

## 2016 Smart Cities Survey Summary Report of Survey Results

### Introduction

In 2016, the International City/County Management Association (ICMA) conducted a survey in partnership with the Smart Cities Council to learn more about the priorities and activities of U.S. local governments related to smart-city technologies. The Smart Cities Council defines smart cities as communities that use information and communication technology to enhance livability, workability, and sustainability. The results of this survey provide insight into the current use of smart city technologies in the U.S., as well as key motivators and barriers to the adoption of these solutions.

### Methodology

The survey was sent on paper via postal mail to the chief administrative officers of 3,423 U.S. local governments with populations of 25,000 or greater. An online submission option was also made available to survey recipients. Responses were received from 493 of the governments surveyed, yielding a response rate of 14.4%. Cities were overrepresented among respondents while counties were underrepresented. Further, jurisdictions in the western region of the U.S. were overrepresented, while jurisdictions from the northeastern region were underrepresented. The following report reflects trends among the unweighted survey responses, and should only be considered to be representative of the responding governments. Weighting should be applied to achieve representation of the broader survey population.

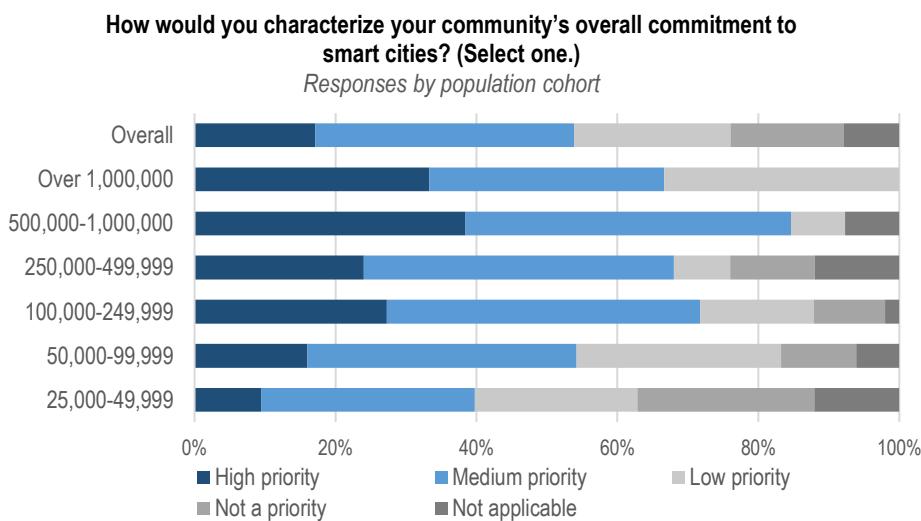
	Jurisdictions surveyed	Jurisdictions responding	Response rate
<b>Overall</b>	<b>3,423</b>	<b>493</b>	<b>14.4%</b>
<b>Type</b>			
Municipalities	1,893	358	18.9%
Counties	1,530	135	8.8%
<b>Population cohort</b>			
Over 1,000,000	42	9	21.4%
500,000 - 1,000,000	98	14	14.3%
250,000 - 499,999	168	27	16.1%
100,000 - 249,999	532	101	19.0%
50,000 - 99,999	939	136	14.5%
25,000 - 49,999	1,644	206	12.5%
<b>Geographic division</b>			
New England	183	19	10.4%
Mid-Atlantic	391	28	7.2%
East North-Central	782	95	12.1%
West North-Central	266	37	13.9%
South Atlantic	541	110	20.3%
East South-Central	253	20	7.9%
West South-Central	354	45	12.7%
Mountain	220	42	19.1%
Pacific Coast	433	97	22.4%
<b>Geographic region</b>			
Northeast	574	47	8.2%
North-Central	1,048	132	12.6%
South	1,148	175	15.2%
West	653	139	21.3%

