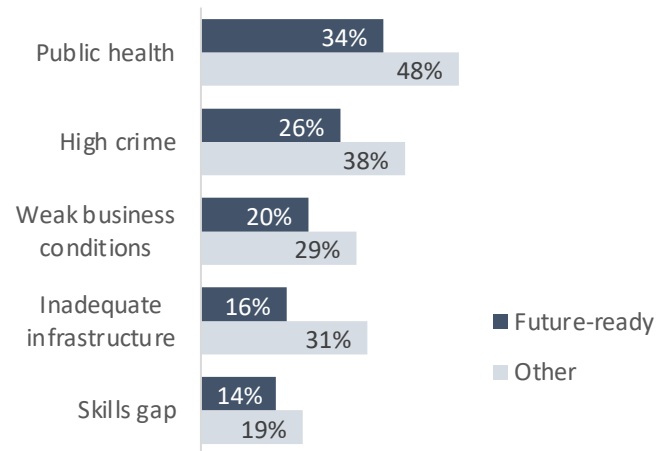
…and are more prepared and resilient

Crucially, 92% of future-ready cities say they are well prepared to overcome these challenges, compared with 60% of others. Thanks to their prolific use of the latest technologies and data analytics, they have much higher resilience to urban stressors. At least twice as many future-ready cities as other cities say they can withstand economic and socio-economic risks, for example. More are also able to weather supply-chain disruptions and other exogenous shocks, from infrastructure failures and cyberattacks to geopolitical and environmental risks.

Future-ready cities have reduced some challenges under their control (% citing as challenge)

Challenge	Future-ready	Other
Public health	34%	48%
High crime	26%	38%
Weak business conditions	20%	29%
Inadequate infrastructure	16%	31%
Skills gap	14%	19%

92% of future-ready cities say they are well prepared to overcome challenges vs. 60% of others.

Future-ready cities are better able to weather urban risks (% with high resilience)

Risk	Future-ready	Other	% diff
Technology risks and cyberattacks	66%	40%	65%
Supply-chain disruptions	58%	33%	78%
Economic and socio-economic risks	48%	23%	109%
Infrastructure failures	64%	38%	68%
Health crises	70%	44%	59%
Geopolitical and trade risks	50%	26%	92%
Environmental risks and natural disasters	66%	43%	53%

Q5. Which are the biggest challenges for your city over the next three years?
Q5a. Overall, how prepared is your city to overcome these challenges?
Q37. Please rate your city's ability to mitigate and withstand the following stressors.

Becoming future-ready:
What the experts say

Jessica Constantinidis

Innovation Officer
EMEA, ServiceNow

"Successfully implementing a future vision for your city is not one action or list of actions. It's a mental shift. When I think about what the most advanced cities have in common, I see that they approach challenges with a holistic mindset, not as one-off projects. That's difficult for a lot of cities because they don't know next year's budget, or even if they have picked the right problems to tackle.

Here are some solutions:

1. **Break down silos.** If you automate in silos, you miss the opportunity to deliver the city of the future. Everything is connected—from your wayfinding app, to roadwork updates, to changes in traffic patterns because of school holidays. There is the potential to fit it all together and provide better, safer experiences if you take a holistic approach.

2. **Make data the single source of truth and insight.** Cities need to understand what data they have access to and how they can analyze that data to get the most value. They also need to address data protection, security, and sovereignty, and collaborate with data owners or have joint data ownership.

3. **Collaborate to drive change.** It needs to become every person's responsibility to take care of the city, and technology can be an enabler, making it easier to bring people together. Leaders need to innovate in partnership with communities, businesses, academic institutions, and beyond.

4. **Prioritize agility.** Cities need to be capable of adjustment and modification. They need to be able to pivot quickly. If you rigidly stick with a single strategy, by the time you finish your initiative, your solution will be outdated."

Jorrit de Jong

Director of Bloomberg Center for Cities at Harvard University

"There is no significant problem facing cities today that can be solved by a single organization. Take homelessness. You can think of that as one big problem, but if you break it into smaller subsets of problems, you see that some homeless people are dealing with mental illness, domestic violence, substance abuse, or are living below the poverty line. When you disaggregate a problem, you see a variety of different causes and consequences. It becomes clear when you need to bring in the social services department for one part of the problem, affordable housing for another, and so on.

In a recent study, we found that the most successful problem-solving collaborations have three things in common. The first is defining a problem in a way that generates sufficient consensus across departments. The second is building a team culture of safety and trust, empowered to try, fail, and learn from mistakes. The third is setting shared goals from the top to avoid siloed accountabilities."

Jerry Power

Co-founder
i3iot

"City leaders must view their challenges as interconnected rather than as isolated problems. Traditionally, cities tackled issues one by one, addressing them in a piecemeal manner, much like a game of Whack-a-Mole. However, there is a noticeable shift away from this siloed thinking. Cities are beginning to restructure their processes to use platforms like data, AI, and digital twins to solve problems systematically in ways that had not been possible in the past.

As cities adopt these smart technologies, a coordinated approach becomes crucial. If each department were to launch its own AI or digital twin program independently, it could lead to fragmented, uncoordinated systems. Over time, these isolated technology stacks would grow into a chaotic and difficult-to-manage mess."

Becoming future-ready:
What the experts say

Anders Grafstrom

Global End Customer Marketing Manager
Axis Communications

"City authorities need to create their own roadmap across functions and stakeholders. The leaders of today should think about the roadmap for the leaders of tomorrow. They should be forward thinking—thinking scalable and future-proof.
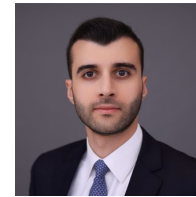
Cities also should work cross-functionally for better collaboration, but also for sharing costs in mutual investments in cameras, sensors, and IoT devices. They should speed up their digital-twin programs and secure good real data to use as a base to train their AI on for their digital twins—something that can be provided by cameras and other smart sensors. The simulations will help cities invest in the right physical changes and use their resources in the best possible way."

Abdo Al Habr

Senior Managing Director
FTI Consulting

"City leaders should focus on two main levers to drive the realization of their future vision. First, securing the required resources to implement change, as plans and ambitions are often halted when faced by the reality of city budgets and funding constraints. To secure the required resources, leaders should explore innovative partnership models to engage non-governmental stakeholders (e.g., private sector, NGOs) early on to diversify sources of funding. Second, leaders should put in place rigorous governance to ensure efficient deployment of resources, which in turn encourages broader participation of stakeholders."

Dan Evans

Director of Smart Cities, Itron

"Cities face persistent challenges that require balancing interconnected social, economic, and sustainability priorities. Well-prepared cities leveraging the latest technology to diagnose, prioritize, deploy, and measure solutions to critical challenges can orchestrate a unified response across municipal silos, regional governments, and third-party partners like utilities."

Stephen Russell

Senior Vice President
Wireside Communications

"There is no denying the impact that technology has on shaping the future of urban development. From the importance of digital transformation to the role of sustainability and AI to enable future-ready cities, the stories that cities and technology companies tell around these initiatives provide a helpful blueprint for other cities across the globe to follow. For this reason, it is critical for both cities and technology companies to develop compelling narratives on the role technology plays to create smarter and safer cities."

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Building a future-ready operating model

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Future-ready cities take six steps to build a better operating model

1. Put humans at the center of their strategies

2. Create frictionless experiences for citizens

3. Build productive, skilled, and diverse workforces

4. Diversify funding and business models

5. Integrate innovation ecosystems into operating models

6. Take a cross-departmental, holistic approach

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1. Put humans at the center of their strategies

Future-readiness is ultimately about people. Future-ready cities adopt a human-centric vision that puts residents, visitors, and communities at the center of their plans and decisions. They create an urban environment that enhances every aspect of urban life, from infrastructure to mobility.

Future-ready cities accommodate everyone, from residents to recent migrants and tourists. Citizen well-being, accessibility, and inclusiveness are their guiding principles, which they apply to all people, regardless of their heritage, culture, generation, gender, disabilities, or income level. To ensure they on the right track, they use digital platforms to get regular citizen feedback, involve residents in urban decisions, and measure their progress on human issues.

New design principles

While traditional urban models prioritize automobiles, economic development, and aesthetics, human-centric design focuses on the experiences, needs, and comforts of city dwellers. In future-ready cities, urban planners, designers, architects, and communities collaborate to build a nourishing relationship between citizens and their environment.

That can mean creating healthier, walkable cities; safer and less polluted car-free areas; convenient "15-minute" neighborhoods; affordable public transportation; and abundant public spaces, parks, and green areas. Future-ready cities use innovative design approaches and advanced technologies to make their environments more human friendly. They leverage mobile apps, smart streetlights, public Wi-Fi, AI, and other digital solutions to make citizen experiences more seamless and personalized and their city environments smarter and safer.

Human-centric actions future-ready cities have taken

Action	%
Provide affordable and safe housing	70%
Improve access to affordable healthcare	68%
Use digital platforms to get citizen feedback	68%
Reduce traffic congestion and air pollution	68%
Create urban green spaces	66%
Use data to analyze progress on equity goals	64%
Close gaps in services in underserved areas	58%
Improve access to healthy food	52%
Involve citizens in decision-making	52%
Foster community engagement	50%
Create urban environments to promote health	42%
Develop new roles, like Chief Citizen Officer	20%

Q43. In which of the following areas of citizen engagement and trust has your city taken or is currently taking significant action?
Q44. In which of the following areas has your city taken or is currently taking significant action to improve equity for citizens?
Q45. In which of the following areas has your city taken or is currently taking significant action to improve how citizens live and stay healthy?

How cities make citizens the center of gravity

Ellinikon: A new, citizen-centric city

An innovative urban development project is under way near **Athens, Greece** that incorporates all aspects of urban living in the 21st century. The Ellinikon project will transform a former airport site into a model future-ready city from scratch—one that integrates sustainability with advanced digital infrastructure and prioritizes citizen needs.

The project will use digital solutions to enhance daily life, foster community engagement, and improve the overall experience for residents and visitors. For example, smart home technologies will allow residents to control essential systems like lighting and heating from their smartphones, and services for everyday needs will be just a few clicks away.

The city will use IoT technology to monitor and manage key environmental and operational parameters, such as air and water quality, noise levels, and network performance. These smart systems will ensure that assets and infrastructure operate optimally, creating a cleaner and more sustainable environment. Smart waste management systems will streamline waste collection and encourage recycling and composting, contributing to the city's overall sustainability.

One of the most innovative aspects of The Ellinikon is the "SuperApp," a user-friendly mobile app that will integrate all digital and physical services. This technology is designed to make daily life seamless and hassle-free, ensuring that the city is finely attuned to the needs of citizens and visitors.

Lyon: Tackling social issues holistically

"We are tackling social challenges like poverty, inequality, or isolation through initiatives like affordable housing, cultural events, and community development to promote unity and social cohesion."

Takamatsu: Going green

"To mitigate environmental issues, we are implementing green infrastructure initiatives, including green roofs and green walls to combat air pollution and enhance air quality."

San Francisco: Providing affordable housing

"Affordable housing is an important issue due to the high rise in prices. We are implementing housing plans and offering new public financing tools as well as reducing housing and impact fees."

Tulsa: Alleviating traffic congestion

"We use AI for transportation management because it reduces traffic congestion and travel times for residents and commuters."

Taipei: Promoting citizen engagement

"Our focus is on fostering community engagement to create an inclusive and participatory environment for decision-making processes."

Wellington: Focusing on equity

"To achieve a viable future, we are building a city that is socially inclusive and focuses on diversity, and community well-being."

Bucaramanga: Improving city life with AI

"We are utilizing AI for city planning, which reduces costs and improves livability."

Q9. What are the biggest obstacles to implementing your future-ready plans and how are you overcoming them?

2. Create frictionless experiences for citizens

Future-ready cities make urban living easy, efficient, and seamless for their citizens and residents. They go far beyond other cities in digitizing urban services and citizen experiences. Nearly every future-ready city provides digital information on public transport, from real-time data on arrivals and schedules to mobile ticketing, and about eight out of 10 accept digital payments for city services.

Most harness digital channels to make it painless for citizens to file taxes, obtain driving licenses, sign up for services, obtain city licenses, and conduct other activities with the city. Crucially, future-ready cities create digital platforms for community meetings and digitally collect feedback, ensuring that citizens continue to be at the core of their plans. Such digital platforms along with social media can create continuous, real-time feedback loops that help make citizen participation feel more dynamic and responsive.

Taking digital service delivery to the next level

Future-ready cities go one step further: to power their digitized citizen services and experiences, they move from siloed solutions to integrated digital systems—what Bill Eggers, executive director of Deloitte's Center for Government Insights, calls digital public infrastructure (DPI). Such a system is essential for bringing together the different elements of a next-generation citizen experience, which, for example, may require identity verification, data management, and the ability to transact with the city agency in charge.

DPI enables all-in-one service apps, portals, and websites (see Kyiv case study on next page). According to Eggers, "Some governments are already creating 10x improvements in the scale, quality, and efficiency of service delivery by using DPI. While the shift to DPI may be difficult for cities, there are many benefits, such as fewer costs, greater resilience, and higher public trust. And most importantly, it delivers the level of service that citizens are coming to expect."

Percentage of cities digitizing citizen services

Service	Future-ready	Other
Information on public transport	92%	88%
Platforms for community meetings	78%	71%
Payments for city services	74%	71%
Tax filing	72%	62%
Business licensing and permitting	72%	73%
Signing up for programs and services	70%	45%
Driver licenses	66%	44%
Voter registration	66%	50%
Land-use building permits	64%	48%
Receive citizen feedback	54%	31%
Permits for events	50%	44%
Scheduling inspections	48%	43%
Access to city data and records	46%	44%

■ Future-ready
□ Other

Q12. Which services does your city now deliver digitally? Which does your city plan to deliver digitally over the next three years?

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Enhancing citizen services with technology
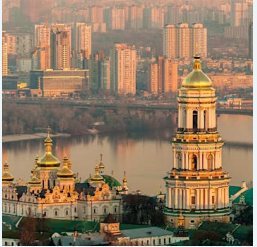
Kyiv: A platform for enhancing service delivery

Kyiv Digital is the official mobile app and digital platform developed by the city of Kyiv, Ukraine, to streamline various public services and make them more accessible to residents and visitors.

Kyiv Digital has evolved into a life-saving platform, now with 3.1 million active users and nearly 90% penetration of the city's population. The app's enhanced functionality has proven crucial during the ongoing war, providing real-time air raid alerts, shelter locations, and essential updates. Kyiv Digital's ability to scale its services to meet immediate wartime needs shows its critical role in ensuring the safety and resilience of Kyiv's residents during times of crisis.

