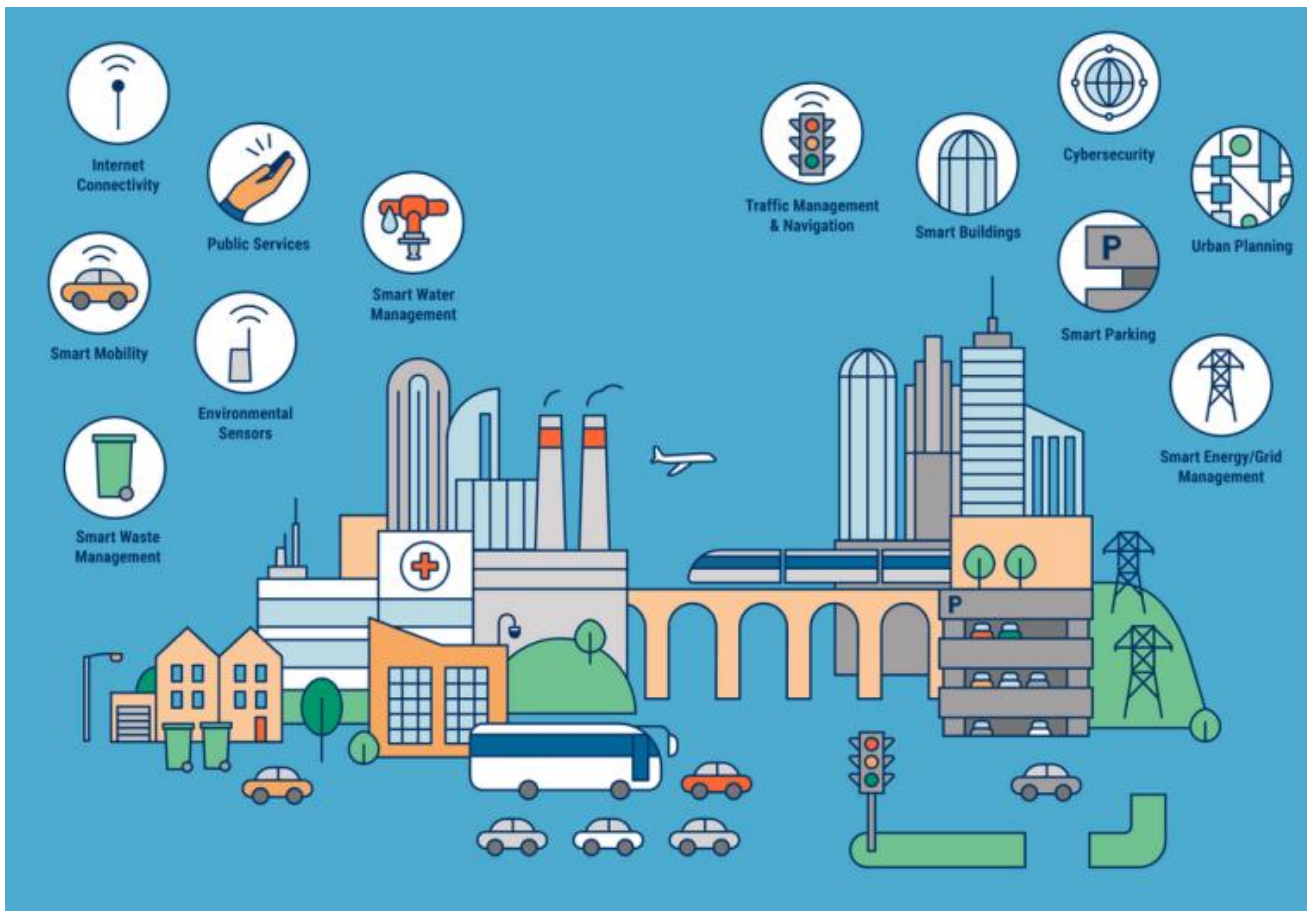




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***Smart Almaty***

*Bayan Konirbayev- Chief Digital Officer of Almaty city*



- By 2050 68% of population will live in the cities
- By 2030 the smart cities market will exceed 1,3T\$
- By 2030 440 cities will generate 50% of the world's GDP



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# Economical Center of the Region