## Survey Highlights

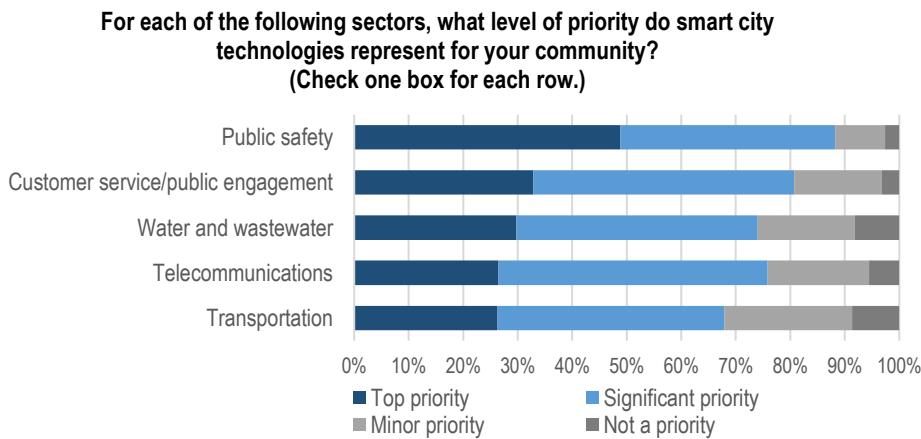
The information collected through this survey provides insight into the use of smart city technologies in the U.S. Key topics explored include community priorities for smart city technologies, the current status of smart-city initiatives, motivators and barriers for the implementation of smart city technologies, and common sources of useful information and resources. Highlights from the data collected are outlined below, and responses to each question are summarized in the appendix.

### Smart City Priorities

Overall, survey respondents most frequently identified smart-city activities as a medium priority (36.8%). Larger communities generally reported higher priority for smart-city activities than smaller communities did.



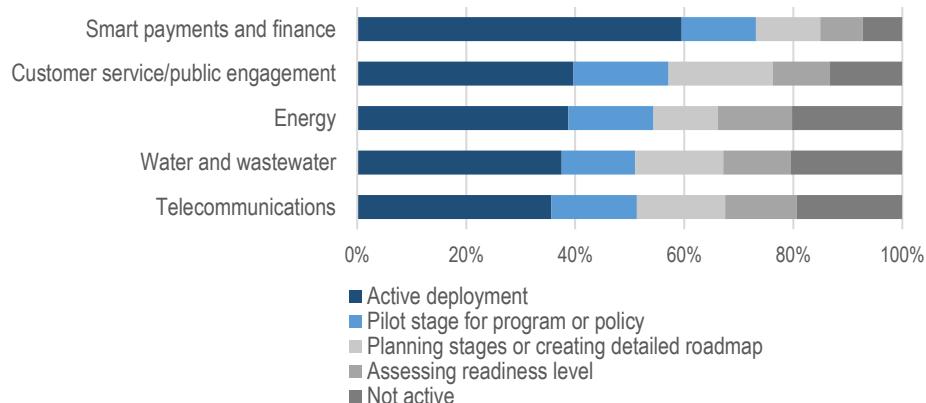
Respondents most frequently identified smart city technologies as a priority in the public safety sector, with almost half of respondents (48.9%) identifying these initiatives as a top priority in this area. Customer service/public engagement (32.9%), water and wastewater (29.7%), telecommunications (26.5%), and transportation (26.3%) were also among the top five sectors in which smart-city technologies were identified as a top priority by respondents.



## Smart City Activities

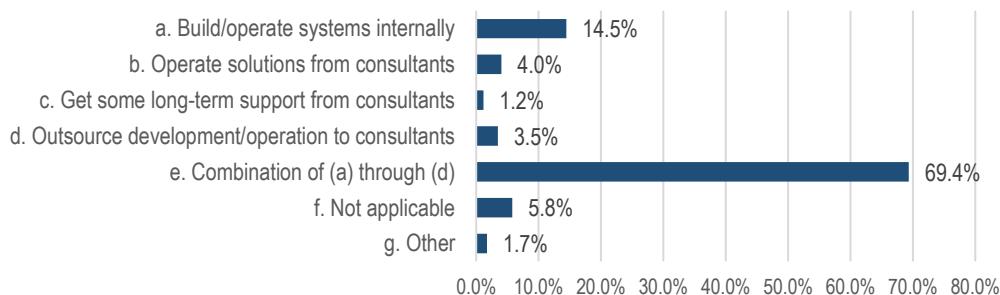
Smart payments and finance was the technology area in which responding communities are most active, with 59.5% of respondents identifying initiatives in this area as being in active deployment. Also included in the top five technology areas with initiatives in active deployment were customer service/public engagement (39.7%), energy (38.7%), water and wastewater (37.5%), and telecommunications (35.7%).

