INNOVATIONS FOR SUCCESSFUL SOCIETIES

LEARNING TO BE SMART: USING DATA AND TECHNOLOGY TO IMPROVE SERVICES IN KANSAS CITY, MISSOURI, 2009–2019

SYNOPSIS

When Troy Schulte took over as interim city manager of Kansas City, Missouri, in 2009, the local economy was struggling and the government faced hard choices about how to use scarce resources. With a slashed budget and a diminished workforce, Schulte had to figure out how to deliver city services without reducing quality. Together with a small team of employees, he began to create a culture of data-driven decision making in municipal offices, to invest selectively in technology, and to give nonprofit organizations and firms an opportunity to develop their own, innovative solutions to city problems by making more information available to them. Schulte found a kindred spirit in Mayor Sly James, who negotiated a public–private partnership with a view to developing what Kansas City's chief innovation officer called "the smartest 54 blocks in the country" along the city's new streetcar corridor. As initial efforts came to a close and a new mayor entered office, Schulte and other officials stepped back to assess what they had learned. The new, data-driven culture had yielded positive improvements, whereas the technology-based smart-city initiative had had a more limited impact—at least in the shorter term. The experience generated important lessons about the scale of the benefits that technology could generate in midsize cities and in what kind of time frame.

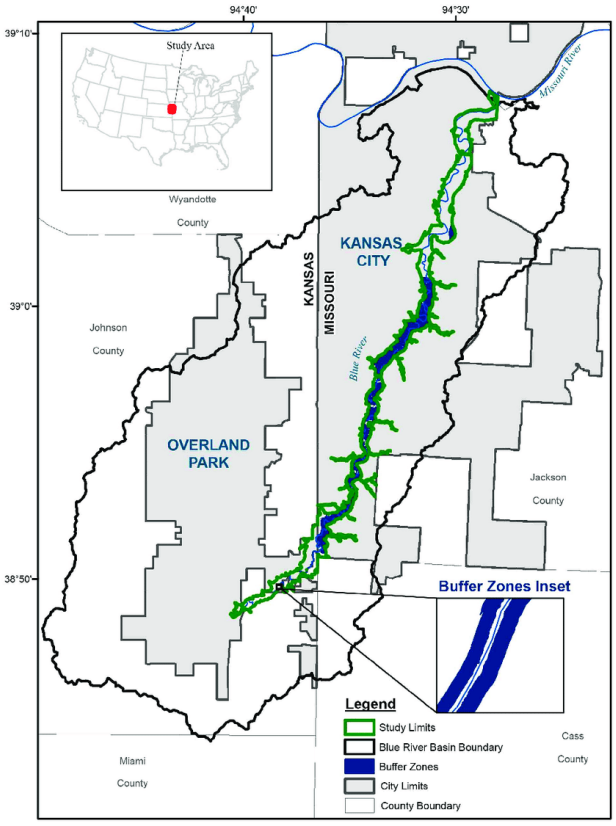
Tyler McBrien drafted this case study based on interviews conducted in Kansas City, Missouri, in January 2020. Case published March 2020.

INTRODUCTION

In early 2009, the city manager of Kansas City, Missouri, declared the Midwestern municipality "at a fiscal crossroads." In his proposed budget for the coming fiscal year, the official outlined plans to lay off city workers, freeze salaries, cut employee benefits, raise taxes and fees, and reduce or eliminate important programs. To make matters worse, no one knew how it would all happen. "The specific implementation details of this budget are not fully resolved," the city manager, who lost his job later the same year, wrote in a letter attached to the budget proposal.[1]

The city's problems were not unique. Local governments across the United States were wrestling with fiscal challenges, as private businesses foundered and public coffers strained under the pressure of the 2008 global financial crisis and the nationwide Great Recession it generated. With a population of just over 450,000, Kansas City's losses were especially pronounced, as overall government revenue shrank 9% from 2008 to 2010 despite the

Figure 1. Kansas City Metropolitan Area



Source: Trina Weilert, Wei Ji, Opeyemi Zubair, "Assessing the Impact of Streamside Ordinance Protection…" ISPRS *International Journal of Geo-Information*, July 2018. Accessed at https://www.researchgate.net/publication/326575668_Assessing_the_Impacts_of_Streamside_Ordinance_Protection_on_the_Spatial_and_Temporal_Variability_in_Urban_Riparian_Vegetation/citation/download

infusion of federal funds through the American Recovery and Reinvestment Act, a stimulus package. An underfunded pension plan, costly debt payments, and a stumbling downtown redevelopment effort all added to the local government's financial woes.[2]

Just as revenues and rainy-day funds were drying up, demands for services and other types of spending—especially those involving public welfare—were on the increase.[3] From January 2008 to December 2009, the unemployment rate in the Kansas City metropolitan area, which included Kansas City, Missouri, and adjacent Kansas City, Kansas, soared to 9.2% from 5.2%, with some neighborhoods especially hard hit in this racially and socioeconomically diverse community.[4] (Figure 1)

After the mayor abruptly fired the city manager in November 2009, staff morale was low, budget shortfalls loomed, and the council sought a new strategy. It was in that tumultuous environment that Troy Schulte assumed his role as interim manager on City Hall's 29th floor.[5]

THE CHALLENGE

In Kansas City's council–manager system of government, Schulte's new job put him in charge of municipal operations, and the mayor, who also served on the 13-member city council, developed policy and engaged with the community. The manager reported to the council, which oversaw the budget (text box 1).