The Kyiv Digital initiative has proven to be an indispensable asset for a city enduring a war crisis. Navigating today's challenges requires a tool that is reliable and timely, and easily adaptable to meet future needs.

Ukraine's Diia app

According to Deloitte's Eggers, Ukraine's Diia app and service portal is another example of superior digital service delivery in the country. Deloitte calls Diia a type of digital "citizen experience platform" that gives more than 19 million users access to over 100 government services, ranging from receiving the world's first-ever state digital ID, to registering the birth of a child or filing taxes, all on a single smart phone app.

Louisville: Using tech to understand needs

"IoT/sensor technology helps us with understanding the needs of the citizens of the city so that we are able to provide services in an effective and easy manner."

Jeddah: Providing self-service capabilities

"Modernized IT platforms have made it possible for the city to provide self-service capabilities to residents, enable employees to work remotely, and adjust to shifting expectations."

Wellington: Using mobile apps for engagement

"The use of mobile apps has led to improved communication, real-time exchange of information, and a platform for citizens to connect with each other and participate in local activities."

Yokohama: Digitizing everyday services

"Using digital identity verification, electronic payment systems, and digital communication platforms has made public services more efficient, reduced paperwork, and increased citizen engagement."

Santa Clara: Analyzing citizen feedback

"We have been able to analyze the feedback of the citizens on services provided by our council through data analysis."

Dundee: Using digital channels to boost awareness

"We improved public awareness and engagement by developing a range of community outreach and education programs, as well as utilizing social media and other digital channels to promote the value and benefits of future-ready plans to citizens."

Q9. What are the biggest obstacles to implementing your future-ready plans and how are you overcoming them?

3. Build productive, skilled, and diverse workforces

Cities face a broad range of workforce pain points, from attracting talent in competitive markets to managing the impact of an aging workforce. Budget constraints, skills gaps, and the evolving nature of work further complicate workforce management in the public sector.

With a sharp focus on workforce optimization, future-ready cities do more to reduce these employee challenges. As a result, they face an average of three workforce-related challenges vs. five among their peers.

How future-ready cities reduce workforce challenges

One of the key areas that separate future-ready cities from others is innovative thinking. Future-ready cities, like Paris, create cultures of innovation across urban domains, and many, such as Vienna and Los Angeles, have built innovation hubs with universities to deliver new ideas and a steady pipeline of talent. This mindset of innovation, along with digitally optimized workplaces, also helps to keep the staff more engaged.

Future-ready cities develop diverse workforces that reflect the populations that they serve. That helps the city make better decisions for their communities and build trust with their citizens. Future-ready cities avoid losing knowledge when employees retire by creating knowledge management systems and documented digital processes that draw on AI, the cloud, and other latest technologies. Importantly, they do more to develop the digital, data, and change management skills to drive the next phase of urban transformation.

Future-ready cities face fewer workforce challenges

	Future-ready	Other	% pt. diff.
Lack of innovative thinking/problem solving	30%	65%	-35
Insufficient digital and data skills	36%	59%	-23
Building a diverse and inclusive workforce	36%	59%	-23
Insufficient leadership, change mgmt. skills	14%	34%	-20
Retaining knowledge when employees retire	23%	42%	-19
Reskilling and upskilling the workforce	54%	73%	-19
Inadequate employee engagement	20%	38%	-18

Q17. Which are the main talent challenges that your city must overcome to achieve its future-ready plans?

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How cities overcome workforce challenges

Los Altos Hills: Addressing talent gaps with AI

In smaller cities and towns, city leaders need to do more with less—particularly when it comes to talent. Dr. Peter Pirnejad, the City Manager for the Town of Los Altos Hills, California, described his resource dilemma: "We are struggling to find qualified and capable staff, while at the same time we are witnessing decades of institutional knowledge walk out the door."

Generational shifts are compounding the problem. As digitally proficient millennials and Gen Zers enter the public-sector workforce, they expect access to modern technologies and tools, as well as competitive salaries. But often they need training to fill their gaps in government experience.

At the same time, older generations are leaving the workforce, often taking with them valuable knowledge of city operations. Cities need to prioritize the transfer of this institutional knowledge to younger generations.

"I am looking to Gen AI and other tools to solve this conundrum," said Dr. Pirnejad, by using them to digest large amounts of data for decision-making and to generate documentation of processes, best practices, and lessons learned from current leaders. This ensures that this information is accessible to the next generation. "And these same tools can be used to provide training to inexperienced new hires," he said.

Perth: Partnering with academic institutions

"Skilled workforce shortages are the biggest obstacle to implementing future-ready plans. In response, we are developing training programs and partnerships with local and international educational institutions."

Utsunomiya: Offering student training

"To address a lack of human resources, we have been collaborating with local universities and technical institutions to provide student training programs as well as internships for recent graduates."

Cleveland: Collaborating with communities

"Our city lacks a qualified workforce with knowledge in emerging technologies such as AI, data analytics, and cybersecurity. To deal with this, we formed connections with local communities and introduced programs that provide on-the-job training and mentorship to young people."

Kuwait City: Improving work-life balance

"One of the most significant hurdles to executing future-ready strategies is a limited workforce. To overcome this, we are attracting remote workers and creating a decent work-life balance by offering amenities."

Hartford: Streamlining and digitizing workflows

"Simplifying our workflow processes allows our employees to communicate more effectively and handle administrative tasks better."

Abuja: Fostering an innovation culture

"Technological gaps pose a significant challenge, but we are actively fostering a culture of innovation and continuous learning through educational initiatives and employee development programs."

Q9. What are the biggest obstacles to implementing your future-ready plans and how are you overcoming them?

4. Diversify funding and business models

Taxes and user fees are common ways for cities to fund their investments. But to achieve their ambitious plans, future-ready cities actively seek a panoply of external sources of funding.

In addition to direct borrowings, future-ready cities routinely track and apply for grants and funding from higher levels of government. They also bring in investment from public-private partnerships and grants from philanthropic and multilateral organizations.

Another tactic is to raise funds through market-based instruments, such as municipal bonds, impact fees, tax increment financing, and online crowdfunding. Many also draw on policy-based tools, from licensing fees to zoning regulations, that can help raise funds for targeted projects and services.

Opening new funding avenues

Over the next three years, future-ready cities will quintuple their use of philanthropic funding to build community impact. They will amplify their use of more innovative funding tools, such as an ROI model to analyze how costs will be recovered over time through cost savings and incremental revenue, as well as draw more on policy-based tools and market-based instruments.

How future-ready cities fund their tech investments

Source	%
Taxes	84%
User fees	80%
State/province funding	76%
Government borrowing	72%
National grants and funding	70%
Private-sector investments	56%
Market-based instruments	56%
Policy-based tools	40%
Multilateral finance	14%
ROI model	10%
Philanthropic contributions	8%
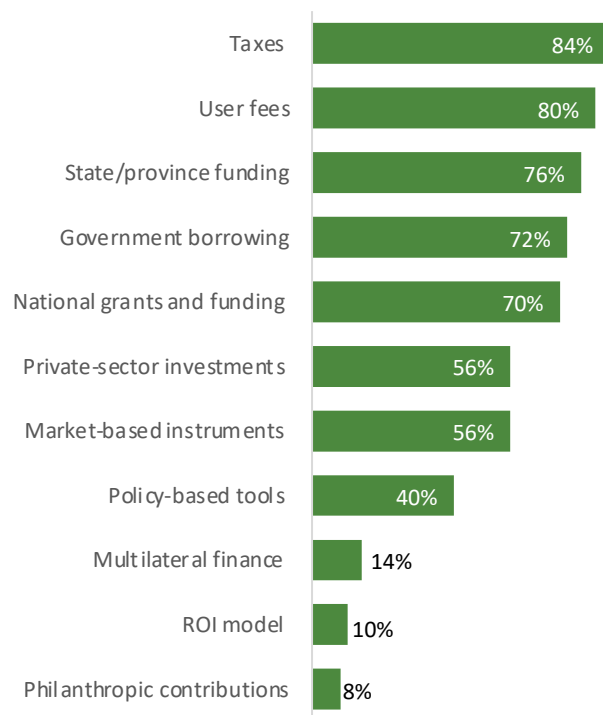
Fastest-growing funding sources over next 3 years

	% growth
Philanthropic contributions	500%
ROI model	200%
Multilateral finance	186%
Policy-based tools	65%
Market-based instruments	36%
Private-sector investments	29%

Q13. Which of the following sources of funding is your city actively using now to fund its technology investment plans? Which funding sources does your city plan to start to use or continue to use over the next three years?

How cities address budget needs

Orlando: Taking full advantage of government grants

Orlando has been proactive in securing funding for its various initiatives, particularly those around sustainability and resilience. "There are so many grants out there around clean energy, energy efficiency, and internet access—it's almost overwhelming," said Mike Hess, Orlando's director of sustainability, resilience, and the future-ready city initiative.

For example, the city converted community centers into "resilience hubs" where residents can go to cool down, charge devices, and use the internet when needed, as well as get information in an emergency. To ensure these centers are resilient and can keep operating in a power outage, Orlando is using a $2.8 million federal grant to upgrade their electric infrastructure and connectivity. "Hurricanes leading to power outages are one of the biggest risks we have here in central Florida," Hess said.

Extreme heat is another challenge, since some affordable housing units aren't fully air conditioned. Orlando has won three grants from federal agencies and other groups to help with energy efficiency and equity for residents and to bolster extreme heat resilience. It has also received a pre-award notice for an energy conservation federal block grant. As a result, said Hess, "We will be able to buy energy-efficient equipment for residents who are struggling with their energy bills and don't have an apartment that they can keep cool."

Hartford: Funding through partnerships

"The city faces a lack of funding to develop and execute plans. Our goal is to establish partnerships with the public sector, private companies, and nonprofit organizations to address funding gaps and maximize resources."

Madrid: Working with international organizations

"Budget constraints are the biggest obstacle. To deal with it, we are collaborating with private companies and international organizations to secure funding."

Kansas City: Funding through cost savings

"The use of cloud infrastructure helps us to reduce capital expenses, leading to cost savings and improved budget management."

Detroit: Applying for federal or state funding

"We are currently struggling with budgetary challenges. We are employing a strategic approach by leveraging public-private partnerships and actively seeking funding from federal and state entities."

Makassar: Collaborating with local communities and businesses

"Due to limited budget and resources, we face challenges to implementing our plans to prepare for the future. We are working with various stakeholders, such as local communities and businesses, to develop collaborative solutions."

Lusaka: Seeking foreign investment

"We continuously work to bring in foreign capital and establish many bilateral partnerships with businesses."

Q9. What are the biggest obstacles to implementing your future-ready plans and how are you overcoming them?

5. Expand partnerships into innovation ecosystems

Future-ready cities know that they cannot drive full-scale transformation alone or with just a few partnerships. They must take partnerships to the next level by building them into innovation ecosystems integrated into their operating models. As Professor Joan E. Ricart of Spain's IESE Business School explains: "The challenges cities face require very complex and novel partnerships. Cities are used to partnerships, but mostly through purchasing contracts and infrastructure investment. The partnerships needed are robust innovation ecosystems to deal with the grand challenges ahead."

Future-ready cities establish collaborative networks with a variety of partners, from businesses and startups to other government agencies and cities, to share ideas, resources, and best practices. On average, they prioritize eight different types of partners.

Targeted partners

The **commercial sector** provides future-ready cities with many opportunities to achieve their goals. Nine out of 10 future-ready cities collaborate with technology startups and established tech firms to drive digital innovation. Over six out of 10 team up with financial institutions and other businesses to foster growth, improve sustainability, and access expertise and funding.

Nonprofit organizations are another good match for future-ready cities. Academia offers cities the innovative thinking, research, and resources to deliver on their plans. Along with universities, foundations, neighborhood associations, and faith-based institutions help cities reach and engage local communities.

Future-ready cities also work closely with other **public-sector** entities to pool resources, improve service delivery, tap funding opportunities, make joint decisions, and align policies and practices. The most common public partnerships are with state/provincial government, public utilities, and other cities.

Setting up robust ecosystems is not just about finding partners. To allow these systems to thrive, future-ready cities instill a culture of innovation and entrepreneurialism, supported by open data policies and a defined governance framework.

Partnerships prioritized by future-ready cities

Commercial sector	Start-ups and technology firms	90%
	Financial institutions	62%
	Businesses	62%
	Industry/trade associations	52%
	Consultants, outsourcing firms	20%
Non-profits	Academic/research institutions	60%
	Foundations/faith-based institutions	58%
	Neighborhood associations	46%
	Civil society organizations	44%
Public sector	State/provincial government	72%
	Other cities or city networks	58%
	Public utilities	56%
	Regional agencies/authorities	52%
	National government	44%
	Multilateral organizations	36%

Q16. Which of the following partnerships is your city prioritizing to meet its future-ready goals?

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How cities create their collaboration networks
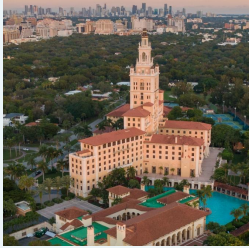
Coral Gables: Building an innovation ecosystem across the city

Coral Gables, Florida exemplifies how cities can partner with others to achieve their urban goals. It has already made great strides in digital transformation and is preparing for the next wave of technological advancements, particularly in mobility, energy resilience, and regional collaboration.

One primary goal is to expand its smart districts and wireless capacity. Coral Gables is already working with companies and research labs involved in robotaxis, autonomous vehicles, and electric vertical takeoff and landing (eVTOL) technology to prepare for changes in urban mobility. "We will eventually have a rooftop with activation for eVTOLs in our newest smart garages," noted Raimundo Rodulfo, the city's chief innovation officer, highlighting the city's commitment to staying ahead of emerging trends in transportation.

Another focus is smart infrastructure, particularly the use of structural health monitoring (SHM) systems to prevent disasters. Coral Gables is conducting research with help from Carnegie Mellon University and other research institutions to develop sensors that monitor the condition of buildings, bridges, and other structures. "We will have real-time sensors and data analytics models that can enhance preventative maintenance programs of those structures before something bad happens," said Rodulfo. This could help prevent tragedies like building collapses by providing early warnings about structural issues.

Coral Gables collaborates extensively with other academic institutions, such as the University of Miami, FIU, and MIT to drive innovation. And the city's GIS and IoT Lab has hosted over 120 interns and researchers from high school to the doctoral level, helping to build the next generation of talent in smart city technology.