### What is your community's current level of engagement with smart city technologies? (Check one box for each row.)



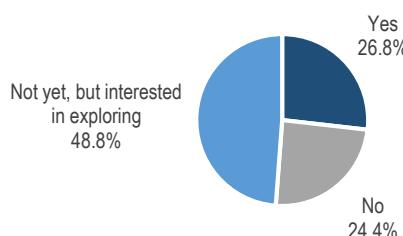
The majority of responding jurisdictions reported that smart-city solutions would be implemented in their communities through a combination of systems or support from external consultants and systems operated and developed internally. Respondents were more than three times more likely to build and operate systems internally than to operate solutions from consultants.

### How will your community primarily implement smart city technologies? (Select one.)



Approximately one-fourth of responding communities (26.8%) reported working with other communities to aggregate demand and increase purchasing power for smart city technologies. About half of responding communities (48.8%) indicated that they had not done this but would be interested in exploring it.

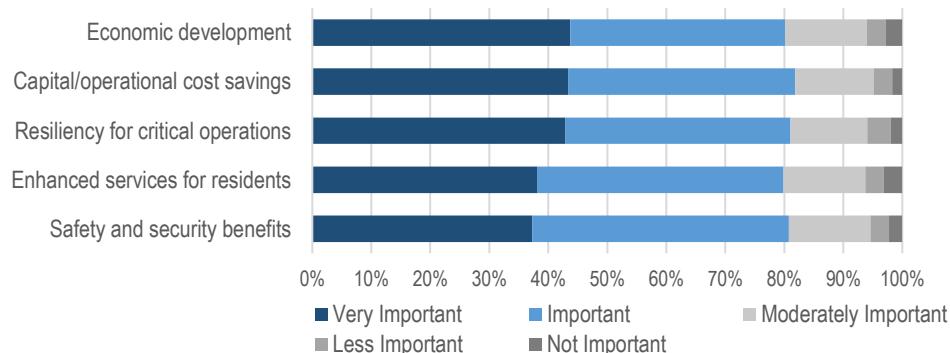
### Does your community ever work together with other cities or counties to aggregate demand and increase purchasing power for smart city technology?



### Smart City Motivators and Barriers

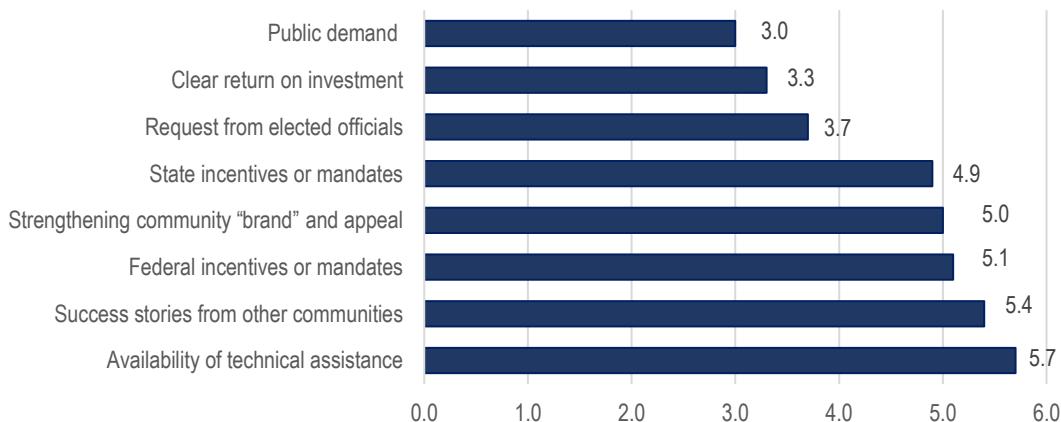
The five benefits most frequently identified by responding communities as being very important in motivating their governments to implement or expand smart city initiatives included economic development (43.8%), capital and/or operational cost savings (43.3%), resiliency for critical operations (42.9%), enhanced services for residents (38.1%), and safety and security benefits (37.3%).

**How important are each of the following benefits in motivating your local government to implement or expand the use of smart city technologies?**  
(Check one box for each row.)