Schulte brought to the position a long career in city government. He had been a part-time analyst at a rural economic development agency while studying economics in graduate school. Then, at age 24, he became city administrator of Marengo, Iowa, a town with a population of about 2,500 and a total area of two square miles. His experience there gave him a crash course in service delivery because he had extensive and diverse responsibilities. In addition to his city administrator duties, Schulte moonlighted as a wastewater plant operator, a zoning official, and a volunteer firefighter. "It gave me an appreciation of all facets of local government," Schulte said in a radio interview.[6]

In 1998, Schulte joined Kansas City's Office of Management and Budget as an entry-level budget analyst; he became the office's director in 2003 and while serving in that position developed a reputation for data-driven management and decision making. Kate Bender, who later became Schulte's first full-time analyst in the performance management office, described him as "a wonky guy, a data guy, an information guy."

Schulte had to figure out how to maintain quality of services with diminished resources. "The council just doing across-the-board stuff was not going to cut it," Schulte said about the crisis he had stepped into. "We had to be strategic about how we reduced expenditures. We had to

Box 1: Kansas City's Council–Manager Form of Government

Once run by the T.J. Pendergast political machine, Kansas City adopted a council–manager system in 1925, during the Progressive Era, to try to improve governance by following the model of many other medium-size cities at the time. Twelve elected officials form the council, which serves as the city's legislative body, with the mayor as the 13th member. An appointed city manager oversees the functions and operations of government, and the mayor develops policy and engages with the community.

Council–manager forms of government have pros and cons. In theory, the manager can focus on running the city without the distractions an elected mayor faces. And managers don't lose their jobs with each election cycle, so they can take a longer view. Council–manager systems may be more efficient as a result—as well as better able to carry out big projects—but they can lose touch with what citizens want, and they may still be subject to political U-turns if the council is divided.

be strategic about how we made investments, whether it was in new technology or as catalytic infrastructure investments. So with those ground rules, we said we have to just start."

Talk of so-called smart cities that used data and technology to make better decisions and improve city services was gaining a lot of traction nationally, but it was unclear whether technology-enabled data collection and processes would really help meet Kansas City's needs—and do so in ways that were practical, inclusive, and affordable.

Introducing a new approach to the city workplace, especially one involving digital technology, was likely to pose implementation challenges. One of the main issues was lack of a data-driven culture across all levels of city government—from the top down. Kansas City had lots of information and data. That wasn't the problem. The problem was that the data was not being used effectively.

"We had an organization that had historically not relied on data for what I would call good decision making," Schulte recalled. "We would collect performance measures. We would put them in the budget document. Then they would be promptly ignored."

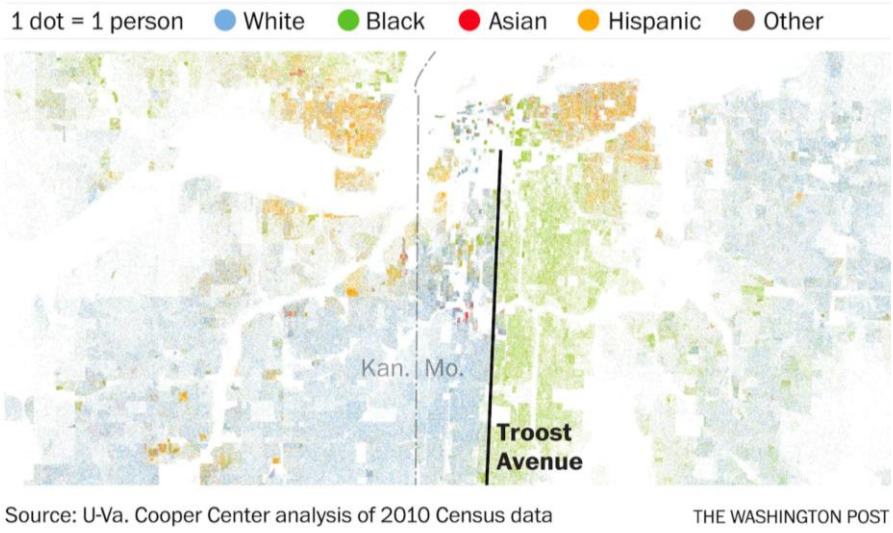
Bender, who was working in the city manager's office when Schulte arrived in 2009, remembered: "One of my tasks was to put together a monthly report from the directors to the city manager, [but] I had a really strong sense that no one was actually reading it. It was a little demoralizing."

Second, although Schulte already had ideas about the changes needed to correct what he viewed as inefficient processes, some of the new, data-based responses he envisioned were likely to elicit resistance from city staff members. They would alter the skills some city jobs required and could make other posts redundant. Schulte had to persuade the city's nearly 5,500 employees to embrace the changes.[7]

A third challenge involved mobilizing capacity to make sound decisions about investments in technology to collect data about, say, community safety and traffic jams. For instance, installing fiber-optic cables across all or even part of the 319-square-mile city would benefit both the government and the citizenry but would require a huge up-front investment. Like many other local governments across the United States, Kansas City had to assess the value—both short- and long-term—of such improvements for the city and its populace and balance that value against the cost.