- **2 million** inhabitants
- **3 million** inhabitants with metropolitan area
- **470,000** vehicles
- **11.5 million** Hospital visits
- **675,000** SMEs
- **288,000** schoolchildren
- **3096.8 km** of roads
- **165,000** electric lighting poles



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## 100+ startups transforming smart cities

### Transportation

#### Traffic data & analytics



#### Micromobility



#### Fleet management



#### Parking



#### Vehicle-to-everything tech



### Connectivity & cybersecurity

#### IoT



#### Cybersecurity



### Government & society

#### Public safety



#### Public health



### Sustainability

#### Environment monitoring



#### Energy management



#### Waste management



#### Water management



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**Transportation** — Startups under the transportation umbrella are developing solutions designed to reduce urban congestion and optimize the flow of people and goods.

**Connectivity & cybersecurity** — Connectivity startups deploy the wireless network infrastructure for smart cities or collect and analyze the data captured by this infrastructure.

**Sustainability** — These companies are developing technology that helps smart cities combat pollution and manage resources more efficiently.

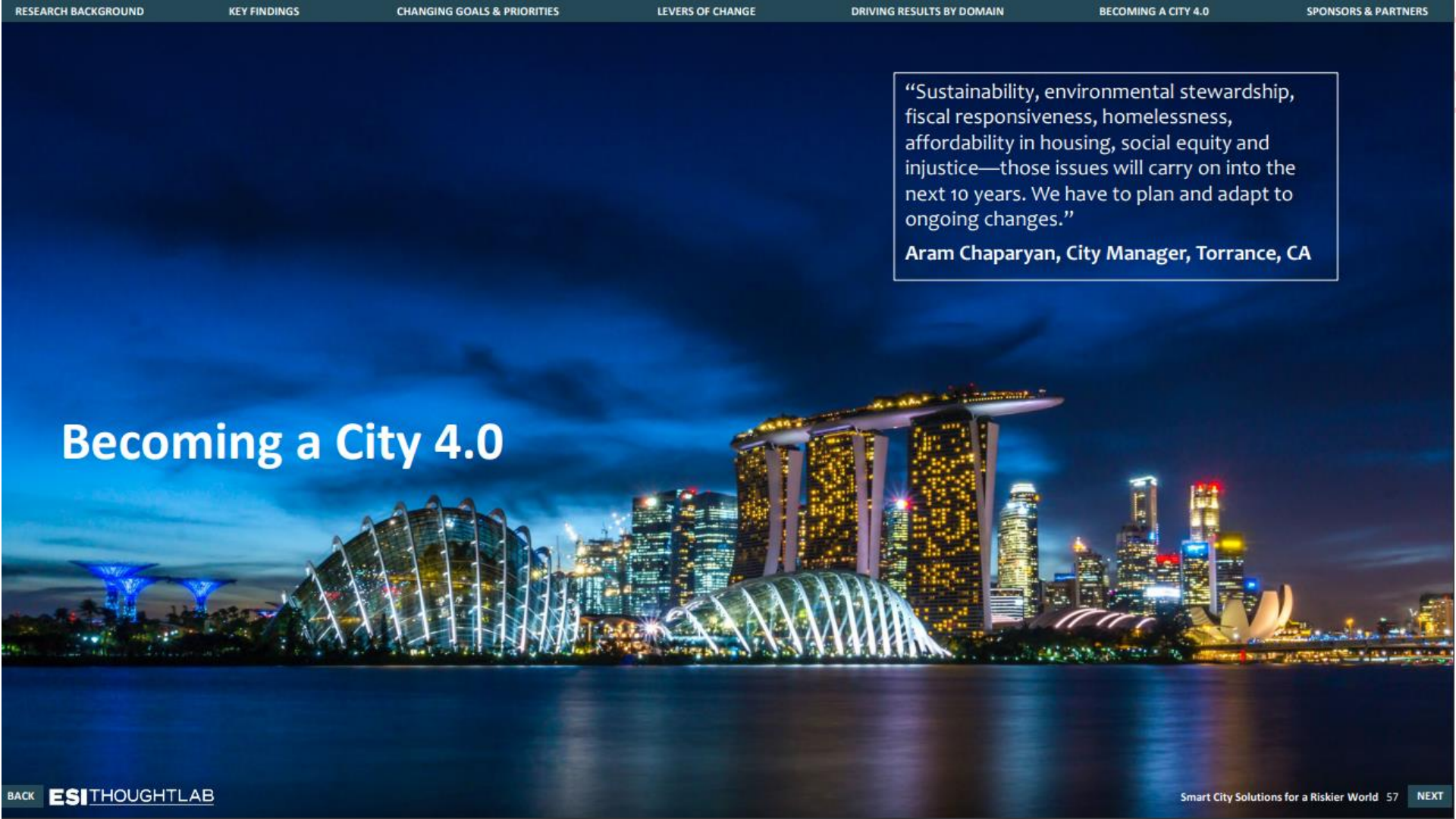
**Government & society** — Startups are also developing technology designed to promote the health and safety of a smart city's inhabitants.