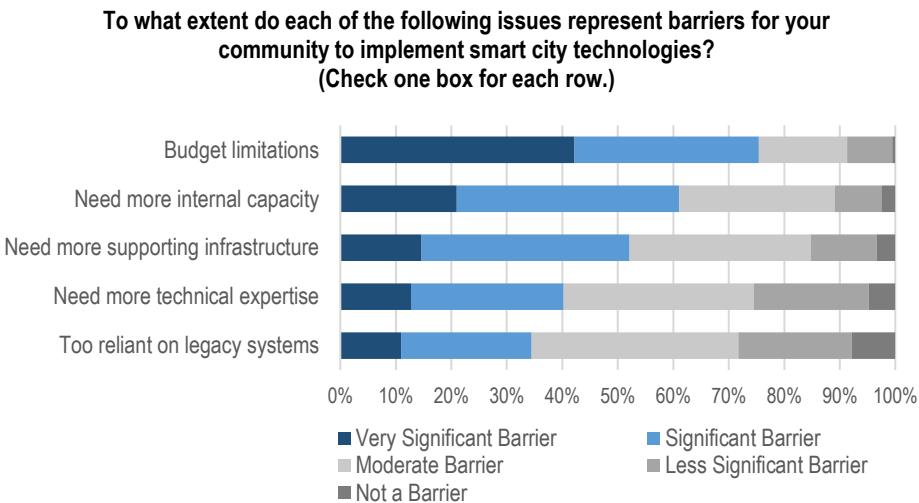


On average, public demand was ranked the most important factor in motivating/facilitating responding communities to strengthen smart city programs, while availability of technical assistance was ranked the least important factor.

**Please rank the following factors from the most important to the least important in motivating/facilitating your community to strengthen smart city programs.**  
Average Rankings (Most important = 1, Least important = 8.)



Responding jurisdictions most frequently identified budget limitations as a very significant barrier to implementing or expanding smart city programs (42.2%), followed by the need for more internal capacity (21.0%) and the need for more supporting infrastructure (14.6%).



## Summary

In summary, among survey respondents, smart city activities are prioritized most highly in the public safety sector, but active deployment of programs are most commonly reported in the area of smart payments and finance. Respondents are more likely to build and operate systems internally than to outsource solutions to consultants, but most respondents reported that they would take a combined approach, relying on both internal capacity and external support. Based on survey results, economic growth and cost savings are the most important benefits motivating smart city activities, and budget limitations and limitations on internal capacity are the most important barriers.

## Appendix: Full Survey Results

### 1. How would you characterize your community's overall commitment to smart cities? (Select one.)

N=468

a. High priority	17.1%	d. Not a priority	16.0%
b. Medium priority	36.8%	e. Not applicable	7.9%
c. Low priority	22.2%		

2. The following questions are focused on your community's activities or plans related to the acquisition and deployment of smart city technology (information and communications technology—ICT). If your community is either engaged or interested in the use of ICT, please continue to the next question. If your community is NOT at all engaged or interested in the use of ICT, please go to the last page of the survey.

N=480

a. Continue survey (engaged or interested in the use of ICT)	74.2%
b. Skip to the end (NOT at all engaged or interested in the use of ICT)	25.8%

### 3. How important are each of the following benefits in motivating your local government to implement or expand the use of smart city technologies? (Check one box for each row.)

Topic	N	Very Important	Important	Moderately Important	Less Important	Not Important
a. Sustainability benefits	354	30.2%	37.3%	18.9%	10.2%	3.4%
b. Resiliency for critical operations	354	42.9%	38.1%	13.0%	4.0%	2.0%
c. Economic development	352	43.8%	36.4%	13.9%	3.1%	2.8%
d. Administrative efficiencies	353	32.9%	44.5%	17.3%	3.4%	2.0%
e. Capital and/or operational cost savings	353	43.3%	38.5%	13.3%	3.1%	1.7%
f. Enhanced services for residents (health, social services, education, etc.)	352	38.1%	41.8%	13.9%	3.1%	3.1%
g. Safety and security benefits	354	37.3%	43.5%	13.8%	3.1%	2.3%
h. Other	36	13.9%	36.1%	11.1%	5.6%	33.3%

### 4. If you chose "Other" above, please describe:

See full dataset for open-ended responses.