Any decision to procure technology systems posed special challenges. No real marketplace existed at the time for the tools used by smart cities in the form of software programs called apps, which use data to perform all kinds of functions. The products were often created by individuals or small firms with limited track

Figure 2. Kansas City, Missouri Troost Avenue Divide 2010



https://www.washingtonpost.com/news/wonk/wp/2015/07/16/how-railroads-highways-and-other-man-made-lines-racially-divide-americas-cities/

records, and it was difficult for the city to evaluate the capacities and compatibilities of the software and hardware that vendors offered, because staff members often lacked specialized technical knowledge.

Ashley Hand, Kansas City's first chief innovation officer, remembered: "There was a lot of frustration with systems that weren't quite meeting the needs. And every department was kind of on its own trying to figure out technology procurement."

Complicating the procurement challenge was the fast-changing nature of technology itself. Investing taxpayers' money in highly touted computerized functions could otherwise backfire if the technology became outdated or obsolete in short order. Given the potential misalignment of timelines and priorities between the government and private technology companies, frustrations often went in both directions. Ryan Weber, president and CEO of the KC Tech Council, a nonprofit organization representing the interests of the city's technology industry, said the tech sector felt hamstrung by the red tape and bureaucracy in government. "If you want to do business with the city, you've got to meet certain criteria, fill out a number of forms, and be aware that it can be an extremely long sales cycle," Weber said. "And they can be extremely difficult customers."

A final challenge was to ensure that new systems responded to the needs of Kansas City's underserved communities, which were generally less well connected to the information infrastructure than wealthier neighborhoods were. Kansas City suffered from deep inequalities visible in the housing stock on either side of Troost Avenue, which ran through the city center. (Figure 2) According to one academic study cited by NBC News, average household income one block east of Troost, in predominantly African-American neighborhoods, was $20,000 less than in the mostly white neighborhoods west of the avenue. The same study, by a professor at the University of Missouri–Kansas City, found that average life expectancy was as much as 15 years lower in ZIP codes east of Troost than on the west side.[8] Advocates for the residents of those areas worried that investments in data and technology, unless applied with care, could perpetuate such inequalities, especially given that people with internet access and smartphones stood to gain the most from smart-city investments.

FRAMING A RESPONSE

Schulte knew that many of Kansas City's services and procedures had to change if the municipality was to get through the financial crisis and prosper in the future. An important element of his task was to make a convincing case—to low-level city employees as well as those who managed the government's spending—for

reallocating resources and changing processes and procedures that had been in place for years. To justify any significant technology spending during this time of austerity, he had to demonstrate to the city council that such investments would produce a return on investment with regard to service improvements, savings, or both.

A first step was to identify what wasn't working effectively—especially from the viewpoint of the city's populace, which knew the city's needs better than anyone. Doing so required Schulte to create a better system for analyzing the information the city already had available. As one of his first actions as interim city manager, he called on Bender to start looking at information received by the city's call center and collected by the departments, so that Bender could identify the services city residents cared about most.

Few people knew this subject better than Bender, Schulte's first data analyst, who had been a special projects analyst in the city manager's office for Schulte's predecessor. Bender had entered Kansas City government in 2007 on a fellowship that placed recent graduates of public administration master's programs in several departments. She had worked in the newly formed 311 call-center office,[9] which managed a nonemergency phone line that city residents could call to make requests or report problems ranging from infrastructure damage to water quality. She said the experience got her "up close and personal with a really key set of data that was also a new set of data for the city."

Bender's assignment marked the first step in the creation of a distinct performance management program, which later became an official part of city government. "I needed some data points other than the number of full-time employees and the size of the budget to make decisions," Schulte said. "So I was looking around for any other data that would suggest there might be a different way of doing things." Schulte said he did not initially think of this strategy as a "smart city" approach but, rather, as a continuation of his focus on data during the years he worked in the budget office.

GETTING DOWN TO WORK

Establishing the performance management program was the first order of business. Then Schulte and Bender looked for ways to spread a new, data-driven culture beyond the city manager's office and into the departments. To do that, they worked closely with department heads to help them analyze their performance data, ultimately launching a monthly televised meeting with members of the city council, the mayor, and department heads to learn from the data. Those initial data efforts paved the way for investments in technology.

Building a culture of data at City Hall

Schulte and Bender set themselves to the task of promoting new ways to compile information into types of data that could be analyzed to illuminate important city needs. As an initial step, Bender sought outcome-focused measures of performance rather than just inputs and outputs. She zeroed in on a citizen satisfaction survey that the city auditor's office had overseen since 2000.

With an annual representative sample of 4,500 respondents, Kansas City's survey captured the views of a larger share of the population than other, similar surveys did. The city was able to keep the cost down for a survey with such a high number of respondents because of its long-standing relationship with the survey contractor: Kansas-based ETC Institute. In 2015, the survey budget was $60,000.[10]

The city developed questions in partnership with the ETC Institute, which selected the sample population, sent out the surveys, and delivered an analysis report to the city. Though the city considered it an annual survey, the sample was divided into four quarters, and the survey was sent to segments throughout the year in order to adjust for seasonal variations in measures of satisfaction. The ETC Institute would mail out

cards inviting citizens to fill out the survey either online or on a hard copy to be returned in a postage-paid envelope. The 118-question survey measured resident satisfaction with the overall quality of city services, police services, fire services, emergency medical services, streets and infrastructure, public transportation, the 311 call center, government communication to citizens, personal and mental health services, schools, and housing.