“Sustainability, environmental stewardship, fiscal responsiveness, homelessness, affordability in housing, social equity and injustice—those issues will carry on into the next 10 years. We have to plan and adapt to ongoing changes.”

**Aram Chaparyan, City Manager, Torrance, CA**

# Becoming a City 4.0

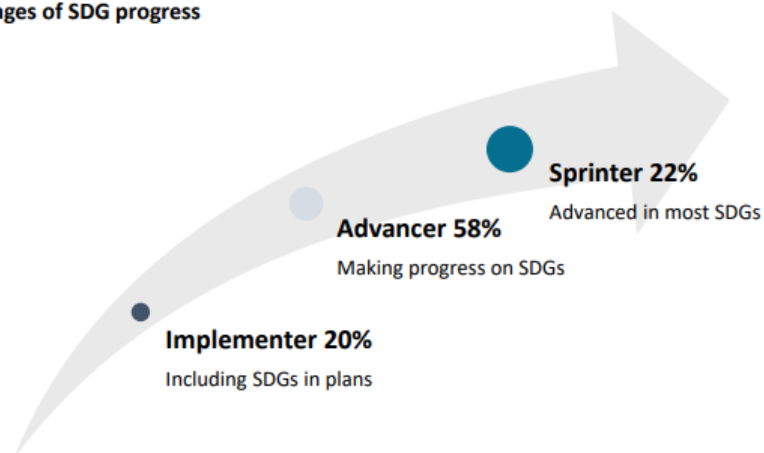


# We categorized cities into three stages of SDG progress

A prime objective of this research was to assess how smart urban solutions—such as use of emerging technologies and forging of new partnerships—can help cities achieve the SDGs. To measure the headway that cities have made in driving the SDGs, we developed an SDG progress framework.

Our framework categorizes cities into three groups: implementers, which are in an early stage of SDG adoption; advancers, which are making progress on a range of SDGs; and sprinters, which are making fast progress on most areas of sustainable development. Twenty percent of cities are classified as implementers, 58% as advancers, and 22% as sprinters.

## Three stages of SDG progress



## Our SDG progress framework

We grouped the cities into three stages of sustainable development progress: implementers, advancers, and sprinters. We classified them based on their scores across the following criteria:

### 1. The number of SDGs a city has included in its plans

### 2. The progress a city has made on each of the SDGs

### 3. The steps a city is taking to achieve the SDGs:

- Regularly monitors SDG efforts
- Assesses areas where the city lags
- Designates a department to implement SDGs
- Gathers high-level support for their SDG program
- Conducts a voluntary local review (VLR)
- Enjoys a reputation as a leader in SDG adoption