### 5. To what extent do each of the following issues represent barriers for your community to implement smart city technologies? (Check one box for each row.)

Issue	N	Very Significant Barrier	Significant Barrier	Moderate Barrier	Less Significant Barrier	Not a Barrier
a. Need better understanding of how to get started	356	7.3%	22.2%	39.9%	19.7%	11.0%
b. Need more internal capacity	357	21.0%	40.1%	28.0%	8.4%	2.5%
c. Need more supportive policies	355	5.6%	19.4%	37.2%	29.6%	8.2%
d. Complexity of procurement	353	6.2%	17.3%	39.7%	29.7%	7.1%
e. Budget limitations	358	42.2%	33.2%	15.9%	8.1%	0.6%
f. Need more supporting infrastructure	355	14.6%	37.5%	32.7%	11.8%	3.4%
g. Need more technical expertise	353	12.7%	27.5%	34.3%	20.7%	4.8%
h. Too reliant on legacy systems	357	10.9%	23.5%	37.3%	20.4%	7.8%
i. Difficulty of systems integration / interoperability	356	7.0%	27.8%	44.4%	18.0%	2.8%
j. Difficulty of coordinating across departments	358	5.3%	15.6%	34.6%	36.3%	8.1%
k. Need more long-term vision or plan	358	10.1%	25.4%	35.5%	21.8%	7.3%
l. Need more project management capabilities	354	7.3%	27.4%	33.6%	26.8%	4.8%
m. Need to gain leadership support	357	7.3%	15.7%	29.4%	29.4%	18.2%
n. Need to gain community support	358	7.3%	17.9%	33.5%	29.6%	11.7%

**6. Please rank the following sources of information and resources on smart city initiatives from the most important to the least important. (Most important = 1, Least important = 9.)**

N = 312

**Average Rankings:**

a. Books and detailed guides	6.6	f. City/county associations	4.7
b. Events/conferences	4.2	g. Social media (i.e., Facebook, Twitter, etc.)	7.1
c. Newsletters/publications	5.3	h. Consultants	5.5
d. Websites	4.2	i. Workshops/training	4.3
e. Peer-to-peer information exchange (i.e., city staff to city staff, within and/or across cities)	3.1		

**7. What is your community's current level of engagement with smart city technologies? (Check one box for each row.)**

Technology	N	Active deployment	Pilot stage for program or policy	Planning stages or creating detailed roadmap	Assessing readiness level	Not active
a. Built environment (building management systems, streetlights with WiFi, or other services, etc.)	346	28.3%	11.6%	14.5%	17.3%	28.3%
b. Energy (smart meters, renewable energy, etc.)	346	38.7%	15.6%	11.8%	13.6%	20.2%
c. Telecommunications (public WiFi, interoperable systems, etc.)	345	35.7%	15.7%	16.2%	13.0%	19.4%
d. Transportation (mobility apps supporting multiple travel modes, electric vehicle charging stations, etc.)	347	24.8%	10.4%	19.6%	14.4%	30.8%
e. Water and wastewater (smart meters, automated leak detection, etc.)	341	37.5%	13.5%	16.1%	12.3%	20.5%
f. Waste management (sensors for waste containers, etc.)	340	8.2%	5.9%	13.5%	14.7%	57.6%
g. Health, education, and human services (remote learning, sensor networks for elderly, etc.)	343	5.8%	5.0%	8.2%	18.1%	63.0%
h. Public safety (police body cameras, streetlights with gunshot detection, etc.)	344	34.6%	19.2%	19.2%	11.0%	16.0%
i. Smart payments and finance (web-based payment for services, etc.)	346	59.5%	13.6%	11.8%	7.8%	7.2%
j. Food (sensor-driven irrigation, indoor farming, etc.)	339	5.6%	2.9%	3.8%	10.3%	77.3%
k. Civic engagement (streamlined mobile interface for city services, etc.)	345	39.7%	17.4%	19.1%	10.4%	13.3%
l. Open data (within and across city responsibility areas)	346	30.1%	10.4%	23.1%	17.1%	19.4%
m. Overarching smart city activities across multiple sectors (linking transportation and public safety, etc.)	343	7.6%	8.2%	21.0%	23.3%	39.9%
n. Other	51	9.8%	2.0%	9.8%	5.9%	72.5%

**8. If you chose "Other" above, please describe:**

See full dataset for open-ended responses.