The city auditor, who reported to the mayor and the city council but remained independent from the city manager, conveyed the survey reports from the contractor to municipal departments. Staff members respected the survey findings, but there often was little substantive response, Bender said. "When they released the report, it was like, 'Here are a bunch of things that are wrong; go fix them,'" she said. "There wasn't much follow-through, and there was a bit of a chill on it, because when you hear from the auditor's office, 'Everything is bad; go fix it,' nobody felt great about wanting to do more with that data." So, to bolster the likelihood of taking action on priorities identified by the survey, the city auditor approved Schulte's request that the city manager's office take over some of the survey analysis as well as dissemination of the results and management of the response.

After compiling and analyzing data from the 311 call center and the citizen satisfaction survey, Bender and Schulte identified shortfalls in performance with respect to street maintenance, water line maintenance, water billing and customer service, code enforcement, and animal control. They then convened weekly meetings with department directors and managers from the relevant areas, developed goals and objectives for each, and tied them to outputs and anticipated outcomes. For example, to achieve the city's overall goal of improving the efficiency of water line maintenance, Schulte and Bender designated the objective as the establishment of reliable time frames for maintenance activities. To track the department's effectiveness in meeting the objective, they applied measures of citizen satisfaction based on water repair requests and output indicators such as the amount of time needed to complete repairs and respond to citizen requests for status. At each meeting, Bender's performance management office would analyze the most-recent data, create agendas, and prepare charts, graphs, and other materials for discussion (exhibit 1).

Often, the gaps required only a low-tech or no-tech solution. In one example, Schulte noticed that 311 consistently received a high volume of calls related to animals struck by vehicles on city streets. "We didn't have a program for addressing roadkill," Schulte said. It was a low-cost operation that did not fit neatly under the umbrella of a bigger service such as firefighting or policing. "So we hired two people and bought them a truck—a program costing about $100,000. And you saw an immediate increase in level of citizen satisfaction."

Schulte and Bender quickly developed a spirit of collaboration in their work with department heads, asking questions like, "How are you collecting data and using that data to make decisions?" and, What data do you need to be better managers? during weekly meetings with the department heads and some line staff. The two also used the meetings as an opportunity to coach department heads and staff on how to use and analyze data.

The compilation and analysis of data helped shed light on city problems and revealed priorities across government. An early example of the relationship occurred with the Parks and Recreation Department. Reviewing data from the satisfaction survey, Schulte noticed that tree removal scored quite low. He then cross-referenced that data with 311 call logs, which suggested that the average wait time for tree removal was a full year—hardly what a citizen should expect from a responsive city government. In a meeting with the head of the department, Schulte learned that the policy regarding trees was to prioritize trimming during the warmer months and removal during the fall or winter. The data enabled Schulte not only to identify the

problem—"The residents want that dead tree out of there"—but also to persuade the department head that the problem was both significant and fairly easy to fix. The department head reworked the department's processes, and the average wait time declined from one year to three days. The new procedure produced a significant increase in citizen satisfaction on the issue.

By getting a data-driven performance management system up and running first, Schulte could better justify investments in tech-enabled solutions to improve the services that data analysis pointed to.

Promoting data-driven decision making

In March 2011, a year and a half after Schulte took the job of interim city manager, Kansas City elected a new mayor. Born and raised in Kansas City's predominantly African-American east side, Sylvester "Sly" James had served in the US Marines before earning a law degree from the University of Minnesota. Elected on a platform focused on education, employment, efficiency, and enforcement,[11] he had a self-professed affinity for fact-based decision making and a desire to see what data said about his city. James looked to Schulte and his team for guidance on what needed to be done and how.

"We admitted that we didn't know what we didn't know," said Joni Wickham, James's chief of staff and close adviser. "I don't think we went in with any preconceived notions of what we needed to focus on. We wanted to look at the data and see the story that it told." Shortly after his victory, James and the city council unanimously appointed Schulte to the permanent job of city manager.[12]

After James became mayor, strengthening the culture of evidence-based decision making took on renewed importance. Inspired by the success of performance management programs in cities like Baltimore and New York, James wanted to use data to hold city officials accountable and use technology to improve city services. Schulte recalled that James "brought that kind of external focus that I think really helped us amp up to use the data not only to show the improvements we were making internally but then to celebrate them externally."

Building on the progress made during the internal weekly performance management meetings, Bender proposed the establishment of a program called KCStat that would help make much of the data her office collected publicly available. She envisioned KCStat as a component of the performance management program that "allows for the data to be brought into the light to provide a channel for review, feedback, and oversight from the mayor and council."

An advocate of technology and data innovation in government, James embraced the idea of KCStat. The mayor "had actually run on the platform of starting a stat program for the city," Bender remembered. "And he'd really done his homework." Schulte approved Bender's proposal, and James planned to participate significantly, even though KC Stat would be an initiative of the performance management program in the city manager's office (text box 2).

Because of James's engagement and interest, the first several KCStat meetings focused primarily on topics of interest to the mayor—like water services. James also wanted to maintain the outward focus. "He was insistent that [the meetings] be televised and open to the public," Julie Steenson, a budget office staff member who joined Bender in the performance management program, said. "He really felt like that was good government transparency but could also be used as a way to say, 'Hey, guys, you gotta get on TV and talk about this.'" James would tweet details from the meetings for better citizen engagement, using the bully pulpit of his position to encourage and promote departments that used data. Schulte and his staff wanted KCStat meetings to be supportive and collaborative for department heads and employees rather than punitive or surprising. "I would meet with department staff prior to every KCStat meeting, or I would send them the slide deck in advance, just so that staff

Box 2: KCStat Proposal

To build out her vision for KCStat, Kate Bender, at the city's performance management office, drew on the research of Robert Behn, a lecturer at Harvard University's John F. Kennedy School of Government. Behn's 2008 article "The Seven Big Errors of PerformanceStat" alerted Bender to common missteps, and she addressed each of them.