# Our cities categorized by SDG progress

Sprinter (22%)		Advancer (58%)						Implementer (20%)	
Aarhus	Mexico City	Abu Dhabi	Chengdu	Honolulu	Monterrey	Raleigh, NC	Tunis	Allentown	Kampala
Accra	Montevideo	Addis Ababa	Chennai	Istanbul	Montreal	Reykjavik	Vancouver	Bamako	Kano
Amman	<b>Moscow</b>	Adelaide	Chicago	Jakarta	Munich	Rio de Janeiro	Victoria	Benin City	Kinshasa
Athens	Mumbai	Ahmedabad	Cincinnati	Jerusalem	Nanjing	Riyadh	Warsaw	Blantyre	Kochi
Baltimore	<b>New York</b>	Almaty	Colima	Kansas City	Nashville	Rotterdam	Washington, DC	Cairo	Lagos
Barcelona	<b>Orlando</b>	Amsterdam	Columbus	Kigali	Newark	San Antonio	Wuhan	Changchun	Lahore
Berlin	Osaka	Asuncion	Dehradun	Kuala Lumpur	Ningbo	San Diego	Xiamen	Chongqing	Libreville
Birmingham	<b>Paris</b>	Atlanta	Denver	Kuwait City	Oakland	San Francisco		Cotonou	Lusaka
Bogota	<b>Philadelphia</b>	Auckland	Detroit	Liege	Oslo	San Jose		Dalian	Monrovia
Boston	Pittsburgh	Austin	Doha	Lima	Panama City	Santiago de Chile		Dar es Salaam	Pearland
Bratislava	Quebec	Bangkok	Dublin	Lisbon	Phnom Penh	Seattle		Guiyang	Pune
Buenos Aires	Sao Paulo	Beijing	Edmonton	Ljubljana	Phoenix	Seoul		Harare	Qingdao
Copenhagen	<b>Singapore</b>	Belgrade	Ekurhuleni	Lucknow	Portland	Shanghai		Hefei	San Juan
Helsinki	Stockholm	Brantford	El Paso	Ludhiana	Porto	St Petersburg		Ibadan	Tianjin
Kyiv	Suzhou	Bucharest	Fukuoka	Manama	Prague	Tbilisi		Jaipur	Toyama
London	<b>Tallinn</b>	Busan-Ulsan	Galway	Manchester	Quezon City	Toronto		Jena	Yangon
Los Angeles	Tokyo	Calgary	Hangzhou	Manila	Quito	Touba		Jiaozuo	
Madrid	<b>Vienna</b>	Canberra	Hanoi	Mariupol	Rabat	Tulsa		Jinan	

Cities in bold are also classified as Cities 4.0.

# SDG scorecard: Where cities have made the most progress

Cities have made the most headway on areas related to people and prosperity: no poverty, decent work and economic growth, quality education, and good health and well-being.

They have made the least progress on zero hunger, climate action, and reduced inequalities, the same SDGs that are least included in their plans. With more manageable populations, small cities are typically making more progress on the SDGs than large ones: 64% vs. 58%. On average, 74% of cities in advanced economies are making progress on the SDGs, compared with half of those in emerging markets. Not surprisingly, SDG sprinters are making far more headway than implementers or advancers. Cities 4.0 are the top performers, with almost nine out of 10 making considerable progress on 11 of the SDGs.

SDGs	Population*				Economic development		SDG leadership			
	All	Small	Medium	Large	Advanced	Emerging	Implementers	Advancers	Sprinters	Cities 4.0
No poverty	82%	80%	79%	91%	84%	81%	53%	88%	100%	90%
Decent work and economic growth	74%	72%	79%	66%	89%	60%	41%	80%	88%	85%
Quality education	70%	72%	70%	66%	82%	59%	38%	75%	88%	85%
Good health and well-being	70%	77%	69%	60%	90%	52%	29%	77%	81%	95%
Sustainable cities and communities	67%	74%	64%	60%	81%	55%	35%	77%	69%	70%
Industry, innovation, infrastructure	66%	75%	61%	60%	87%	48%	18%	77%	69%	95%
Life on land	65%	77%	60%	51%	87%	44%	18%	74%	75%	90%
Clean water and sanitation	63%	71%	58%	57%	82%	45%	18%	71%	88%	80%
Gender equality	61%	65%	60%	57%	77%	47%	9%	70%	81%	90%
Affordable and clean energy	57%	57%	55%	60%	63%	51%	35%	55%	81%	85%
Responsible consumption, production	56%	55%	54%	63%	61%	52%	32%	57%	69%	85%
Partnerships for the goals	56%	57%	54%	60%	67%	47%	29%	59%	69%	80%
Peace and justice strong institutions	56%	69%	49%	46%	73%	41%	24%	58%	88%	80%
Life below water	55%	49%	61%	54%	57%	53%	41%	52%	69%	85%
Zero hunger	53%	58%	58%	34%	77%	32%	6%	59%	81%	85%
Climate action	50%	37%	55%	66%	35%	64%	56%	42%	69%	65%
Reduced inequalities	47%	46%	51%	40%	63%	32%	18%	48%	63%	75%
Average	62%	64%	61%	58%	74%	51%	29%	66%	78%	84%

\* Small = 600,000 to 1m inhabitants; medium = 1m to 5m inhabitants; large = 5m to 10m inhabitants.