Los Angeles: Working with universities

"We are collaborating with universities to develop research partnerships, talent pipelines and innovation hubs that foster innovation and entrepreneurship."

Qingdao: Aligning with stakeholders

"Limited collaboration is a major hurdle, but our city is addressing it by promoting interagency coordination and public-private partnerships to ensure that all stakeholders are aligned towards a common goal."

Kinshasa: Partnering with funding agencies

"We are working to solve funding problems by developing partnerships with funding agencies and highlighting project alignment with goals."

Da Nang: Partnering with big tech

"Outdated technology is our biggest challenge, and we are partnering with big tech players and consultants to overcome this issue."

Cincinnati: Tapping outside experts for technical aid

"Many staffers lack knowledge, and they need to learn about the fundamentals of renewable energy. We are taking the support of external partners to provide technical assistance, which will help to fill the knowledge gap."

Delhi: Working with other government authorities

"Lack of infrastructure in terms of connectivity and power is a significant obstacle. We overcome this with the help of government authorities to promote the use of renewable energy sources."

Q9. What are the biggest obstacles to implementing your future-ready plans and how are you overcoming them?

6. Take a cross-departmental, holistic approach

One reason that future-ready cities are better at addressing challenges is that they take a holistic approach to problem-solving. This involves analyzing the interdependence of various components and processes, and looking at these elements as a system, rather than as individual parts. In cities, complex problems like homelessness, crime, and economic uncertainty are intertwined and require multiple stakeholders to work together. Future-ready cities collaborate across departments and with other government agencies, as well as private-sector entities, local communities, and other groups. Some cities that have adopted a holistic, cross-departmental method of problem-solving include:

New York City: Reducing fatalities through Vision Zero

Aimed at reducing traffic fatalities, New York City's Vision Zero program brings together multiple agencies, including the Department of Transportation, the Department of Health and Mental Hygiene, the Department of City Planning, the Police Department, and the Mayor's Office.

The program began with 63 initiatives in 2014 and now includes over 385 initiatives undertaken by departments across the city. The program has led to an increase in citizen safety: overall traffic deaths declined by more than 12%, with pedestrian deaths dropping by 45%, when comparing data from 2023 and 2013, the year before Vision Zero's launch.

As the first US city to implement a Vision Zero safety program, New York City has served as a model for other cities, such as Los Angeles, Seattle, and Philadelphia.
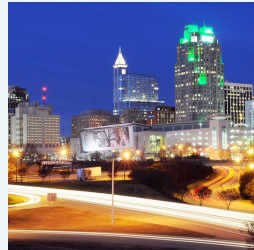
Raleigh: Sharing ideas in cross-departmental committees

"Historically we've had some departments with some great technology, but they were not thinking strategically about how another department could use it in a different way," said John Holden, Raleigh's smart city manager.

To address that problem, the city created coordinating groups, such as the new Smart Raleigh Coordinating Committee, co-chaired by Holden.

"I was insistent that every one of our 32 departments have a representative," said Holden. "People don't know what they don't know." The departmental representatives are generally managers of people in the field. "We want input from people who can see the opportunities, experience staff issues, and interact with the public." At the first meeting, one representative mentioned a new technology they were exploring, and another instantly saw a possible use for it. "It's already a success," said Holden.
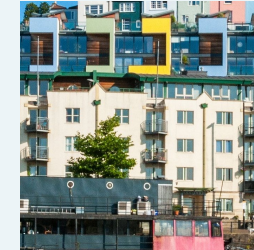
Bristol: Setting a One City Plan to 2050

Bristol's One City Plan sets out a vision for Bristol to evolve into what its mayor, Marvin Rees, called a "fair, healthy, and sustainable city, a city of hope and aspiration, where everyone can share in its success." The plan recognizes that erasing inequality, enabling communities to build their assets, and making a climate transition to net zero requires close collaboration across urban sectors to address shared goals and achieve long-term impact.

The plan brings together a huge range of public, private, voluntary, and third-sector partners to enable the city to respond to immediate and long-term, city-wide opportunities and challenges that transcend organizational boundaries.

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Harnessing the power of technology

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Future-ready cities do five things differently than other cities to harness the power of technology:

1. Make prolific use of digital technology

2. Invest more in their digital future

3. Fund tech from capital and operating budgets

4. Ensure technology is an in-house competency

5. Create a clear digital path to the future

1. Invest more in their digital future

Future-ready cities plan to spend more than four times as much as their peers on technology over the next three years. This big difference largely reflects the size of future-ready cities, which typically have bigger populations and budgets.

Future-ready cities also outspend others on a per-capita basis and as a percentage of budget—the latter by a difference of around 22%. The wide gap in technology spending between larger and smaller cities gives the former the edge in becoming future-ready. Yet cities with tighter budgets might still access the digital tech they need via lower-cost options such as public-private partnerships.

Spending patterns by urban domain

As an urban leader in Istanbul said, cities must prioritize future-ready projects and allocate resources accordingly. Our research reveals that cities earmark the biggest share of their tech budgets for urban infrastructure, followed by safety, security, and resilience; and then mobility and transportation. They apportion smaller shares to environment and sustainability and to citizen living, health, and trust. The distribution is similar for cities across digital maturity, population size, and region.

Some cities even use technology to make technology-related decisions. For example, the finance team for Milwaukee uses data analytics to improve budgeting and resource allocation.

Average technology spending over next three years

	Future-ready	Other	
Total $M	$428	$107	
Per capita	$131	$128	
Percent of budget	1.91%	1.56%	
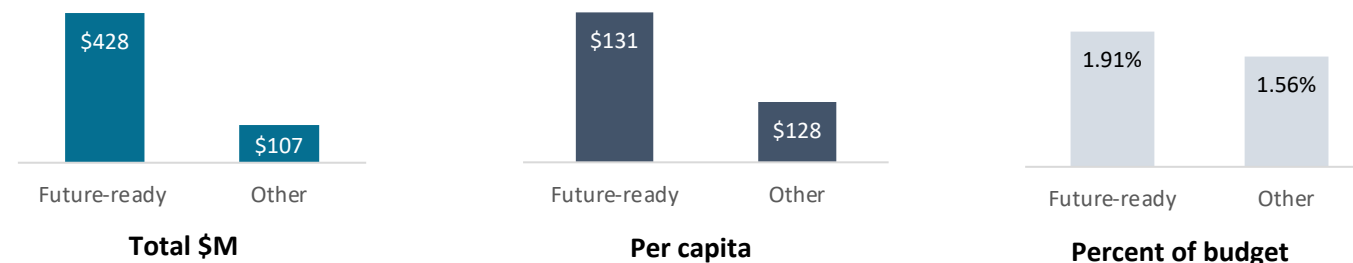
Distribution of spending across domains over next three years (all cities)

Urban infrastructure 23.9%	Safety, security, and resilience 19.2%	Mobility and transportation 18.6%	Environment and sustainability 17.2%	Living, health, and trust 14.5%
				Other 8.9%

Q7. How much does your city plan to spend on technology and data over the next three years (cumulatively) in US dollars to prepare these urban domains for the future? Q8. How will these technology and data investments be allocated across the following urban domains?

2. Make prolific use of digital technology

Due to their larger technology budgets—and their bolder digital plans—future-ready cities are well ahead of others in the use of digital solutions. The differences are stark, particularly in the use of modernized IT platforms, AI, IoT, automation, and biometrics, which are used by about four to five times as many future-ready cities as others. Among the most effective technologies are data analytics, cloud infrastructure, and cybersecurity technologies—used widely by about three-quarters or more of future-ready cities.

What the digital future holds

Over the next three years, future-ready cities will ramp up their use of advanced technologies. The percentage making extensive use of robots will almost quadruple from 8% today to 34% in three years. Robots will play a greater role across domains, from surveillance robots to ensure public safety to robotic systems to automate waste management.

Similarly, the use of Gen AI will more than triple from 12% to 40% of future-ready cities, as they draw on this new flavor of AI to solve urban problems and better serve citizens. At the same time, they will expand their reliance on earlier forms of AI, which will be widely used by 72% of cities in three years, and selectively used by 20% of others. For more information on AI and its related technology, digital twins, please see the next section of this report.

Technologies cities use widely now

Technology	Future-ready	Other
Cybersecurity technology	80%	37%
Data analytics	78%	43%
Cloud infrastructure	72%	36%
Chatbots/digital assistants	70%	29%
Mobile apps	66%	36%
IoT/sensors	60%	9%
Biometrics	54%	9%
Modernized IT platform	52%	11%
Automation	50%	8%
Traditional AI	50%	11%
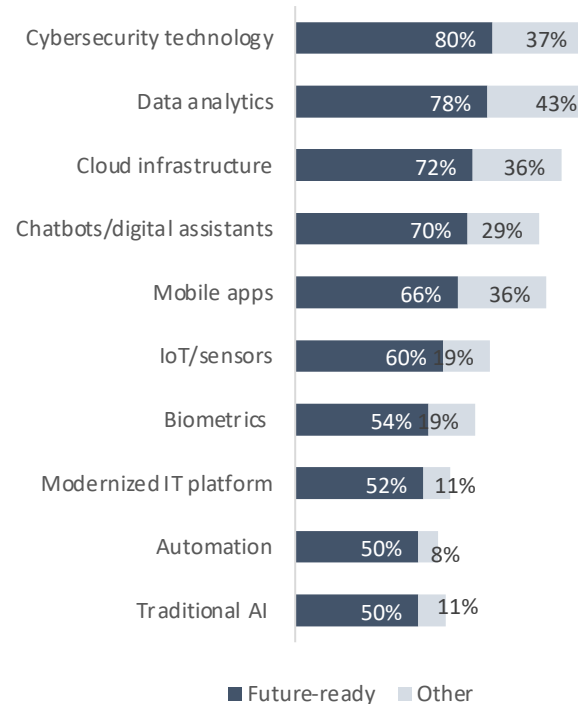
■ Future-ready ■ Other

Fastest-growing tech for future-ready cities in 3 years*

	% growth
Robots	325%
Generative AI	233%
Blockchain	222%
Drones/autonomous vehicles	188%
Digital twins	143%
Digital collaboration tools	127%
Augmented and virtual reality	113%
Edge computing	85%
Geospatial technology	80%
Automation	56%
Biometrics	44%
Traditional AI	44%

* Compares the wide use of technologies now with the wide use of these technologies in three years

Q20. How extensively is your city using the following technologies to achieve its future-ready plans? How extensively does your city plan to use them over the next three years?

Most effective technologies for becoming future-ready

1. Data analytics	**Melbourne**: "The integration of data analytics in city management has revolutionized the decision-making process, enabling officials to make choices based on real-time information rather than solely depending on their intuition or historical data. This has improved urban planning outcomes."
2. IoT/sensors	**Lisbon**: "We are able to collect real-time information from different sensors about traffic, air pollution, and noise pollution."
3. Cloud	**Oklahoma City**: " The cloud provides greater flexibility and scalability, allowing our city to respond rapidly to changing needs and prioritize resources."
4. Cybersecurity	**Johannesburg**: "By using advanced cybersecurity tools like firewalls, secure codes, and attack detectors, we have strengthened our digital safety."
5. Modernized IT platform	**Dundee**: "With a modernized IT platform in place, we have been able to set the stage for a future-ready city characterized by efficient digital services, enhanced data management, and improved security."
6. Geospatial technology	**Ottawa**: "GIS software has allowed us to arrange and assist in land use decision-making, evaluate data, and allocate resources appropriately."
7. Chatbots	**Nairobi**: "Our current use of chatbots and digital assistants has made sharing health data reports and other tax information easier."
8. Automation	**Niteroi**: "Adoption of automation technologies has helped the city become more efficient, sustainable, and responsive to the needs of its citizens."
9. Collaboration tools	**Da Nang**: "Digital collaboration tools are most effective. We get real-time updates on city projects and initiatives and simplified project management."
10. Traditional AI	**Ningbo**: "By using AI, we have successfully optimized energy consumption and distribution in real time, thereby improving grid stability and reliability through predictive maintenance."
11. Digital twins	**Paris**: "Digital twins are known to be one of the most effective technologies as it's a dynamic representation of the city's infrastructure, which encompasses buildings, transportation systems and more."

Q21. So far, which one of these technologies has been most effective in making your city future-ready and what benefits is your city seeing?

3. Fund tech from capital and operating budgets

As cities build technology into their future-ready initiatives, they will draw more heavily on both capital and operating budgets. The rise of cloud and SaaS solutions provide cities with greater flexibility in financing their digital plans.

Funding trends are evolving fast, with future-ready cities out front. Currently, 40% of future-ready cities use the capital budget to make their technology investments, 32% use the operating budget, and 28% use a mix of both. Over the next three years, as future-ready cities implement their more ambitious plans, the bifurcated use of capital or operating budgets will shrink, and 50% of theses cities will use both budgets together.

More flexible use of capital and operating budgets

Over that time, future-ready cities will continue to use their capital budgets to fund long-term investments across urban domains. These investments may include major infrastructure projects, such as building new data centers; installing new digital connectivity infrastructure, such as broadband, Wi-Fi and 5G; and adopting smart city technologies, such as IoT sensors, smart traffic management systems, and advanced surveillance systems.

During that same period, future-ready cities will increasingly draw on funds from their operating budgets to digitize service delivery and government operations. Such investments may include cloud and SaaS services for customer, financial management, project management, and e-government services, as well as training and development, IT support and maintenance, and digital communication tools.