- "No Clear Purpose": KCStat focused on selected improvement areas—each of them with clearly defined goals, objectives, and indicators.
- "No One Has Specific Responsibilities": The Performance Management Program rested on an established partnership between the city manager, the performance management program, improvement area departments, and support departments. KCStat further defined the role of the mayor/council and citizens.
- "Meetings Are Held Irregularly, Infrequently, or Randomly": The frequency of KCStat (monthly) struck a balance between sustaining an ongoing conversation and keeping workloads manageable. Meetings took place on Tuesdays, the day of the week least likely to conflict with existing mayor, council, city manager, and departmental obligations, thereby ensuring regular attendance.
- "No One Person Authorized to Run the Meetings": The mayor and city manager or their delegates chaired these meetings.
- "No Dedicated Analytic Staff": The Performance Management Program staff of two people, with significant part-time assistance from four others, was responsible for the analysis required for KCStat.
- "No Follow-Up": KCStat is designed to be an ongoing conversation from one meeting to the next that updates the same sets of data and responds to ongoing objectives and goals.
- "No Balance Between the Brutal and the Bland": The mayor and the city manager had announced that one of the KCStat goals was an honest, open discussion with department directors on identifying and solving problems.

Source: Robert D. Behn, "The Seven Big Errors of PerformanceStat," Rappaport Institute/Taubman Center Policy Briefs, February 2008; https://www.hks.harvard.edu/sites/default/files/centers/rappaport/files/performancestat.pdf.

was aware of what would be coming and maybe what questions the mayor would be asking," Steenson said.

Schulte used KCStat meetings to identify opportunities for service improvement. Attended by James, Schulte, and Bender or Steenson as well as the relevant assistant city manager, department director, and department staff, KCStat meetings either focused on process improvements or celebrated successes within departments. "You could identify gaps where you were missing data and then either figure out a technological solution or figure out a process solution," Schulte said. "And we call that smart governance, but it's really just using the data."

Introducing Open Data KC

In late 2012, as the data-driven culture was spreading across Kansas City's government and gaining a foothold in the public consciousness, James noticed that other cities had launched open-data portals, whereby citizens could access useful city datasets all in one centralized place online. One of the aims was to improve local government transparency, but the other purpose was to enable citizens and entrepreneurs to view

the information and develop their own apps to help others put the information to use.

At a mayoral conference, open-data portal vendor Socrata approached James about the potential of open data and the firm's product. James brought the idea to Bender and Steenson, who determined that Seattle-based Socrata was one of the only vendors in the market selling such software and that the company had hired former officials of other municipal governments for its sales and outreach teams. "We ended up going with Socrata because the contract amount was reasonable, and we knew we couldn't build it in-house because the IT staff was already overburdened with other projects," Steenson remembered. One Socrata staff member who helped persuade Kansas City to purchase the software had helped launch Baltimore's CitiStat program, which served as inspiration for KCStat.

While Socrata worked with the city to get the portal up and running, the company organized community-of-practice workshops with peer cities that had similar interest in open data. Steenson and Bender attended customer summits and webinars with counterparts from Louisville, New Orleans, Denver, and other cities. "We started seeing that this is more than just our little office here in Kansas City," Steenson said. "This is a movement across the country."

In January 2013, the city launched Open Data KC, a dedicated website that Kansas City residents could access to find information the city made publicly available, including anything released during KCStat meetings. First, the city published the citywide line-item budget, adding 311 call center data shortly thereafter. As the portal grew to include datasets on audits, census data, health statistics, housing information, land-use details, and other topics, Eric Roche, another management fellow from Bender's program, joined the office as a full-time open-data analyst. He later became the city's chief data officer.

After the portal launched, Steenson and Roche observed something unexpected among users. "One of the things we noticed was that the heaviest users of our open data were our own employees, because so much of our data in the past had been locked in enterprise systems or required logging on," Steenson said. Transparency enabled departments to take the initiative and plan their own work.

The portal served the city in other unexpected ways as well. After the city manager's office determined that the removal of structurally dangerous buildings ranked as a high priority in the citizen satisfaction survey, Kansas City sold $10 million of bonds to pay for a demolition program. During press coverage about the bond issue, journalists relied on the open-data portal for information and graphics such as maps and charts. "That was the first time I'd actually seen local media send out links to our open-data portal or embed city data in their materials," Roche said. "We went from expecting 50 or 60 clicks to getting thousands."

But even as the number of clicks, or visits, rose, residents were slow to put the information the portal made accessible to new uses—a problem other cities also were experiencing at the time. There were some exceptions. For example, in a 2015 presentation, Roche highlighted a food truck owner who planned where to park his truck based on a map Socrata had created based on pedestrian data.[13] There was no sudden surge of questions, suggestions, or new applications, however, and in an effort to find out why, Roche spoke with several residents to identify the impediments they encountered in using the system. He quickly realized that the portal lacked a human element. At a meeting of the local Code for America chapter, a group of volunteer computer coders who work to support governments, Roche proposed the idea of an automated chatbot whereby users could get answers to their questions about the open-data portal 24 hours a day. The volunteers made the idea a reality, and the chatbot, which would deliver predetermined answers to users' questions via Facebook's messenger app, became available on Open Data KC's Facebook page.