Q6a: Which of the SDGs are included in your city's plans and on which of them has your city made considerable progress? blue=high, gray=low



# Driving results through five levers of change

Our economists created an analytical framework to examine how 167 cities apply a variety of change drivers across urban domains to advance sustainability, economic growth, social change, and citizen well-being.

The importance of these levers of change became apparent during the pandemic. To cope with the health crisis, cities relied on partnerships, digital technology, data analytics, and new funding models to get things done. Proactive governance and leadership helped cities keep citizens safe and businesses intact.

## Five levers of change

### 1. Partnerships and ecosystems

How cities work with citizens, businesses, universities, NGOs, and others to achieve the SDGs.

### 2. Finance and business models

Financing and business models that cities use to pay for needed investments.

### 3. Digital technology

The use of digital technology to drive operational, social, environmental, and economic improvements.



### 4. Data management and analytics

How cities manage data and analytics to support their smart, sustainable practices.

### 5. Governance, leadership, and vision

How cities govern and manage their SDG programs and engage with stakeholders.












# Technology placing the right debts

Cities are adopting a wide array of smart technologies, especially cloud, mobile, IoT, biometrics, and AI.

Cities 4.0 are moving even faster to leverage advanced technologies: 100% have made hefty investments in cloud and IoT, and slightly fewer are spending significantly on mobile, biometrics, blockchain, AI, and RPA.

Over the next three years, cities plan to increase investments significantly in digital twins, 3-D printing (off an extremely small base), data warehouses, augmented and virtual reality, blockchain, digital dashboards, and drones. The share of cities making large investments will jump the most for digital twins, from 11% today to 31% in three years—a rise of almost 300%. For Cities 4.0, the increase in digital twins will be even greater, from 20% today to 70% in three years.

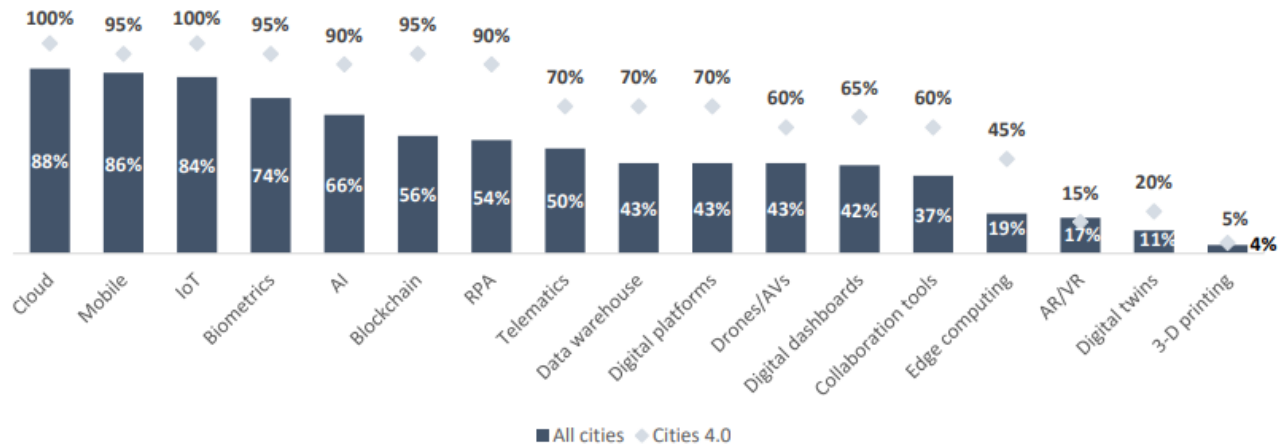
## % increase in cities making large investments over next 3 years

 282% Digital twins	 200% 3-D printing
 149% Data warehouse/ lakes	 147% AR/VR
 127% Blockchain	 126% Digital dashboards
 126% Drones, AVs	 124% Telematics/ geospatial
 121% AI	 119% Online collaborative tools

“Smart technology, data, and analytics will need to be translated into new sustainable economic and environmental policies. AI and analytics-based solutions providing real-time and predictive information will be key alongside having better data and multiple data sources.”