Budget future-ready cities use for technology investments

Capital budget	40% (Future-ready now) / 30% (Future-ready next 3 years)
Operating budget	32% (Future-ready now) / 20% (Future-ready next 3 years)
A mix of both	28% (Future-ready now) / 50% (Future-ready next 3 years)

- Future-ready now
- Future-ready next 3 years
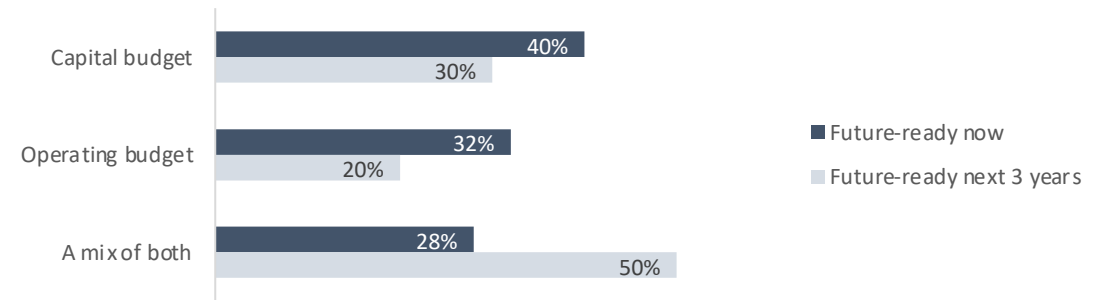
Budget other cities use for technology investments

Capital budget	53% (Other now) / 29% (Other next 3 years)
Operating budget	29% (Other now) / 22% (Other next 3 years)
A mix of both	19% (Other now) / 49% (Other next 3 years)

- Other now
- Other next 3 years
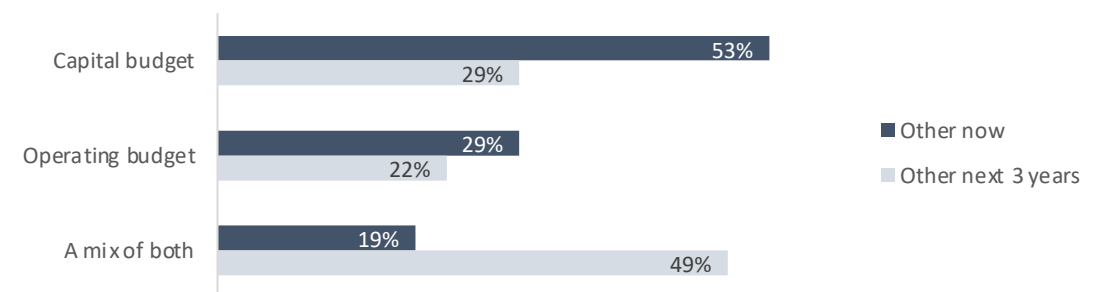
Q14. When investing in technology, does your city use your capital budget (CAPEX) or your operating budget (OPEX)? Which does your city plan to use more over the next three years?

4. Ensure technology is an in-house competency

For future-ready cities, technology is not a support function. It is a key strategic asset—one that needs to be nurtured by a strong in-house team. Building technology solutions in house not only allows future-ready cities to create efficient systems tailored to their needs, but also gives them greater control over functionality, updates, and security.

Creating and supporting solutions in house requires that cities have both the digital skills and IT foundation to succeed—elements that future-ready cities have in spades. As a result, 66% of future-ready cities develop some or all their own technology solutions, whereas the predominate method for other cities is to buy solutions from technology vendors (68%).

However, future-ready cities do not act completely on their own. They buy solutions from outside vendors, but rather than operate them separately, they integrate those systems into their own. For example, to address the complex issue of integrating technology into existing systems, Tokyo (a future-ready city) seeks outside expertise and resources.

Big cities are significantly more likely to build their technology solutions in house: 62% do so vs. 18% of small cities. Over three-quarters of small cities buy their solutions from technology vendors.

How cities approach technology development

	Future-ready	Other	All
Build solutions in house	40%	5%	12%
Build mainly in house, but buy some tools from vendors	26%	17%	18%
Buy solutions from many vendors, rather than build in house	16%	40%	35%
Buy solutions from one or two vendors, rather than build in house	12%	28%	24%
Outsource as much technology build and operation as possible	4%	7%	6%
No dominant approach: we do not favor any one solution	2%	4%	4%

	Small	Medium	Large/Mega
Build solutions in house	2%	17%	31%
Build mainly in house, but buy some tools from vendors	16%	17%	31%
Buy solutions from many vendors, rather than build in house	52%	23%	17%
Buy solutions from one or two vendors, rather than build in house	24%	30%	9%
Outsource as much technology build and operation as possible	4%	10%	6%
No dominant approach: we do not favor any one solution	3%	4%	6%

Q19. Which of the following best describes your city's technology approach?

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5. Create a clear digital path to the future

Building a modern technological foundation to run a future-ready city—one that supports citywide activities, from real-time delivery services to predictive analysis—is no easy task. Our research uncovered five key obstacles that cities need to overcome to prepare for a digital-first world:

1. **Integration of diverse systems** – cities often have legacy systems that may not be compatible with new technologies.

2. **Data management and security** – cities are dealing with large volumes of data from an increasing number of data sources, which also expose them to greater potential risks.

3. **Budget constraints** - limited budgets can hinder the development and implementation of comprehensive technology plans.

4. **Rapid technological change –** the fast pace of technological innovation makes it challenging for cities to develop long-term strategies that remain relevant.

5. **Human resistance –** resistance from city employees or residents to new technologies or processes can impede progress.

Future-ready cities consider these obstacles when devising their long-term tech plans. For example, Coral Gables started its smart city journey in the early 2000s when several hurricanes left the city without power and connectivity for days. To prevent this from occurring again, the city built up its capacity and connectivity to provide a more resilient foundation.

Then in 2016 to 2020, Coral Gables pursued a period of hyperconnectivity, integrating systems such as smart lights, IoT sensors, CCTV cameras with edge analytics, and traffic and environmental sensors. In recent years, the city replaced its legacy system with a modern cloud-based infrastructure, harnessing data from IoT sensors and other systems and supporting digital-twin environments.

Orlando: Working through innovation labs

"We have set up innovation labs to conduct thorough testing of technologies before their full-scale implementation. By doing so, we are effectively reducing the risks involved in adopting these innovations."

Porto Alegre: Upgrading legacy systems

"A major obstacle blocking smart city initiatives is technological gaps. We address this by upgrading our digital infrastructure to support advanced tech, such as data analytics and IoT, as well as robust cybersecurity measures."

Kochi: Keeping up with technology

"Rapidly changing technology is our city's largest obstacle. We are working to stay updated on new technologies and working with technology businesses."

Abuja: Fostering a culture of innovation

"Technological gaps pose a significant challenge to our future-ready plans. To fill these gaps, we are actively fostering a culture of innovation and continuous learning through training programs."

Palma de Mallorca: Managing data

"Coping with huge volumes of data produced through digital transformation efforts is challenging. We are focusing on secure cloud-based infrastructure, which offers the convenience of on-demand access to computing resources and scalability."

Salt Lake: Vaulting budget constraints

"Budget allocation is a significant obstacle in implementing new technology. We have been forming various public and private partnerships to achieve our goals."

Q9. What are the biggest obstacles to implementing your future-ready plans and how are you overcoming them?

The next frontier:
AI and digital twins

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The AI urban imperative

AI is ushering in a new era for cities. It's revolutionizing how they conduct analysis, perform tasks, drive productivity, meet citizen needs, and solve problems. Cities also are dramatically lowering barriers for employees and citizens to access AI and its benefits.

Recognizing the transformative power of AI, future-ready cities have made much greater progress than others in implementing it across their urban landscape. Two-thirds actively use AI to automate and streamline government operations and make better decisions. Over half use it to enhance living conditions, public health, and trust. Slightly fewer employ AI for safety and security, and for mobility and transportation.

Surprisingly, only 40% of future-ready cities use AI to improve sustainability, an area that will gain greater momentum as cities look for innovative ways to achieve their net-zero goals.

> " Generative AI has the potential to change the world in ways that we can't even imagine. It has the power to create new ideas, products, and services that will make our lives easier, more productive, and more creative. It also has the potential to solve some of the world's biggest problems, such as climate change, poverty, and disease."
>
> **Bill Gates, Microsoft Co-founder Forbes, November 29, 2023**

Cities actively using AI for operations and domains

Domain	Future-ready	Other
Government management and operations	66%	39%
Living, health, and trust	56%	28%
Safety, security, and resilience	52%	40%
Mobility and transportation	50%	26%
Urban infrastructure	48%	31%
Environment and sustainability	40%	18%

■ Future-ready   ■ Other

Top three use cases

Government management and operations
1. Analyze huge volumes of data
2. Answer citizen queries
3. Digitize/process documents

Living, health, and trust
1. Chatbots for personalized assistance
2. Intelligent self-service portals
3. Risk factor identification

Safety, security, and resilience
1. CCTV camera optimization
2. Video surveillance and analysis
3. Predict disasters or disease outbreaks

Mobility and transportation
1. Traffic management and flow prediction
2. Smart parking management
3. Intelligent public transportation routing

Urban infrastructure
1. Predictive maintenance
2. Digital infrastructure security
3. Smart infrastructure design

Environment and sustainability
1. Waste management/recycling
2. Water management/monitoring
3. Energy/smart grid optimization

Q22. What progress in using AI has your city made in the following domains? (Actively using) Q22a. For which of the following use cases is your city using AI?

The top 10 most successful AI use cases cited by cities

1. Traffic management	**Ostrava**: "Using AI to control traffic has greatly helped us, resulting in faster emergency response times, fewer accidents, and less traffic congestion."
2. Public safety	**Monrovia**: "Using AI in video surveillance and analysis helps us to detect suspicious activities, monitor crowds, and respond to emergencies swiftly."
3. Energy management	**Tallin**: "The most effective AI use case is energy optimization. We have achieved significant benefits in energy efficiency and grid reliability."
4. Customer service	**Nairobi**: "The most effective use case right now is 24/7 chatbot assistance, which enhances the accessibility of government services."
5. Predictive maintenance	**Philadelphia**: "Predictive maintenance provides advantages by minimizing downtime and improving the flow of operations."
6. Waste management	**Johannesburg**: "By using IoT sensors, data analytics, and AI, our city optimizes waste collection, cuts operational costs, and enhances overall city cleanliness."
7. Data analysis/management	**Toyama**: "We utilize generative AI technology to manage a large amount of data, which supports us in making decisions."
8. Urban planning	**Taiyuan**: "Analyzing city planning is the most beneficial AI use case for our city and helps us make better decisions."
9. Cybersecurity	**Dammam**: "Through AI we have been able to detect cyberattacks more effectively than usual methods."
10. Fraud detection	**Sao Paulo**: "We use AI for fraud detection in public services, which assists us in identifying false claims or misuse of public funds."

Q23. Please describe the most effective AI use case for your city and the benefits it is generating.

How cities unlock value from AI

Raleigh: Leveraging AI across urban domains

Located in the famed North Carolina Research Triangle, the city of Raleigh is well placed to partner with high-tech companies and nonprofits to incorporate AI into its future-ready plans. The city is doing this across urban domains, most recently pairing AI and digital-twin technology to foster more intelligent and resilient urban development in an era of climate change.

Raleigh already has made significant progress in AI-enabled traffic management. It has more than 100 cameras installed at traffic intersections, making it possible to view activity in real time. Live video feeds from these cameras are fed into computer vision models that can detect vehicles. City systems can use this data to help make informed traffic management decisions.

Raleigh also has partnered with Nvidia, Quantifi, and ESRIi, maker of its GIS mapping software, to study traffic patterns and counts at several intersections, using AI cameras and vision tools. It aims to reduce or eliminate traffic fatalities as part of the city's commitment to Vision Zero. "We know when an accident happens, but we don't know about the near misses," said Mark Wittenburg, Raleigh's CIO. His team is training the AI model to look for near misses between vehicles and pedestrians, and how the city can make the intersections safer.

Using AI to improve water management

Raleigh also uses AI to forecast creek flooding and overflows in stormwater systems, based on factors such as gauge-adjusted radar rainfall amounts, creek levels, hydraulic and hydrologic models, soil moisture content, and more. "We have pretty advanced flood early warning systems in the city, using sensors," explained John Holden, Raleigh's smart city manager.

Similarly, Raleigh's municipal water utility, Raleigh Water, uses machine learning to predict failures in the water and sewer systems. One project, in partnership with Xylem, predicts water main breaks, so that the utility can do pre-emptive maintenance. Another project, with Advanced Drainage Systems, detects early signs of blockages and potential overflows in the sewer system. Raleigh works with another firm, Hazen Construction, which uses machine learning for real-time prediction of wastewater flows and sewer main failures in the city.

"AI increases resilience by predicting natural disasters, optimizing resource use, and enhancing sustainability. It supports digital enablement thought use with other technologies like digital twins for urban planning and IoT for smart buildings. AI boosts public safety through integration with emergency response systems and monitors environmental conditions via sensors and analytics."

Oleg Polovynko, Adviser on Digitalization to the Mayor of Kyiv, Ukraine

"Cities must prepare for different scenarios of climate change, local disasters, geopolitical crises, and other disruptions. AI could differentiate pessimistic, real, and optimistic scenarios and anticipate consequences not only in one month or one year, but also in decades. Based on this, a city could plan the budget and resources needed; customize territorial development master plans of the city; and anticipate and influence the behaviors of residents."

Bayan Konirbayev, Advisor to the Mayor of Almaty City, Kazakhstan

"I see AI as a 'how' not a 'what.' For a large county like ours, the ability to gain insights from large unstructured data archives will inform us on the design and evaluation of programs, and every aspect of our public services. For years, it has been very hard to deliver on the promise of data architecture and build with the end in mind. Now, we can take these tools and gain insights in a way we've always wanted to be able to do."

Bob Leek, CIO, Clark Country, Nevada, USA

What urban experts say about AI

Jean Barroca
Global Public Sector Digital Modernization Leader, Deloitte

"AI has the power to catapult cities into the future. By leveraging data-driven insights, AI can revolutionize urban planning and resource management, from predicting trends and managing traffic to planning infrastructure, making cities more resilient and sustainable.

AI's role in energy optimization and traffic reduction underscores its contribution to sustainable living. As we weave AI with cloud computing and IoT, we're not just creating connected cities, but equipping them to tackle complex issues like climate change. The result? A smarter, future-ready urban landscape that elevates the quality of life for all residents."

Andrea Sorri
Segment Development Manager, Smart Cities – EMEA Axis Communications

"AI can be a way for cities to improve Big Data management. AI can help cities to do more sophisticated data analysis, leading to quicker and better fact-based decisions. Cities can also use AI to mitigate organizational risks due to the scarcity of data analysts. And cities can build AI intelligence into their assets and devices that will do the initial analysis on the edge and then send relevant data forward, thereby saving on data storage and transfer."

Philippe Cases
CEO
Tomorrow Territories

"The main benefits of AI in cities include enhanced resilience through predictive disaster management, sustainable development via optimized energy use and waste management, and increased efficiency in transportation and public services. AI enables real-time, data-driven decisions, ensuring innovative governance and citizen engagement. By continuously monitoring environmental conditions and infrastructure health, AI helps cities minimize resource waste and maintain ecological balance. This integration of AI supports economic growth and innovation and enhances the overall quality of life, making cities future-ready by being resilient, sustainable, efficient, and digitally connected."