The innovation helped boost usage in unexpected ways. "I was shocked to see people at

one o'clock in the morning asking this chatbot questions about why our fiscal year starts in May," Roche said.

Improving tech management: The chief innovation officer

As a heightened appreciation of data and technology spread through the city manager's office and other departments, Schulte and James looked for better ways to manage the tech and innovation work in City Hall. To get things done in a municipality required the kind of heft that came with some degree of centralization of responsibility in a single person. "We wanted to make sure that that individual could walk into any room and have the authority from both the mayor and the city manager to get things done and change processes," Wickham said.

Looking again to other cities for inspiration, James and Wickham, his chief of staff, noticed that San Francisco and Philadelphia had appointed chief innovation officers. At that time, the idea of a mayoral appointee dedicated to innovation and change management was novel but ascendant. In an article from March 2012 entitled "The Dawn of the Municipal Chief Innovation Officer," one CityLab writer explained, "The birth of the municipal chief innovation officer job is a response to these two trends: to fundamental changes in technology that are revolutionizing citizen engagement, and to a cultural movement that is turning the data-dense inner workings of city halls into public challenges that are actually kind of a kick to solve."[14]

James appointed Hand as Kansas City's first chief innovation officer in January 2013. The job description set forth three responsibilities: to improve internal processes, to solicit citizen input on technology, and to encourage innovation across all city departments. The position coexisted with the post of chief information officer, whose job was to implement and manage all information technology systems in city operations.[15]

Hand brought a nontraditional background to the position, having studied political science as an undergraduate at McGill University and architecture as a graduate student at the Pratt Institute. A licensed architect, she was already involved in the Kansas City community in several capacities, including holding a James-appointed position on the board of the Planned Industrial Expansion Authority.

Compared with similar positions in other cities, Kansas City's newly created office came with few resources and little direction. When she started in February 2013, Hand had to figure out how she would fulfill her mission. "I had a very large portfolio and a very small portfolio at the same time, and I had no staff and no budget," she recalled.

Hand's only explicit assignment from James involved oversight of a newly formed mayor's challenge cabinet, an advisory board of young professionals formed to make recommendations on city policy and governance. Hand asked the group to help refine the city's open-data policy, which led to a new city ordinance that set standards for the new Open Data KC portal.[16]

Free to launch her own initiatives beyond the cabinet, Hand took the opportunity to work across departments and learn about the innovative efforts already taking place. She quickly established an open-door policy to find early adopters and people within departments interested in technology and innovation. "This city had already been doing quite a bit of work around data-driven performance management," Hand said, referring to Bender and Steenson's performance management program. "So when I joined, it was really about doing an assessment, listening, and trying to understand what was working in City Hall, what wasn't, and where there were opportunities to break down silos."

To conduct that assessment, Hand formed an innovation team with senior managers, middle managers, and lower-level staff from all 14 city departments. As the only person in City Hall who reported to both the mayor and the city manager, Hand used her office's unique position to launch an open dialogue across departments.

With the support of pro bono consultants, Hand and the innovation team conducted a

yearlong digital inventory to take stock of the innovative efforts already taking place and to lay out the city's future vision for technology. In February 2015, the team completed the project, called the KC Digital Roadmap.[17] The roadmap established five strategic areas, each with a set of corresponding goals: digital inclusion, open government, citizen engagement, industry, and smart city.

Keeping an eye to tomorrow: Futureproofing

Hand, Schulte, and James looked for opportunities to put the KC Digital Roadmap into action—especially when it came to deploying smart-city infrastructure like free public Wi-Fi and sensors that generate real-time data to improve services. They soon decided to focus on the 2.2-mile downtown streetcar project, which had been under construction since May 2014. "We were having initial scoping conversations to try to understand if and how infrastructure could work around the streetcar line, because it was a highly visible project in Kansas City," Hand said.

Smart-city technology like sensors, cameras, and Wi-Fi kiosks required modern infrastructure like high-speed fiber internet. Investing in the new technologies and related infrastructure improvements posed a high financial hurdle. But the streetcar project offered an opportunity to align the smart-city plans with infrastructure changes and to cut potential costs in the process. "When we designed the pilot, it was this fortunate moment in time," Hand said. "The streetcar construction was under way. There were tons of disruption to all of the infrastructure downtown."

Initially, Hand and Schulte worked together closely, given the city manager's deep knowledge of the citywide budget and the streetcar budget. In one conversation, Hand learned that the city had removed a line item from the streetcar budget that called for laying empty conduit along the entire line, which would allow for any future cables or wires to run underground. The city had eliminated the installation of the conduit because the final project included no plans to lay fiber. "Fortunately, when we discovered that had happened," Hand recalled, "we went back and put that conduit back into the project to at least enable the possibility of negotiation around a partnership for implementation of smart-city technology, including all the fiber and Wi-Fi and also any sensors."

Robert Bennett, Hand's successor as chief innovation officer, described Hand's decisive move as crucial. "Ashley was a genius," he said. "While the hole was in the ground, the one piece of infrastructure she absolutely got done was conduit. Empty, beautiful, three-inch conduit."

Weber of the KC Tech Council agreed that installation of the conduit had been a giant step toward making the city smarter. "There was strong leadership from the city and also private industry to do something special alongside the development of the streetcar line, which was seeing a lot of momentum already," he said. "If we were going to be digging in the streets, we might as well be upgrading conduit so we can fit new fiber and really take advantage of some of the technologies that existed."