**9. How will your community primarily implement smart city technologies? (Select one.)**

**N = 346**

- |                                                                           |       |
|---------------------------------------------------------------------------|-------|
| a. Build/operate systems internally                                       | 14.5% |
| b. Operate solutions from consultants                                     | 4.0%  |
| c. Get some long-term support from consultants                            | 1.2%  |
| d. Outsource solution development and operation activities to consultants | 3.5%  |
| e. Combination of (a) through (d)                                         | 69.4% |
| f. Not applicable                                                         | 5.8%  |
| g. Other (please describe): _____                                         | 1.7%  |

**10. Please rank the following factors from the most important to the least important in motivating/facilitating your community to strengthen smart city programs. (Most important = 1, Least important = 8.)**

**N = 310**

**Average Rankings:**

- |                                         |     |                                               |     |
|-----------------------------------------|-----|-----------------------------------------------|-----|
| a. Federal incentives or mandates       | 5.1 | e. Public demand                              | 3.0 |
| b. State incentives or mandates         | 4.9 | f. Success stories from other communities     | 5.4 |
| c. Availability of technical assistance | 5.7 | g. Request from elected officials             | 3.7 |
| d. Clear return on investment           | 3.3 | h. Strengthening community "brand" and appeal | 5.0 |

**11. What collaborative smart city efforts does your community participate in? (Select all applicable.)**

**N = 342**

- |                                                                                                       |       |
|-------------------------------------------------------------------------------------------------------|-------|
| a. County level efforts                                                                               | 44.2% |
| b. State/regional system level efforts                                                                | 34.5% |
| c. Organized by regional authorities such as districts                                                | 24.0% |
| d. Peer-to-peer information exchange<br>(city staff to city staff, within and/or across cities, etc.) | 70.8% |
| e. None                                                                                               | 14.3% |
| f. Other (Please describe): _____                                                                     | 5.6%  |

**12. Does your community ever work together with other cities or counties to aggregate demand and increase purchasing power for smart city technology?**

**N = 336**

- |     |       |    |       |                                      |       |
|-----|-------|----|-------|--------------------------------------|-------|
| Yes | 26.8% | No | 24.4% | Not yet, but interested in exploring | 48.8% |
|-----|-------|----|-------|--------------------------------------|-------|

**13. What group within the community is most directly involved in each stage of identifying, sourcing, and deploying smart city technologies? (Please select one box for each row.)**

Action	N	Individual requesting department (transportation, water, energy, etc.)	IT dept.	Purch dept.	Fin. dept.	Plan. dept.	Chief executive (mayor/manager's office)	IT, innovation or similar task force or committee	External consultants/stakeholders	Varies widely from project to project
a. Introducing idea for a new smart city service within the city	329	32.8%	11.6 %	0.0%	0.0%	1.2%	10.9%	7.0%	0.6%	35.9%
b. Creating detailed specifications for technology in RFI, RFP, etc.	327	21.7%	30.6 %	10.4%	1.5%	1.2%	1.8%	8.0%	4.0%	20.8%
c. Doing the technical evaluation of solicitation responses	327	20.8%	30.6 %	5.2%	0.6%	0.6%	1.5%	11.6%	2.8%	26.3%
d. Making the final purchasing decision	327	18.3%	3.7%	3.7%	2.8%	0.6%	46.2%	6.4%	0.3%	18.0%
e. Monitoring implementation of smart city technology	328	22.9%	28.7 %	0.6%	0.3%	1.2%	8.2%	6.7%	0.6%	30.8%

**14. What techniques does your community use to attract qualified consultants to bid on smart city projects? (Please select all that are commonly used.)**

**N = 342**

- |                                     |              |                                               |              |
|-------------------------------------|--------------|-----------------------------------------------|--------------|
| a. Meetings with consultants        | <b>50.3%</b> | e. Maintain list of pre-qualified consultants | <b>23.4%</b> |
| b. Attend industry conferences      | <b>40.9%</b> | f. Not applicable                             | <b>12.0%</b> |
| c. Formal RFIs and RFQs             | <b>79.8%</b> | g. Other (Please describe): _____             | <b>1.8%</b>  |
| d. Review vendor lists or databases | <b>20.8%</b> |                                               |              |

**15. Which methods are commonly used for undertaking smart city procurements in your community?**

(Select all that apply.)