Renu Navale
VP, Edge Computing Group and General Manager, Cities-Critical Infrastructure Intel

"As we build future-ready cities, AI-based technological innovation can improve the lives of our citizens in various areas such as safety, urban mobility, sustainability, water delivery, and waste management. Not only do we need to build new cities that are AI-ready, but also transform existing cities to evolve into adaptable cities. We need cities to adapt to be regenerative and support circular and sustainable economies. AI can be used to enhance quality of life through equitable access to the services and opportunities that residents need to thrive. Cities that are transformed by AI can look forward to a future where urban efficiency and sustainability are achievable realities rather than just distant goals."

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Becoming AI-ready

Future-ready cities are rushing to build the AI processes and organizational resources needed to drive future success.
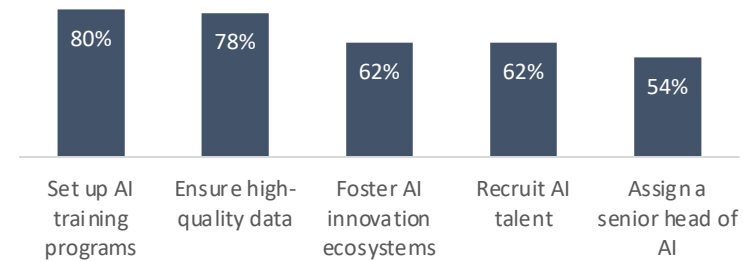
Aware of the key role of data in delivering AI outcomes, 78% of future-ready cities are taking steps to ensure that their data is consistent and high quality. These cities are also preparing the organization for AI by training their workforces, recruiting AI talent, and assigning a senior executive responsible for AI.

To compliment their in-house resources, future-ready cities also develop AI innovation ecosystems. These include AI experts from technology companies, universities, consultancies, and other external groups.
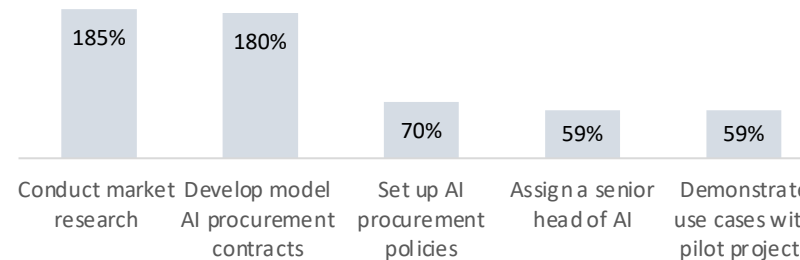
What lies ahead

Over the next three years, as AI usage goes mainstream, future-ready cities will focus on systemizing their AI procurement processes. That will include developing model AI procurement contracts, identifying potential vendors, and setting up AI procurement policies.

Actions taken by future-ready cities to drive AI adoption

80%	78%	62%	62%	54%
Set up AI training programs	Ensure high-quality data	Foster AI innovation ecosystems	Recruit AI talent	Assign a senior head of AI

Fastest-growing actions for future-ready cities over next 3 years (% growth)

185%	180%	70%	59%	59%
Conduct market research	Develop model AI procurement contracts	Set up AI procurement policies	Assign a senior head of AI	Demonstrate use cases with pilot projects

"To become AI-ready, cities must include AI as part of their overall long-term strategy. This means ensuring that AI initiatives are not just piloted but also scaled effectively. Investing in digital infrastructure, fostering public-private partnerships, and developing governance frameworks that promote ethical AI use are essential steps. Cities should also focus on upskilling the workforce and promoting digital literacy and inclusion programs. Creating a culture of innovation that embraces technology-driven solutions will be crucial for leveraging AI to improve urban living, enhance services, and ensure inclusive growth."

Professor Sampsa Samila, IESE Business School

It starts with the training of your council, community, and staff. Then you need to develop use policies that dictate and ensure, to the public, how you intend to use the technology to improve and expand public services. Finally, explore, pilot, pivot, and iterate on the use of Gen AI and AI-enabled solutions and test the impacts and enhancements they have on the quality of service you offer your constituents.

Dr. Peter Pirnejad, City Manager, Los Altos Hills

Q24. Which of the following actions has your city taken to drive the adoption of AI and which ones does it plan to start to take or continue to take over the next three years?
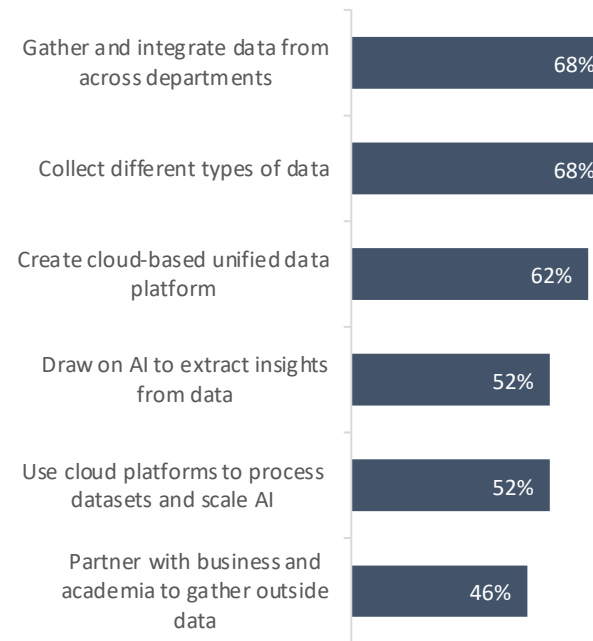
Building the data foundation for AI

Effective data management is foundational to the successful deployment of AI technologies. Future-ready cities see the use of AI as the next step in their data journey.

Said Ryan Hendrix from Arizona State University's Smart Cloud Innovation Center: "Ten years ago, we were trying to help people move to the cloud, then IoT, and now we're doing the same with AI. It's all connected in their journey in terms of getting better data, doing more with that data, and making that data more accessible and secure."

It starts with gathering and integrating different types of data. This can include data across departments, as well as from external data sources, such a IoT sensors or business partners.

Then, by putting the data on a secure cloud-based platform, it can act as a single source of truth for the city. Introducing AI and other analytical tools into the mix helps to extract more insights from the data and make it more accessible to urban decision-makers and stakeholders. Having the data foundation in place allows city employees to leverage AI, especially Gen AI, to ask questions of data and get answers in real time.

Top data steps by future-ready cities

Data step	Percentage
Gather and integrate data from across departments	68%
Collect different types of data	68%
Create cloud-based unified data platform	62%
Draw on AI to extract insights from data	52%
Use cloud platforms to process datasets and scale AI	52%
Partner with business and academia to gather outside data	46%

AI and data concerns

"AI generates concerns around privacy and data security, bias and fairness, and transparency and trust," according to Oleg Polovynko, adviser on digitization to the mayor of Kyiv, Ukraine. "Addressing skill gaps and data quality management is also crucial, and effective consent management and AI's role within current data frameworks are essential." he adds. "Overcoming these challenges requires implementing robust data protection regulations, ethical guidelines, AI literacy programs, and public participation in AI decisions."

The data challenge

David Larose, CIO of Drancy, France sees data management as a critical prerequisite for using AI. "We have to take the data, clean it, and make sure it is okay." Because of ever-changing regulation and data in the public sector, Larose stresses the need to update data continuously. "Sometimes you have a yes that turns into a no six months later," he said.

Q26. In which of the following areas has your city taken or is currently taking significant action to create a data foundation to support its future plans?

Managing the downside of AI

In a recent *Financial Times* Op-Ed piece, the US secretary of state, Antony Blinken, and the US secretary of commerce, Gina Raimondo, spoke about AI's potential to improve people's lives, but warned about AI's hazards. "These include the risk of AI generating false information, reinforcing bias and discrimination, being misused for repressive or destabilizing purposes, or proliferating the knowledge to make a bioweapon or conduct a cyberattack," they said.

Effective governance is crucial for maximizing the benefits of AI, while minimizing the risks. That's particularly the case with Gen AI, which carries greater dangers around misinformation, bias, and privacy than traditional AI because of its ability to create content and provide answers from its analysis. As usage of Gen AI continues to expand, strong governance will be essential to ensure its ethical use and to mitigate these potential threats.

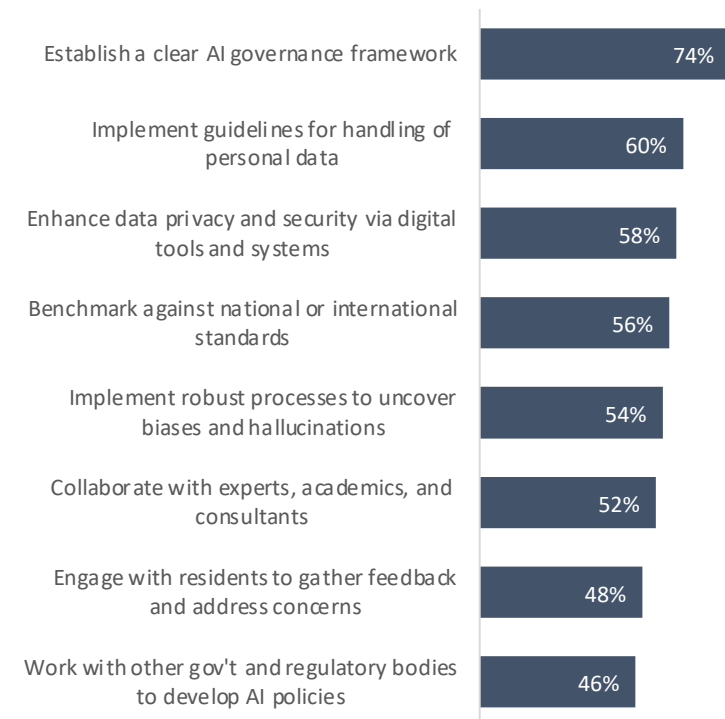**Future-ready cities set policies for responsible use of AI**

As cities roll out AI tools, they need to think about the data security, privacy, and sovereignty issues, and how to maintain public trust and support. Future-ready cities understand the ethical and privacy concerns around AI, and their citizens' worries. They take early action to build a strong AI governance framework. This includes setting guidelines for personal data use, installing digital systems for data security, and developing robust AI auditing processes. They actively involve citizens in AI decisions and provide them with training.

These advanced cities also look outside of their perimeters for support and guidance. This includes benchmarking themselves against national and/or international standards; collaborating with experts and academics; and working with other levels of government and regulatory bodies to develop robust AI policies.

> "Privacy, security, increasing complexity, and lack of knowledge are all big concerns when using AI. Some solutions to these challenges include knowledge programs, using pilots, close connections to research facilities, and fast feedback loops. The idea is to fail fast, fail safe, and fail cheap. "

Øyvind S. Tanum, Head of Smart City, Trondheim, Norway

Actions future-ready cities take to build AI governance

Action	Percentage
Establish a clear AI governance framework	74%
Implement guidelines for handling of personal data	60%
Enhance data privacy and security via digital tools and systems	58%
Benchmark against national or international standards	56%
Implement robust processes to uncover biases and hallucinations	54%
Collaborate with experts, academics, and consultants	52%
Engage with residents to gather feedback and address concerns	48%
Work with other gov't and regulatory bodies to develop AI policies	46%

Q25. Which actions is your city taking to ensure the responsible use of AI?

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Future-ready cities run on AI-enabled digital twins

Digital twins—which increasingly draw on AI to drive real-time analysis and predictive capabilities—are fast becoming foundational tools in digital transformation strategies. They are being used pervasively for urban planning and everyday city management. Over the next three years, every city surveyed will be implementing or using digital twins.

Helsinki, our top-rated future-ready city, has one of the world's longest running digital-twin programs (see case example later in this section). Other future-ready cities in our study, such as Chicago, Denver, Ljubljana, Paris, Tokyo, and Toronto, are making wide use of digital twins. Our research shows that future-ready cities are well ahead in using this technology. Half already use it selectively or widely across urban domains.
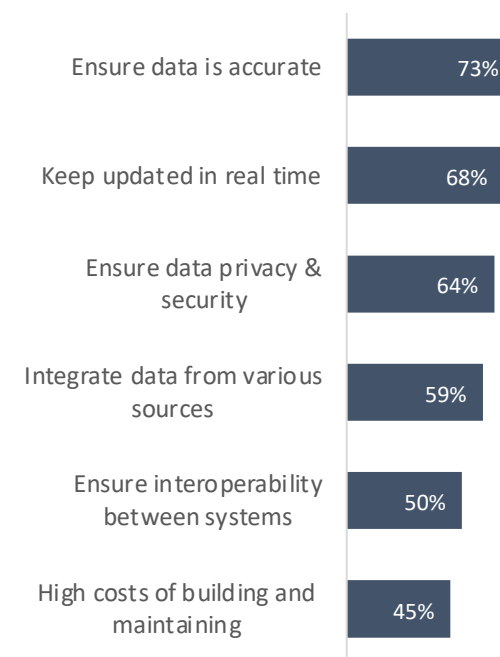
These investments are already paying dividends for cities. A 2021 report by global tech firm ABI Research estimates cities will save $280 billion by 2030 thanks to more efficient digit-twin-supported urban planning.

Potential challenges

While digital twins offer significant potential for enhancing the operations of cities, addressing a series of challenges is essential for successful deployment. Future-ready cities highlight the challenges. These chiefly revolve around data: its accuracy, timeliness, sourcing, and protection.

Other obstacles include interoperability barriers due to organizational and data silos across departments. Another is the high cost of implementation and maintenance, since digital twins may require significant investment in technology infrastructure, sensors, and data management systems, particularly if these systems are not already in place.

Top digital-twin challenges future-ready cities face

Challenge	%
Ensure data is accurate	73%
Keep updated in real time	68%
Ensure data privacy & security	64%
Integrate data from various sources	59%
Ensure interoperability between systems	50%
High costs of building and maintaining	45%

93% of cities now are using, piloting, or planning to use digital twins—in 3 years it will be **100%.**

44% of future-ready cities already use digital twins selectively or widely vs. 36% of other cities.

In 3 years, 76% of future-ready cities will be actively using digital twins.

Q20. How extensively is your city using the following technologies to achieve its future-ready plans? How extensively does your city plan to use them over the next three years?
Q28. Which of the following challenges has your city encountered in developing a digital twin solution?

Top use cases for digital twins

Future-ready cities shed light on the most effective ways to put digital twins to work. Their most prominent use cases today include monitoring air quality, optimizing traffic flows, monitoring infrastructure, and tracking emergencies and security incidents in real time.