William Bayer, Vice President, Smart Platform, NTT

## % of cities making large investments today



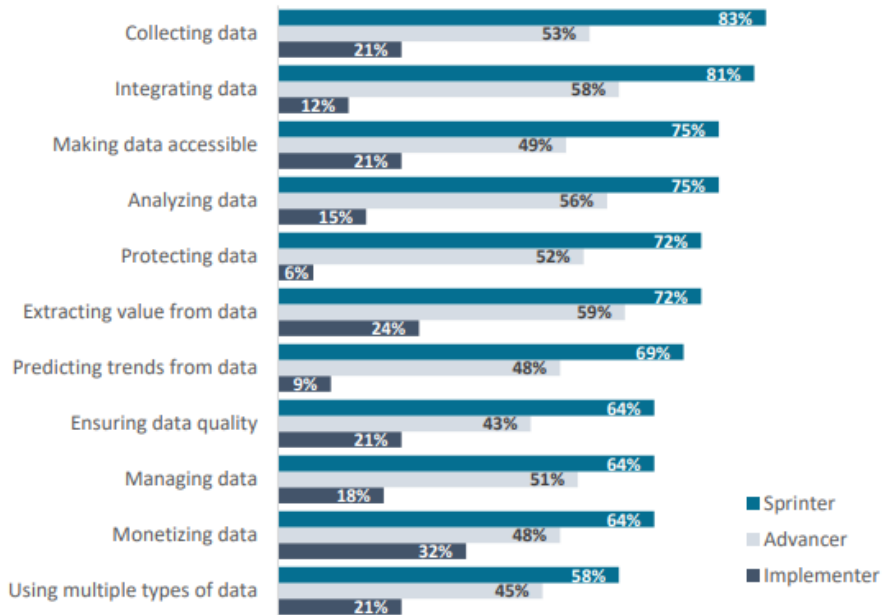


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# Technology placing the right debts

## Maturity stages in data analytics

(% maturing or leading)



## % having a positive view

	All	Advanced markets
Sale of personal data to raise funds	29%	35%
Sale of impersonal data to raise funds	22%	32%

# Progressing across eight urban domains

Our analysis examines how 167 cities around the world advance their social, environmental, and economic agenda across eight urban domains.

To understand which levers of change work best, our economists correlated individual initiatives with returns on investment. This section details the levers of change that cities are applying across each domain and their impact on urban performance.

## The eight urban domains



### 1. Economy, trade, and industry

Attracting business, generating growth and industrial development.



### 2. Government and education

Managing a city and its services and workers.



### 3. Living and health

Ensuring well-being and equity of citizens.



### 4. Public safety and security

Ensuring citizen safety and preventing crime.



### 5. Mobility and transportation

Enabling people and goods to move faster and safer.



### 6. Environment and sustainability

Improving sustainability and environmental quality.



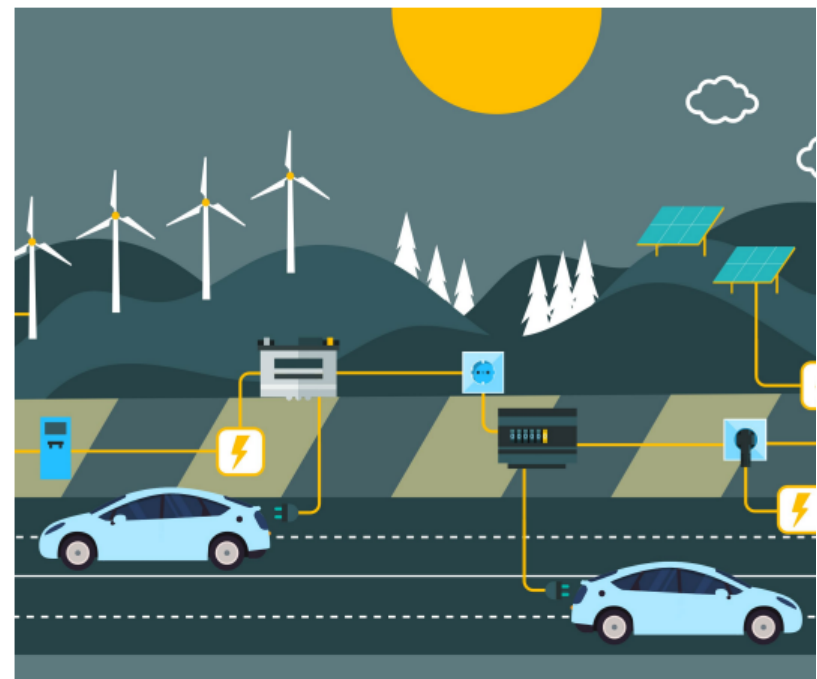
### 7. Energy, water, and other utilities