The conduit installation was an example of so-called futureproofing—a commitment to planning ahead for the use of tech-based systems that might not be installed immediately—and was critical to Schulte's open-ended approach to making Kansas City a smarter city. "As we rebuild the infrastructure, let's put in multiple components at a very small incremental price," Schulte said. "That gives us future adaptability and future flexibility."

Negotiating a public–private partnership

With the streetcar construction under way and the future tech compatibility secured, Hand sought to partner with a private company to deploy and finance technology-based infrastructure. The city had a positive view of public–private partnerships—based largely on the success of the downtown Sprint Center arena, which had opened in 2007 and was named for Sprint Corp., based in nearby Overland Park.

Around the same time in late 2014, a local consulting and investment firm, Think Big

Partners, approached the city with the possibility of partnering with California-based technology conglomerate Cisco Systems and other private entities to develop a public–private partnership. Herb Sih, who had been a military helicopter pilot and venture capitalist before forming Think Big Partners, had been working with Cisco on a different venture when executives from the company approached him about selling smart-city products to Kansas City. "We said we really don't do that," Sih said. "But then they started talking about their technology—about the theoretical impact it could have. We then thought about it and said, if this is true—or if even half of what you say is true, we're going to go down that road. But before we introduce anything, we have to make sure the city needs it and it's going to be valuable." After conducting a pro bono needs assessment, Sih arranged a meeting with Cisco and the Kansas City government.

At the time, larger tech companies and start-ups alike had begun developing smart-city technologies ranging from sensors to data dashboards, and they were eager to establish proof of concept. "The companies that have developed these tools and products needed a laboratory to actually deploy them in the real world," said Weber. "Most smart-city technology is not going to see the light of day because it hasn't been tested well enough."

At City Hall, Hand said, she struggled at first to decide how to approach the conversations with Cisco and Think Big Partners. "It was evident that nobody knew how to negotiate this," she said. "I reached out to a lot of other cities, trying to find some best practices on partnering with a tech company to do a smart-city implementation at such scale. And it was hard to find anybody in the United States. You could find it overseas, but it's very different in terms of the political and civic constructs."

In the negotiations, Hand said, she encountered legal limitations. For instance, she said, Cisco wanted to share revenue from advertising on digital kiosks at streetcar and bus stations. But Missouri state laws prohibited municipal governments from revenue-sharing agreements with the private sector.

In another instance, the city negotiators nearly signed away more rights than they had to. "I woke up in the middle of the night because I realized that somewhere in that data agreement, which the city attorney's office had reviewed on several occasions, Cisco was being given access to our data in perpetuity—beyond the term of the five-year pilot," Hand remembered. "And that's

Box 3: Components of the Smart+Connected Communities Partnership

- An intelligent Wi-Fi network that automatically selects the best connections for users (constructed, managed, and owned by Sprint)
- An enterprise mobility services platform that enhances the resident and visitor experience over a mobile app
- A living-lab development data portal managed by Think Big Partners
- Sensity Systems smart lighting and video that adjusts light levels when pedestrians move through an area, that identifies blockages on the streetcar line, that spots traffic jams, and so on
- CityPost interactive digital kiosks and mobile citizen engagement
- Planned future collaborations with Black & Veatch for smart-water innovative solutions
- Identification of technologies for next-generation police cruisers

Source: Accessed at: https://newsroom.cisco.com/press-release-content?articleId=1647580 and https://www.kcmo.gov/programs-initiatives/emerging-technology-initiative-smart-city/emerging-technologies-history

the type of language that nobody had negotiated before and was probably typical boilerplate legalese for Cisco."

In June 2015, Cisco, Sprint, and Kansas City signed an agreement to build smart-city technology along the 2.2-mile streetcar corridor. The first phase of the project called for connecting 54 blocks along the corridor with free Wi-Fi, comprehensive kiosks for services, and a data analytics platform (text box 3).

Hand said, however, that she became concerned about data privacy during the negotiations with Cisco. Hand feared that citizens' data—from information on their cell phones to their physical likenesses captured on cameras equipped with facial recognition software—could be collected and stored by a private company without their consent.

Hand turned to the mayor's challenge cabinet to develop a policy on data privacy for the city council to consider along with the Cisco partnership. Working with the group of young professionals, Hand looked at other cities' privacy policies—especially the policies of Seattle—which she called the *privacy king*. After adapting the language to fit the Kansas City context, Hand distributed copies to other city departments—including the city manager's office, the mayor's office, and the legal department—for their review.

A week after the city council adopted the resolution that authorized the Cisco partnership, the council adopted a resolution that established Kansas City's first data privacy principles. For Hand, data privacy was "essential, because we were going into such a new space, and I felt we didn't quite have a full public handshake on that." She added: "I wasn't hiding what we were doing. We had been talking about it publicly. But because we didn't have comprehensive community outreach around smart-city data, I felt it was very important that council set up some guideposts for what that would look like, adapt to the era of big data, and ensure that we're protecting individual privacy" (text box 4).