Over the next three years, other use cases will gain traction. The fastest-growing ones will be around the ability of digital twins to provide virtual representations of cities, which will engage stakeholders by helping them visualize projects. Future-ready cities will also focus more on using digital twins to improve multi-modal connectivity and manage emergency responses.
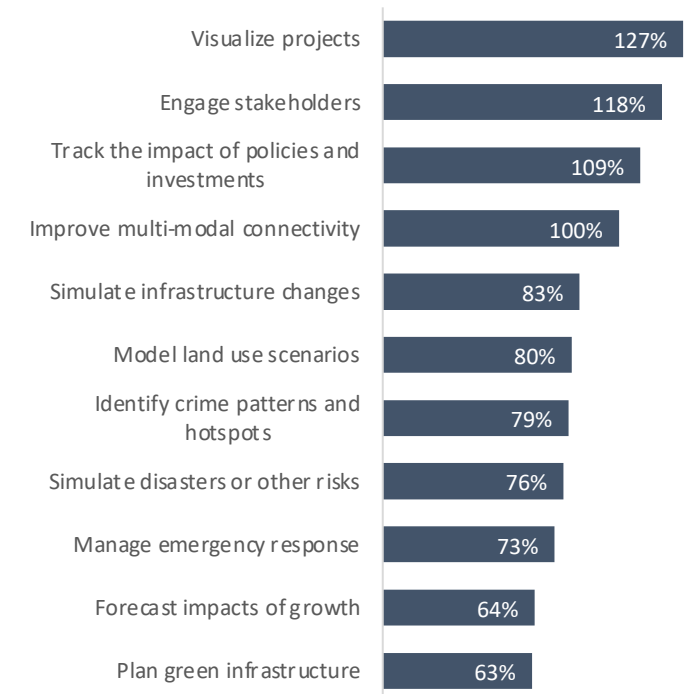
Here is how two cities are using digital twins:

- **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.

- **Chattanooga's** digital twin includes a digital representation of the traffic signal network to examine mobility-related energy usage. The model is being expanded to include sensors and laser imaging to monitor pedestrian and vehicle movements to improve safety.

% of future-ready cities using digital twins by domain

Domain	Use case	%
Environment & sustainability	Monitor air quality	62%
	Plan green infrastructure	38%
Infrastructure management	Optimize traffic flow	66%
	Monitor assets	50%
Citizen living, health, & trust	Monitor health and disease trends	40%
	Allocate resources effectively	32%
Safety, security, & resilience	Monitor emergencies and crime	48%
	Test strategies to respond to crime	38%
Transportation & mobility	Plan and optimize public transit	32%
	Improve multi-modal connectivity	24%
Urban planning	Model land use scenarios	30%
	Forecast impacts of growth	28%

Fastest-growing use cases for future-ready cities over next 3 years

Use case	%
Visualize projects	127%
Engage stakeholders	118%
Track the impact of policies and investments	109%
Improve multi-modal connectivity	100%
Simulate infrastructure changes	83%
Model land use scenarios	80%
Identify crime patterns and hotspots	79%
Simulate disasters or other risks	76%
Manage emergency response	73%
Forecast impacts of growth	64%
Plan green infrastructure	63%

Q27. In which of the following ways is your city now using a digital twin, and in which ways does it plan to start to use or continue to use a digital twin over the next three years?

The value of digital twins

Helsinki's city-scaled digital twin

Helsinki, Finland, has one of the world's longest-running digital twin programs. It began over three decades ago with the city's early adoption of computer-aided design (CAD), followed by 3D mapping of the city, and most recently, the development of a full-scale digital twin. The city is leveraging the digital twin to improve Helsinki's internal services and processes, promote smart city development, and share city models as open data to citizens and companies for research and development.

One of the key lessons learned from the development of the digital twin is that it is an iterative process. According to Jarmo Suomisto, the head of Helsinki's digital twin program, quoted in a VentureBeat article, "The best way to start is with a reality mesh model since you get good results, and it looks pretty. Then, as city leaders understand the power, you can get resources to do more. You can get a good model up and running in a few years and then build on that."

Helsinki leverages its digital twin to support many initiatives to improve sustainability and quality of life, including several tools that citizens can use. One such application is a service that allows citizens to analyze solar radiation and the potential impact of the renovation of roofs, walls, doors, and windows on the city's carbon footprint. Homeowners can compare the cost of new insulation, windows, and heat pumps against the anticipated energy savings and CO_2 reduction and estimate the potential ROI.

"Digital twins are the most important instrument for the development of the city's master plan, so that construction companies will be able to avoid mistakes and save on cost."

Bayan Konirbayev, Advisor to the Mayor of Almaty City, Kazakhstan

"Digital twins provide a bridge between reality and virtuality. Technically, the digital twin solves the problem of scattered or weak integration experienced in traditional smart cities. Digital twins will become increasingly powerful in enabling data-driven decisions and will have a high adoption rate among city governments, with a promise of making cities more resilient. "

Jean Barroca, Global Public Sector Digital Modernization Leader, Deloitte

"Cities are employing AI alongside other technologies like modern cloud-based IT platforms, IoT, blockchain, and digital twins to create future-ready urban environments. Digital twins, virtual replicas of physical assets, use AI to simulate and predict the behavior of infrastructure and systems, allowing for proactive maintenance and efficient urban planning. Together, these technologies form a cohesive ecosystem that enhances cities' efficiency, sustainability, and resilience."

Philippe Cases, CEO, Tomorrow Territories

Best practices across urban domains
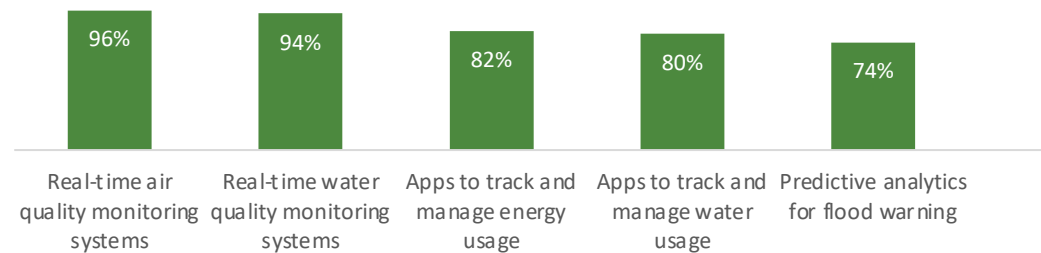
1. Environment and sustainability

Future-ready cities are committed to decarbonization. Almost half are significantly ahead of their net-zero plans vs. just 5% of others. It is a similar story with renewable energy targets.

Future-ready cities have gotten this far by taking key steps to **reduce greenhouse gas emissions**, setting citywide emissions targets, and turning their goals into funded actions through climate budgeting. They also **facilitate a green energy transition** through incentives and investments; **manage buildings and open space** to drive sustainability and efficiency; and **manage waste** by promoting circular economy practices and recycling.

Future-ready cities embed technology into their sustainability solutions. More than eight in 10 have made significant technology investments to monitor air quality, energy usage, and water quality, usage, and flooding.

Top five technology investments by future-ready cities

Real-time air quality monitoring systems	Real-time water quality monitoring systems	Apps to track and manage energy usage	Apps to track and manage water usage	Predictive analytics for flood warning
96%	94%	82%	80%	74%

Top steps taken by future-ready cities

Reduce greenhouse gas emissions	Adopt climate budgeting	80%
	Set city-wide emissions targets	78%
	Develop a citywide climate action	68%
Facilitate a green energy transition	Provide renewable energy targets and incentives	78%
	Invest in alternative fuel source infrastructure	76%
	Promote use of electric vehicles	74%
Manage land use and open space	Mandate building energy efficiency	84%
	Build and maintain more parks and green spaces	76%
	Set sustainable building and materials standards	74%
Manage waste	Promote circular economy practices	78%
	Use recycling and treatment facilities	78%
	Develop sustainable public procurement policies	70%

Q29. In which of the following areas of environment and sustainability has your city already taken or is currently taking significant action?
Q30. In which of the following technologies and solutions has your city invested to improve the environment and sustainability? In which does your city plan to start to invest or continue to invest over the next three years?

Overcoming sustainability challenges

Orlando: Fast-tracking decarbonization

Bolstering sustainability and reducing the city's carbon footprint is a cornerstone of the urban plans of Orlando, Florida. "We have goals to transition the entire city to 100% clean energy by 2050," said Mike Hess, director of sustainability, resilience, and the future-ready city initiative. "To get there is going to require a lot of improvements in energy efficiency." He explained that lower-income residents in rental or affordable housing experience many barriers to improving energy efficiency in their living spaces and difficulties switching to clean energy.

Thanks to several grants from federal agencies and others, Hess said "We will be able to buy energy-efficient equipment for residents who are struggling with their energy bills and don't have an apartment that they can keep cool." Orlando is pursuing a private donation of equipment and will be doing a pilot of the project before moving to full implementation.

Leading by example

For its municipal operations and services, Orlando hopes to meet its 100% clean energy goal considerably sooner, by 2030. "Orlando likes to lead by example," said Hess, adding that the city has made considerable progress on its energy transition and is on track to meet its needs for about 30 megawatts through solar energy generation. For its wider city goals, Orlando is working largely in partnership with its municipally-owned utility, which is planning its own path to the 2050 clean energy goal.

Auckland: Revising sustainability plans to address population growth

"We consider a growing population and environmental degradation to be the biggest obstacles. To overcome them, we are actively devising distinct and effective strategies such as incorporating long-term adaptive measures and enhanced resilience to climate change in our planning decisions, as well as developing a new Future Development Strategy."

Dhaka: Planting trees and improving water treatment

"Implementing our plans can be hindered by environmental challenges such as air pollution and water scarcity. To deal with these issues, the government has taken initiatives like planting trees along roadsides and setting up water treatment plants."

Muscat: Minimizing waste from rapid urbanization

"Waste disposal is a significant obstacle, although we are trying hard to recycle the waste as much as we can. We have also set a target to minimize household waste disposal from 13 kg to 8 kg by 2030."

Monrovia: Building environmental resilience and early-warning systems

"We are designing climate resilience strategies, including implementation of flood management systems, green infrastructure projects, and early-warning systems to mitigate the impacts of climate change and ensure that our plans are resilient and future-ready."

Casablanca: Investing in smart technologies

"Our city faces environmental challenges such as pollution, waste management, and the impact of climate change. To fix this, we are putting our money into smart technologies, such as renewable energy, sustainable transportation, and smart urban planning."

Takamatsu: Going green

"In order to mitigate environmental issues, we are implementing green infrastructure initiatives, including green roofs and green walls to combat air pollution and enhance air quality."

Q9. What are the biggest obstacles to implementing your future-ready plans and how are you overcoming them?
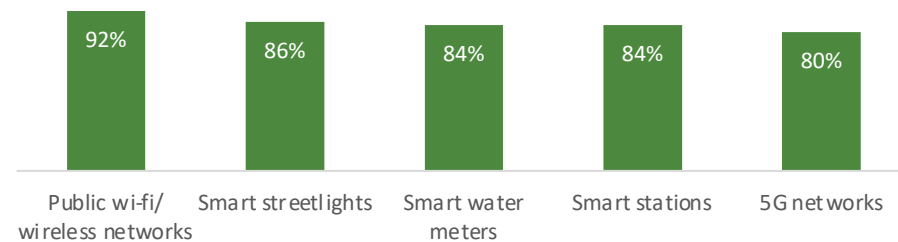
2. Urban infrastructure

Reliable urban infrastructure is a prerequisite for economic growth and development in cities. Future-ready cities ensure that their physical, digital, and utility infrastructure is resilient, sustainable, and fit for future purpose.

They **address aging infrastructure** with planning and capital investment, **build infrastructure resiliency** by improving preparedness for disasters, and **encourage sustainable utility usage** with promotion and incentives. They also **ensure adequate digital infrastructure** throughout the city and **integrate digital and physical infrastructure** by deploying sensors and digital displays.

Future-ready cities are forging ahead in leveraging technology to improve urban infrastructure. More than eight in 10 have already invested in public Wi-Fi, 5G networks, smart streetlights, smart water meters, and smart stations.

Top five technology investments by future-ready cities

Public wi-fi/ wireless networks	Smart streetlights	Smart water meters	Smart stations	5G networks
92%	86%	84%	84%	80%

Top steps taken by future-ready cities

Address aging infrastructure	Develop comprehensive life-cycle planning	66%
	Dedicate funding to capital improvement plan	64%
Build infrastructure resiliency	Invest in battery storage systems	82%
	Develop a disaster preparedness plan	76%
	Invest in infrastructure to withstand natural disasters	68%
Encourage sustainable utility usage	Promote efficient energy usage	88%
	Promote efficient water usage	86%
	Promote dynamic electricity pricing	58%
Ensure adequate digital infrastructure	Provide free Wi-Fi and computer access	78%
	Lease infrastructure to telecom firms	76%
	Provide free Wi-Fi in disadvantaged communities	74%
Integrate digital and physical infrastructure	Equip city infrastructure and assets with sensors	82%
	Create interactive public spaces	72%
	Implement real-time monitoring of physical assets	50%

Q32.In which of the following areas of urban infrastructure has your city taken or is currently taking significant action?
Q33. In which of the following technologies has your city invested to improve urban infrastructure? In which does your city plan to start to invest or continue to invest over the next three years?

Addressing outdated infrastructure

Drancy: Modernizing digital infrastructure to support future plans

Drancy, a small city in France, has proven that size is no barrier to upgrading infrastructure and building a modern, smart city.

When David Larose became CIO in 2002, he faced the daunting task of modernizing the city's digital infrastructure. "My first goal was to have a city with IT architecture at the same level as what one should expect from a city in 2010," Larose explained. His initial steps were to deploy a fiber network and CCTV systems, laying the groundwork for future advancements.

One of the first major AI projects Larose initiated was use of CCTV cameras to detect littering, a significant issue for Drancy, which cost the city considerable resources to manage. By leveraging the existing network of 200 CCTV cameras installed in 2004, Larose saw an opportunity to tackle this problem efficiently.

Building IoT connectivity across the city

To support its smart city initiatives, Drancy also deployed a LoRaWAN network, a low-frequency, long-range network essential for IoT connectivity. "We've deployed our LoRaWAN network because it's the backbone to connect everything you need in the city," Larose stated. This network enabled the installation of 400 CO2 sensors in primary and elementary schools and allowed the city to monitor and manage environmental conditions effectively.