Distributing energy, water, and other resources responsibly.



### 8. Digital infrastructure and networks

Connecting people, devices, and assets across a city.





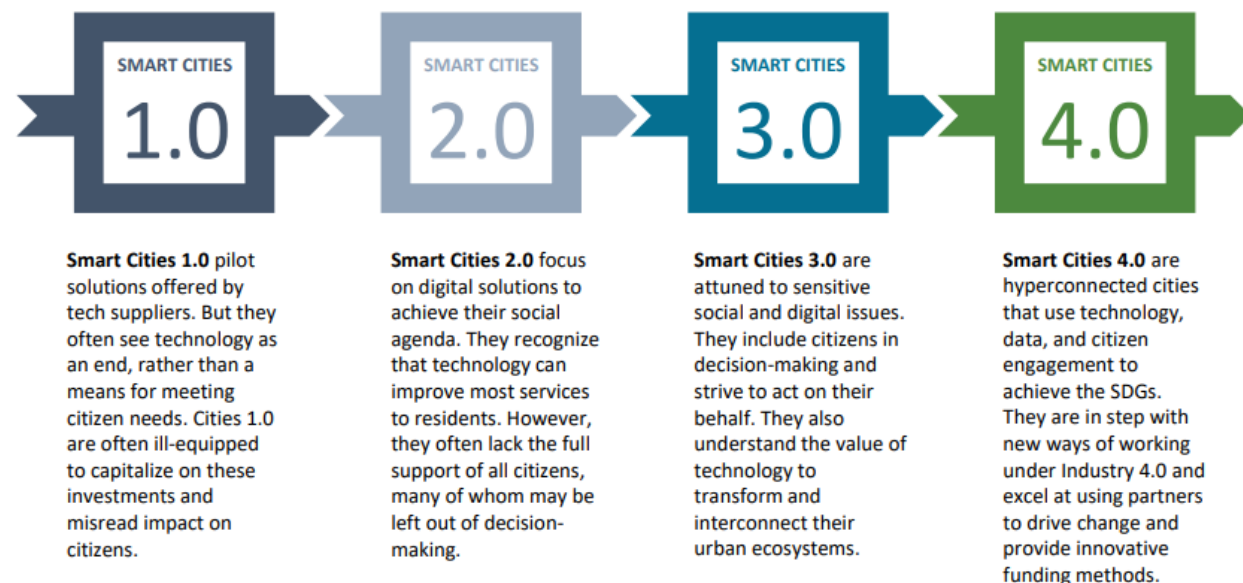
# The evolution of smart cities to Cities 4.0

**Urban centers will need to become Smart Cities 4.0 to prosper and grow after the pandemic.**

Even before the health emergency, cities were evolving into smarter cities, learning from mistakes made early on in their digital journey.

The pandemic has exposed the need for cities to go beyond what some have categorized as Cities 3.0 to become Cities 4.0 in order to achieve their social, environmental, and economic goals. With the pandemic permanently changing citizen needs and behaviors, and businesses gearing up for the Fourth Industrial Revolution, tomorrow's cities will need to be hyperconnected, fully sustainable, citizen-centric, and partnership focused. They will also need to be skilled in the new way of doing business.

## Smart city stages of development



Cities 4.0 include Aarhus, Athens, Baltimore, Barcelona, Berlin, Birmingham, Boston, Copenhagen, Helsinki, London, Los Angeles, Madrid, Moscow, New York, Orlando, Paris, Philadelphia, Singapore, Tallin, and Vienna.

Source: <https://www.fastcompany.com/3047795/the-3-generations-of-smart-cities>