**N = 332**

- |                                                       |              |                                             |              |
|-------------------------------------------------------|--------------|---------------------------------------------|--------------|
| a. Provide detailed specifications                    | <b>72.6%</b> | d. Collaborative public-private partnership | <b>45.8%</b> |
| b. Use performance-based solutions                    | <b>44.0%</b> | e. Other (Please describe) _____            | <b>4.5%</b>  |
| c. Request innovative responses to accelerate process | <b>31.3%</b> |                                             |              |

16. For each of the following sectors, what level of priority do smart city technologies represent for your community? (Check one box for each row.)

Sector	N	Top priority	Significant priority	Minor priority	Not a priority
a. Built environment	338	13.9%	44.4%	33.7%	8.0%
b. Energy	346	21.4%	45.1%	24.3%	9.2%
c. Telecommunications	344	26.5%	49.4%	18.6%	5.5%
d. Transportation	346	26.3%	41.6%	23.4%	8.7%
e. Water and wastewater	343	29.7%	44.3%	17.8%	8.2%
f. Waste management	347	9.8%	38.3%	33.4%	18.4%
g. Health, education, and human services	342	11.1%	33.6%	33.9%	21.3%
h. Public safety	348	48.9%	39.4%	9.2%	2.6%
i. Smart payments and finance	347	20.5%	53.6%	23.3%	2.6%
j. Food	339	1.5%	14.7%	32.4%	51.3%
k. Customer service/public engagement	347	32.9%	47.8%	16.1%	3.2%

17. What is your community's average annual capital budget for the software, hardware, and consulting components of smart city technologies (do not include associated physical infrastructure)?

N = 352

- |                                      |       |                                      |       |
|--------------------------------------|-------|--------------------------------------|-------|
| a. Under \$1 million                 | 48.3% | e. From \$20 million to \$50 million | 0.3%  |
| b. From \$1 million to \$5 million   | 24.1% | f. Over \$50 million                 | 0.9%  |
| c. From \$5 million to \$10 million  | 2.6%  | g. Unknown                           | 23.0% |
| d. From \$10 million to \$20 million | 0.9%  |                                      |       |

18. Does your local government typically allocate a certain amount of funding for smart city technologies (sensors, monitoring, and prediction software, etc.) when planning for physical infrastructure projects (transportation, water, energy, communications technology, etc.)?

N = 355

- |     |       |    |       |
|-----|-------|----|-------|
| Yes | 31.5% | No | 68.5% |
|-----|-------|----|-------|

18a. If yes, on average what percentage of the project budget is typically allocated for smart city technologies?

N = 107

- |              |       |                                   |       |
|--------------|-------|-----------------------------------|-------|
| a. 0% to 1%  | 15.0% | d. Over 10%                       | 3.7%  |
| b. 1% to 5%  | 47.7% | e. Other (Please describe): _____ | 14.0% |
| c. 5% to 10% | 19.6% |                                   |       |

19. What mechanisms does your community use to finance smart city initiatives? (Please select all that are commonly used.)

N = 350

- |                          |       |                                                  |       |
|--------------------------|-------|--------------------------------------------------|-------|
| a. Department budget(s)  | 87.1% | e. Public-private partnership                    | 28.9% |
| b. State support         | 37.7% | f. Franchise or shared revenue model with vendor | 12.3% |
| c. Federal support       | 34.3% | g. Not applicable                                | 8.9%  |
| d. Philanthropic support | 6.3%  | h. Other (Please describe): _____                | 2.0%  |

20. Are you aware that your community can generate revenue from the data it collects or has access to?

N= 353

- |     |       |    |       |
|-----|-------|----|-------|
| Yes | 41.9% | No | 58.1% |
|-----|-------|----|-------|

21. Please share additional comments related to smart city activities in your community. Feel free to mention an activity about which you are proud, a challenge you are working to overcome, or any other thoughts.

See full dataset for open-ended responses.