The integration of IoT devices has provided Drancy with granular control over various urban systems. For instance, the city's heat management system now optimizes heating in schools based on real-time data, resulting in significant cost savings.

Mumbai: Coping with population growth

"One of the biggest obstacles Mumbai is facing is the limitation of its infrastructure to support its large population. We are working to integrate urban planning and affordable housing to overcome this challenge."

Montreal: Repairing before expanding

"Due to a lack of investment in infrastructure, our city is struggling with aging and deteriorating water and waste collection systems. In response, we are prioritizing repairs and maintenance to ensure the stability of our existing infrastructure before moving forward with new projects."

Johannesburg: Leveraging partnerships

"A major challenge is developing modern infrastructure, such as public transport, energy grids, and digital connectivity. We have formed partnerships, started public-private collaborations, and are looking for funding for improvements."

Toronto: Testing technologies through pilots

"Current infrastructure limitations pose significant barriers to implementing future-ready plans. We are working on small-scale pilot projects that allow for testing new technologies and approaches for transportation systems, utilities, and buildings."

Naples: Following a phased approach

"The historic city center presents a complex challenge for modern infrastructure and technology integration. But by adopting a phased approach and starting with pilot projects, we are successfully overcoming these obstacles and gradually expanding our initiatives to larger areas."

Surabaya: Applying predictive maintenance

"With predictive maintenance, we are able to closely monitor and anticipate the condition of urban infrastructure, including roads, bridges and buildings, thereby enabling proactive maintenance strategies that minimize unexpected failures and downtime."

Q9. What are the biggest obstacles to implementing your future-ready plans and how are you overcoming them?
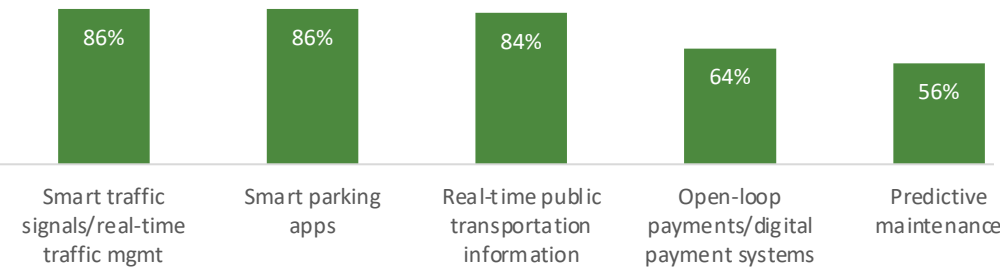
3. Mobility and transportation

Future-ready cities take steps to develop people- and planet-centric transportation. They enhance **efficiency and quality** by extending hours for public transit and offering more micromobility options. They ensure **safety** with improved pedestrian infrastructure, slower speeds, and public awareness campaigns. They ensure **social equity and physical access** for disabled and disadvantaged communities, often by providing discounted pricing and multilingual information. Future-ready cities boost **sustainability** by setting up public EV-charging infrastructure, low/zero emission zones, and preferred parking for hybrid and electric vehicles.

Future-ready cities use technology and data to make travel simpler and safer for their citizens. Their biggest technology investments are in smart traffic signals and in apps for parking and real-time transportation data. Most future-ready cities employ digital payments to provide frictionless mobility and use data analytics for predictive maintenance of infrastructure.

Top five technology investments by future-ready cities

Smart traffic signals/real-time traffic mgmt	Smart parking apps	Real-time public transportation information	Open-loop payments/digital payment systems	Predictive maintenance
86%	86%	84%	64%	56%

Top steps taken by future-ready cities

Efficiency and quality	Extend public transit service hours	80%
	Provide micromobility options	74%
	Partner with private providers	68%
Safety	Improve pedestrian infrastructure	78%
	Implement speed management measures	74%
	Implement a pedestrian and bike safety plan	66%
Social equity and physical access	Offer discounted transit pricing for the low income	72%
	Improve transit service for underserved areas	64%
	Ensure public transit is safe in all locations	64%
Sustainability	Build public EV-charging infrastructure	86%
	Offer preferred parking to hybrid, low emission, EVs	70%
	Set up low or zero emission zones	70%

Q34. In which of the following areas of mobility and transportation has your city taken or is currently taking significant action?
Q35. In which of the following technologies has your city invested to improve transportation and mobility? In which does your city plan to start to invest or continue to invest over the next three years?

Making transportation future-ready

Philadelphia: Improving transportation with frugal innovation

Philadelphia's public transportation system, SEPTA (Southeastern Pennsylvania Transportation Authority), is no stranger to dealing with major funding limits. However, Emily Yates, SEPTA's chief innovation and sustainability officer, has crafted a vision that blends cutting-edge technology with a "smart and frugal" approach.

SEPTA's budget for innovation is disproportionately small, given the agency's responsibility for overseeing the transit needs of a major metropolitan area. Yet, Yates has found ways to stretch this budget by leveraging partnerships and working collaboratively with other departments.

One example is SEPTA's pilot of ZenCity, an AI-powered tool that tracks customer sentiment. To fund the pilot, Yates worked with SEPTA's police department, splitting the cost and running the project together for a year. This collaborative model has been key to enabling innovation even when direct funding isn't available.

Sharing budgets

"A lot of it is, 'Hey, you help me, I'll help you,'" Yates explained. Whether it's deploying weapon detection tools like ZeroEyes for the police or piloting e-ink screens at bus stops, Yates's team is constantly looking for ways to work across departments and deliver value to SEPTA's riders.

In a previous role at the city of Philadelphia, Yates managed to launch 14 pilot programs with just $250,000 over two and a half years. By working with early-stage entrepreneurs eager to test their technology, she was able to offer SEPTA as an R&D partner in exchange for reduced costs. This allowed the city to pilot innovative solutions without breaking the bank—a strategy she has continued at SEPTA.

Minneapolis: Improving efficiencies through intelligent routing

"We are enhancing the efficiency of public transportation routes by implementing intelligent routing systems that utilize AI and real-time data."

Manchester: Employing IoT

"We have installed IoT sensor-based technology to monitor people, vehicles, and public transportation to get real-time insights and data."

Melbourne: Using AI to fight traffic

"We employ AI-driven traffic management systems to access real-time traffic information from diverse sources like cameras, sensors, and GPS devices to alleviate traffic congestion and boost overall transportation efficiency."

Tampa: Building an innovation budget

"To improve transphation solutions, we have created a special budget to make transportation more affordable and innovative."

Quebec: Moving to green transportation

"We are focusing more on investing in the electrification of transport modes and in promoting sustainability."

Guangzhou: Adopting alternative transport vehicles

"To avoid traffic congestion, we have introduced a combination of drones and small helicopters, which can be used for goods transfer or as alternative transport vehicles."

Q9. What are the biggest obstacles to implementing your future-ready plans and how are you overcoming them?
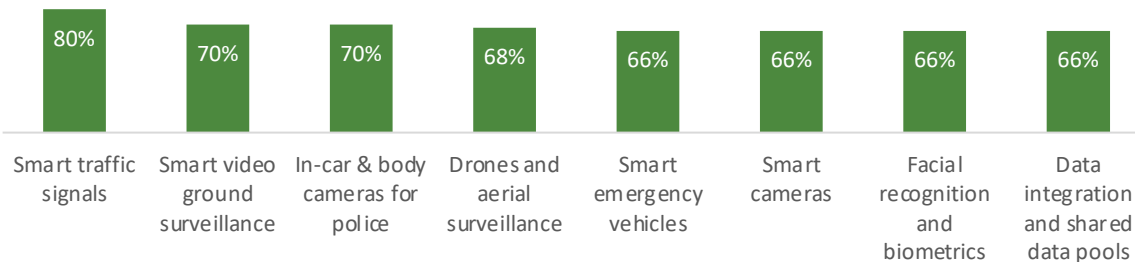
4. Safety, security, and resilience

Future-ready cities experience less crime and are better prepared for emergences and disasters. They promote **public safety and security** by upgrading street lighting in high-crime areas, introducing crime prevention programs, improving collaboration, setting policies for the use of surveillance technology, and training police in de-escalation techniques.

Future-ready cities also make **urban resilience** a top priority. They commonly develop rigorous resilience and continuity plans and work with the private sector to implement them. To build resilience, future-ready cities provide their teams with risk management training, run crisis simulations, and create back-up systems—and often appoint a chief resilience officer to oversee these activities.

Future-ready cities use smart traffic signals to give first responders the right of way and provide police with in-car and body cameras. They use both aerial and ground surveillance and smart cameras to detect accidents.

Top six technology investments by future-ready cities

Smart traffic signals	Smart video ground surveillance	In-car & body cameras for police	Drones and aerial surveillance	Smart emergency vehicles	Smart cameras	Facial recognition and biometrics	Data integration and shared data pools
80%	70%	70%	68%	66%	66%	66%	66%

Top steps taken by future-ready cities

Public safety and security	Upgrade street lighting in high-crime areas	62%
	Introduce crime prevention programs	58%
	Improve collaboration among law enforcement and emergency services	54%
	Establish policies to oversee the use of surveillance technology	54%
	Train police in de-escalation techniques	48%
Urban resilience	Work with private sector to implement resilience projects	68%
	Develop a comprehensive resilience strategy and action plan	68%
	Provide resilience and risk management training to staff and leadership	56%
	Create a command-and-control center to coordinate emergency response	44%
	Establish backup systems for critical infrastructure	42%

Q38. In which of the following areas has your city taken or is currently taking significant action to build resilience? Q41. In which of the following areas of public safety and security has your city taken or is currently taking significant action?
Q42. In which of the following technologies and solutions has your city invested to improve the safety of its citizens? In which does your city plan to invest over the next three years?

Coping with safety, security, and resilience challenges

Stuttgart: Striking a balance between innovation and privacy

Stuttgart's journey to becoming a future-ready city is a work in progress, characterized by both ambition and caution. The city is using technology to improve urban life, from AI-enabled chatbots and digital twins to public well-being and sustainability initiatives.

Safety and security are a key part of Stuttgart's plans. For example, the city has introduced surveillance systems in key areas to enhance safety. But these measures have sparked debate among residents concerned about privacy and data protection.

Such tension is particularly pronounced in Germany, where the right to privacy is highly valued. Anja Tamm, smart city coordinator, acknowledged that communicating the need for these security measures to the public can be difficult, as the city strives to balance safety with the protection of individual rights.

Coping with citizen resistance

Citizen resistance is not limited to security measures. Stuttgart has encountered resistance to new technologies such as public Wi-Fi due to health concerns. This makes digital transformation efforts even more complex.

In this environment, Tamm and her team often take on a kind of marketing role, where they must not only implement technologies but also have to convince the public of their benefits. Educating citizens on the positive impacts of innovation is crucial for building trust and public acceptance, a task that requires both transparency, commitment, and engagement.

Montevideo: Employing technology for public safety

"We have placed detection cameras and surveillance systems all around the city, which can help enhance public safety and security."

Dublin: Using data analytics to mitigate risks

"Through data analytics, cities can better understand and manage risk, ultimately contributing to a more sustainable and resilient urban future."

Harare: Keeping residents safe

"We face significant challenges in ensuring safety and security due to high crime rates and natural disasters such as floods. To tackle these, we have increased police presence in high crime areas and set up early-warning systems to facilitate timely evacuations during natural disasters."

Tangshan: Building economic resilience

"Economic downturns are one of our primary challenges. So, our city is diversifying its economy and investing in new businesses to improve resilience against economic downturns."

Monterrey: Reducing crime and emergency response times with AI

"AI is helping us to identify crime patterns, optimize police resource allocation, and also improve emergency response times."

Johannesburg: Investing in cybersecurity

"Cybersecurity-related technologies have been most effective in making our city future-ready. By using advanced cybersecurity tools like firewalls, secure codes, and attack detectors, we have strengthened our digital safety. We also carry out thorough checks and updates."

Q9. What are the biggest obstacles to implementing your future-ready plans and how are you overcoming them?

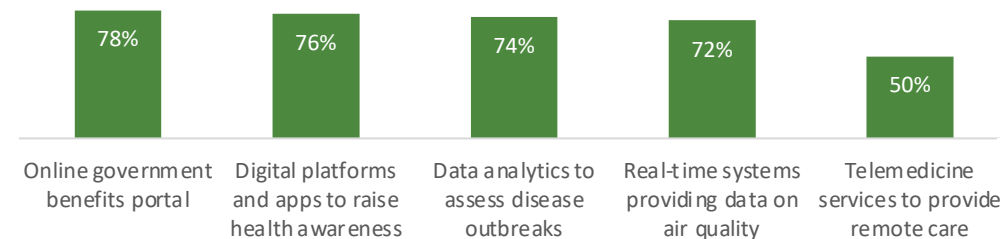**Thought**Lab

5. Citizen living, health, and trust

Future-ready cities work to improve living conditions and health for citizens—as well as earn their trust. Most use data-driven approaches to close service gaps and expand mixed income housing in underserved areas to drive **social equity**. They leverage the availability of inclusionary zoning to provide affordable housing and boost **public health** with urban green spaces and reduced traffic congestion.

Future-ready cities build **public trust** by engaging citizens through digital platforms and by enhancing transparency in decision-making and usage of data.

In addition to using digital platforms to communicate with citizens, future-ready cities invest in technology to help raise health awareness, allow citizens to sign up for government benefits, and provide real-time air-quality and health data. Over half now use blockchain to ensure secure transactions.

Top five technology investments by future-ready cities

Online government benefits portal	Digital platforms and apps to raise health awareness	Data analytics to assess disease outbreaks	Real-time systems providing data on air quality	Telemedicine services to provide remote care
78%	76%	74%	72%	50%

Top steps taken by future-ready cities

Social equity	Use data to analyze progress on equity goals	64%
	Provide training for city staff on inclusiveness and equity	62%
	Expand mixed-income housing and inclusionary zoning	58%
	Conduct equity assessments to identify disparities	58%
	Partner with schools and employers to create jobs for marginalized populations	52%
Public health	Provide affordable and safe housing	70%
	Improve access to affordable, high-quality healthcare	68%
	Reduce traffic congestion and air pollution	68%
	Create urban green spaces and recreational areas	66%
Public trust	Use digital platforms to communicate with citizens	68%
	Enhance transparency in government budgets	66%
	Set guidelines and governance for city's data/tech use	64%
	Provide education about city services and programs	62%
	Partner with communities/businesses to address issues	56%

Q43. In which of the following areas of citizen engagement and trust has your city taken or is currently taking significant action?
Q44. In which of the following areas has your city taken or is currently taking significant action to improve equity for citizens? Q45. In which of the following areas has your city taken or is currently taking significant action to improve how citizens live and stay healthy?
Q46. In which of the following technological solutions has your city invested to improve citizen living, health, and trust? In which solutions does it plan to start to invest or continued to invest over the next three years?

Improving citizen living, health, and trust

Stockholm: Putting citizen needs first

As mayor of Stockholm in 2018-22, Anna Jerlmyr championed the belief that future-ready cities must place citizens at the heart of decision-making processes, and prioritized quality-of-life metrics as a key indicator of urban success. To improve urban livability, Jerlmyr implemented various initiatives, such as creating accessible public spaces, enhancing transportation, and integrating sustainable practices.

For example, Jerlmyr expanded Stockholm's cycling infrastructure and pedestrian-friendly areas, making the city more navigable for all citizens.

By facilitating citizen feedback through digital platforms, Jerlmyr was better able to understand and respond to the needs and desires of residents. From neighborhood design to public-service improvements, Stockholm became a model for cities looking to involve citizens in shaping their urban landscape, ensuring that policy development was not only data-driven but also human-centered.

Balancing short-term needs with long-term vision

One of the most challenging aspects of city leadership, according to Jerlmyr, is balancing short-term needs with long-term goals. While long-term planning is essential, mayors must also deliver visible, tangible results that resonate with citizens in the short term. "You have to do both," she said. "If you're too focused on the long term, you won't get reelected."

Jerlmyr offered practical advice for achieving this balance, emphasizing investing in physical improvements that citizens can see and appreciate, such as greening public spaces or redesigned urban squares. These visible changes help build public confidence in the city's leaders and make it easier to pursue more challenging, long-term projects like climate action or social equity programs.

Vancouver: Communicating openly

"Our goal is to promote transparent communication between the government and residents, build trust, and strengthen community relationships."

Lyon: Tackling social problems to build unity

"We are tackling social challenges like poverty, inequality, and isolation through initiatives like affordable housing, community development, and cultural events that promote unity and social cohesion."

Geelong: Supporting a growing population

Growing population is a concern. Hence, our government is working to provide employment, education, and healthcare facilities to every citizen."

Cotonou: Targeting social protections for inclusive growth

"Poverty and inequality are challenges that we are working to solve through targeted social protection programs and inclusive growth."

Denver: Zoning in our housing

"The largest challenge is making housing affordable for low- and middle-class citizens. We are taking a multi-faceted strategy that includes resources like rental assistance, eviction prevention laws, and support for homeless shelters in emergency situations."

Rabat: Tracking disease outbreaks with AI

"AI-powered health analytics help identify high-risk patients and track disease outbreaks."

Q9. What are the biggest obstacles to implementing your future-ready plans and how are you overcoming them?

Insights from the experts
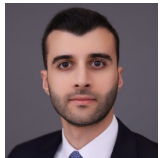
Abdo Al Habr

Senior Managing
Director
FTI Consulting

Environment: "We have seen many national and local governments set 'green' agendas and new environmental and sustainability policies. However, these ambitious plans often face difficulties at the implementation stage. Common obstacles include government bureaucracies and resistance from private players. To overcome these challenges and meet decarbonization targets, a more participatory governance framework is required to secure buy-in and encourage active participation. Crucially, government bodies will need to work together with stakeholders to prioritize high-impact policies that minimize disruption."
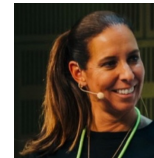
Mobility: "As cities reshape their future visions, mobility stands at the center of reimagining urban life. A more inclusive and sustainable urban mobility framework has emerged and continues to expand across cities worldwide. Its focus is on improving walkability, providing dedicated cycling lanes, and further integrating micro-mobility solutions to replace or complement legacy mass public transit alternatives. These measures will become even more efficient and convenient with the growing integration of digital platforms."

Jessica Constantinidis

Innovation Officer
EMEA, ServiceNow

Urban infrastructure: "I see a need to reinvent how we define a city. Traditionally, cities are viewed in two dimensions—flat space carved into specific areas where people live, work, and play. What if we turned that notion on its head and said we want everything residents need to be accessible within five minutes? That is exactly what NEOM is Saudi Arabia is doing—built with the intention of being people-first and environment-friendly, blending residential, commercial, and leisure areas, and giving everyone access to the resources they need to thrive.

To achieve that vision, we need a three-dimensional view where you maximize all the space your city has to offer. Urban infrastructure can be layered with dedicated space for transport vehicles, then bicycles, then pedestrians on top, and drone or air-traffic above. To get where you need to go efficiently, you can connect these layers. This requires planning, innovation, and technology to make this vision possible."

Andrea Sorri

Segment Development
Manager, Smart Cities,
EMEA
Axis Communications

Safety and resilience: "Cities will need to implement proper early-warning systems with smart sensors to be able to react as quickly as possible. These systems can also be further developed by AI-enabled simulations and digital twins. With flooding, water, and pollution sensors, cybersecurity is very important to prevent false alarms caused by hackers. So, cities need to invest in long-term solutions that are both reliable and cybersecure."
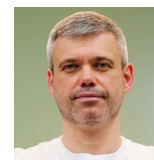
Petro Olenych

Deputy Mayor, Chief
Digital Transformation
Officer, Kyiv City Council

Citizen living: "Kyiv knows that equitable access to services is essential for a thriving city. The veteran services portal [Defender.Kyivcity] is just one example of how the city is providing essential services to those who need them most. Furthermore, by prioritizing the development of its digital services strategy and mental health interventions, Kyiv is ensuring that everyone has the support they need, especially in times of crisis."

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Methodology appendix

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Methodology for future-ready cities index

As part of our research, ThoughtLab economists created a future-ready maturity model to show the progress that cities are making in preparing five key urban domains for the evolving needs of citizens, visitors, and local businesses.

To determine the future-readiness of the cities surveyed, we drew on self-reported data on their progress in future-proofing urban domains and in laying the foundation for widescale digital transformation. (See slide 65 and 66 for more details.)

To ensure the objectivity of our rankings, we combined the survey statistics with data from objective secondary sources that measured each city's performance in reducing problems around pollution, traffic, health, and safety. (See slide 67 for more details.)

This approach allowed our economists to develop an overall future-readiness score for each city and to classify them into three categories: future-ready, progressing, and beginning. By comparing future-ready cities to others, we were able to identify best practices and create a future-ready roadmap.

Future-ready city index methodology

We based our scoring system on 0 to 100, with zero being the lowest and 100 being the highest score. The actual index scores ranged from 26.4 to 88.8. with an average value of 59.8 and a median value of 59.6.

We classified the cities into three groups. Cities that had an index value in the top 20th percentile were classified as "future-ready," those with a value in the bottom 20th percentile were classified as "beginning," and the cities that fell in-between were classified as "progressing."

Future-ready: greater than or equal to 71.2

Progressing: between 49.6 and 71.1

Beginning: less than or equal to 49.5

Scoring methodology for survey question on urban progress

One input into our future-ready model was based on the following survey question about progress across five urban domains:

How much progress has your city made in preparing the following urban domains for the future?

- **Environment and sustainability:** coping with climate change and pollution; providing parks, open space, energy, water, and other resources responsibly

- **Urban infrastructure:** communication networks and internet connectivity and how they are integrated into physical infrastructure

- **Mobility and transportation:** enabling people and goods to move effectively and safely, without leaving a carbon footprint

- **Safety, security, and resilience:** preventing crime, ensuring physical and digital security, responding effectively to external shocks

- **Citizen living, health, and trust:** ensuring health, well-being, housing, trust, and equitable treatment of citizens

Scoring methodology

We used respondents' answers to the question to assign them to a maturity category, based on the following scoring formula for the progress made on each area of the pillars:

1. **No progress – 0 point**

2. **Little progress – 5 points**

3. **Moderate progress – 10 points**

4. **Significant progress – 20 points**

We scored every respondent on each of the five areas of future-readiness. By averaging the scores across each area, we arrived at the future-ready progress score for each city. The scores ranged from 1 to 18, with an average of 10.7

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Scoring methodology for question on digital transformation

Another input into our future-ready model was based on the following survey question on the city's stage of digital transformation:

Which best describes your city's stage of digital transformation in the following areas?

People and organization

- **Digital innovation team:** a dedicated group driving continuous innovation across the city

- **Technology governance:** policies to ensure responsible use of digital technologies

- **Digital skills and talent:** digital skills and resources needed to drive urban innovation

Process

- **Digital experiences:** seamless digital experiences for citizens and employees

- **Data security and privacy:** advanced technology and processes to mitigate risks

- **Software deployment:** agile engineering approaches and API-focused micro-services

Technology

- **Automation**: use of automation to streamline and optimize workflows and perform tasks

- **Data management:** data center for gathering, integrating, and sharing data

- **Modernized IT platform:** digital infrastructure for optimizing and scaling processes and services

- **Latest technologies:** use of AI, cloud, blockchain, digital twins, IoT, and other advanced technologies

Scoring methodology

We used respondents' answers to this question to assign them to a maturity category, based on the following scoring formula for the progress made on each area of the pillars:

1. **Not pursuing - 0 point**
2. **Planning – 5 points**
3. **Early implementation – 10 points**
4. **Mid implementation – 15 points**
5. **Advanced implementation – 20 points**

We scored every respondent on each of the 10 areas of digital maturity. By averaging the scores across each area, we arrived at the digital maturity score for each city. The scores ranged from 3 to 19.5, with a mean of 13.2.

Scoring methodology for secondary data

To ensure the objectivity of our rankings, our analysts combined self-reported and secondary data sourced from Numbeo, a trusted source of crowd-sourced quality-of-life data. Our model included data on how cities have performed across four Numbeo indexes:

- **Safety index:** estimates citizen safety based on the level of crime in a city. The data comes from citizen perceptions, which may differ from official government statistics.

- **Healthcare index:** evaluates the quality of the healthcare system, including factors such as healthcare professionals, equipment, staff, doctors, and costs.

- **Pollution index:** reflects the overall pollution level in a city, including air and water pollution, garbage disposal, cleanliness, noise and light pollution, and green spaces.

- **Traffic index:** gauges traffic problems in a city, such as commute time, dissatisfaction with time spent in traffic, CO_2 emissions, and overall traffic system inefficiencies.

Scoring methodology

Each index had different ranges. To combine them into a comprehensive set of performance measures, we normalized the data so that each index had a range of between 0 and 1.

The city with the lowest value for a given index was scored as 0 and the city with the highest value was scored as 1; the other cities were distributed based on their relative value.

We then averaged the normalized index values to set an overall performance score for each city.

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Full list of 250 cities benchmarked

Future-ready	
Abu Dhabi	Los Angeles
Amsterdam	Lyon
Ankara	Madrid
Barcelona	Manama
Beijing	Manchester
Berlin	Melbourne
Boston	New York
Bratislava	Paris
Bucharest	Quito
Buenos Aires	Rabat
Caracas	Rosario
Chicago	Salvador
Curitiba	San Antonio
Dammam	San Francisco
Doha	Seattle
Dublin	Seoul
Edinburgh	Stockholm
Guangzhou	Taipei
Helsinki	Tehran
Houston	Tokyo
Istanbul	Toronto
Kampala	Valencia
Kuala Lumpur	Vienna
Kuwait City	Warsaw
Ljubljana	Wroclaw

Progressing					
Abha	Christchurch	Hartford	Marseille	Ottawa	Shiraz
Abidjan	Cincinnati	Hong Kong	Mecca	Perth	Sofia
Al-Ain	Coahuila	Honolulu	Memphis	Philadelphia	St Louis
Amman	Columbus	Indianapolis	Merida	Pittsburgh	Strasbourg
Aracaju	Cordoba	Izmir	Mexico City	Porto	Sunderland
Asuncion	Cork	Jacksonville	Miami	Pretoria	Susono
Atlanta	Corpus Christi	Jaipur	Milton Keynes	Puebla	Sydney
Auckland	Da Nang	Jeddah	Milwaukee	Qiddiya/Neom	Takamatsu
Bakersfield	Daegu	Jersey City	Minneapolis	Qingdao	Tallinn
Baltimore	Dallas	Johannesburg	Monterrey	Quebec	Tampa
Bangkok	Dar es Salaam	Juarez	Montevideo	Raleigh	Tangshan
Barranquilla	Denver	Kansas City	Montpellier	Riga	Tbilisi
Belo Horizonte	Detroit	Kigali	Montreal	Sacramento	Toledo
Berkeley	Dubai	Kinshasa	Mumbai	Salt Lake City	Toulouse
Bilbao	Durham	Kochi	Murcia	Saltillo	Tucson
Bologna	Edmonton	Kyiv	Nairobi	Salzburg	Tulsa
Boulder	Ekurhuleni	Las Vegas	Naples	San Bernardino	Tunis
Bridgeport	El Paso	Libreville	Nashville	San Jose, CA	Ube
Brisbane	Fukuoka	Limerick	New Orleans	Santa Clara	Utsunomiya
Bucaramanga	Galway	Lisbon	Ningbo	Santa Fe	Vancouver
Cambridge	Geelong	Louisville	Niterói	Sao Paulo	Victoria
Can Tho	Gold Coast	Lucknow	Oakland	Semarang	Vilnius
Cardiff	Guayaquil	Maebashi	Oklahoma City	Sharjah	Wellington
Casablanca	Halifax	Makassar	Orlando	Shijiazhuang	Western Sydney
Charlotte	Harare	Manchester, NH	Ostrava	Shimonoseki	Zaragoza

Beginning	
Abuja	Hobart
Accra	Kano
Addis Ababa	Liverpool
Adelaide	Luanda
Agadir	Lusaka
Algiers	Medina
Anaheim	Monrovia
Austin	Muscat
Bamako	Pachuca
Beirut	Palma de Mallorca
Blantyre	Pearland
Brighton and Hove	Port Harcourt
Cape Town	Porto Alegre
Cartagena	Quezon City
Cleveland	Recife
Cotonou	San Juan
Coventry	Sanaa
Dakar	Sheffield
Delhi	Stockton
Dhaka	Surabaya
Duitama	Tacoma, WA
Dundee	Taiyuan
Durban	Toyama
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For further information about this study, please contact:

Lou Celi, Chief Executive Officer
louceli@thoughtlabgroup.com

Daniel Miles, Chief Economist
danielmiles@thoughtlabgroup.com

Anna Szterenfeld, Editorial Director
annaszterenfeld@thoughtlabgroup.com