Teaming with a university to address data privacy concerns

With no budget and no staff, Hand looked outside City Hall for potential partners to help her bring innovation and technology into government. Her intern, Kate Garman, was completing a law degree at the University of Missouri–Kansas City and had interacted in courses and projects with law professor Anthony

Box 4: Kansas City's Data Privacy Principles

Adopted on April 30, 2015, the city's data privacy principles demonstrated a commitment to city residents' privacy as Kansas City was growing more and more interconnected and technologically advanced. The principles stated that Kansas City was committed to use data only in a manner consistent with the context in which the data had been collected. Further, it said the city affirmed that people had the right to

- Make sure their data was collected, stored, and used in a manner consistent with the data privacy principles
- Understand and have access to the information about their data privacy and security
- Be sure of the secure and responsible handling of their data
- Access their data and correct it when reasonable, considering the sensitivity of the data and the possibility of harm to the person if the data is inaccurate
- Have an effective and responsive mechanism in place for exercising privacy complaints

Source: Access the full principles here: http://cityclerk.kcmo.org

Luppino. Luppino had recently started an interdisciplinary course about the relationship between law, technology, and public policy, which was open to law, business, engineering, and other students at the school. The students, working in interdisciplinary teams, earned course credits by working with city officials to tackle real problems the officials faced.

City officials sought help from Luppino and other course instructors to deal with policy problems in need of innovative and cost-effective solutions. The students in the course typically delivered three types of end products to city officials. In many cases, they conducted research to help resource-strapped departments learn about a new or adapted technology as it relates to government. Students and university faculty also created apps, developed software, wrote up questionnaires, and produced other tools related to specific policy issues. The course teams often recruited help from the local Code for America brigade, Code for KC, or other volunteers and community mentors. Larger projects sometimes spun off into longer, multiday workshops that involved a variety of other participants.

In an early example, Rick Usher, who was Schulte's assistant at the time, brought the educators a policy problem involving the city's permitting process, which he called the *plumber's dilemma.* Usher explained that a plumbing contractor would have to obtain six permits from five different departments, all of which asked overlapping questions. The students first parsed through all of the permits to make sure the questions matched what the city ordinances required, and they eliminated any that did not. With the help of a Code for KC volunteer, they combined all of the permits into one automated questionnaire, which the city adopted.

In January 2016, Garman approached Luppino about data privacy issues related to the streetcar corridor project. The ordinance that the city council had passed in 2015 had established data privacy principles and directed the city manager to implement best practices, and Garman thought that Luppino and his students could help. The professor set up a course project. "We started mapping the data flows from the sensors to the Cisco platform and the other devices and repositories," Luppino said. "And we found that it's a sort of moving target because cities have different kinds of vendors. And so we got more and more curious about the negotiation and monitoring of those agreements, because some vendors may have many lawyers with vast experience in data gathering and ownership, but city staff and city legal departments may already be stretched when the negotiations arise."

After parsing through sample agreements, Luppino and his students developed checklists for the city to use when negotiating agreements with technology vendors that involve collection, storage, and sharing of data. The checklist included reminders to focus on key aspects such as names, contact information, and termination dates of the contracts. Other sections aimed to make sure contracts are consistent with the city's core data privacy principles and provide guidance on the control and access of data being collected, owned, and used.

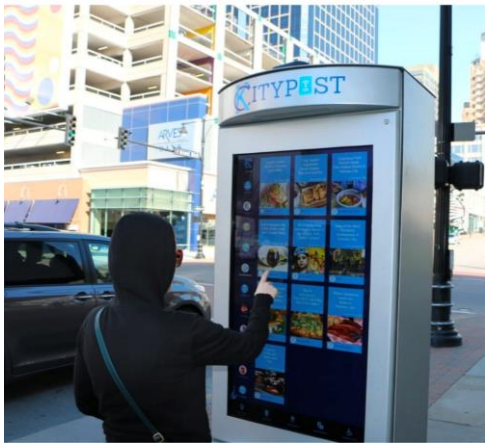
OVERCOMING OBSTACLES

Six months later, the city weighed a new opportunity. The US Department of Transportation announced a smart-city challenge that asked midsize cities to "develop ideas for an integrated, first-of-its-kind smart transportation system that would use data, applications, and technology to help people and goods move more quickly, cheaply, and efficiently."[18] The challenge came with a prize of $50 million in funding to implement the winning bid.

Hand had left the city to pursue other opportunities, and Bennett had replaced her as chief innovation officer. An engineer by training, Bennett said he arrived thinking his main job

Figure 3: Digital Kiosks

Photo by Tyler McBrien



https://www.flatlandkc.org/news-issues/smart/

would be to implement the Cisco deal, but he soon began looking for ways to make better use of the 2.2-mile streetcar corridor, its Wi-Fi, service kiosks, and the data analytics platform. (Figure 3)

After talking with staff members, residents, and students, Bennett proposed that Kansas City's technology investments focus on the need for inclusion. The proposal explained that winning the grant would enable the city to expand the existing smart-city infrastructure along the streetcar corridor to neighborhoods "that need impactful infrastructure improvements the most"—namely, those east of Troost Avenue.[19] But after Kansas City's application for the federal grant failed—the winner was Columbus, Ohio—enthusiasm for smart-city innovations began to fade at City Hall as the risks of early adoption became apparent. One prominent aspect of the Cisco–Sprint–Kansas City partnership fell victim to such risks. In addition to the installation of sensors, Wi-Fi, and kiosks, the agreement called for the establishment of a KC Living Lab to be managed by Think Big Partners. The Living Lab was supposed to serve as a data marketplace where companies could acquire city data from the sensors and develop apps to improve service delivery. Bennett and the city's private partners had hoped that entrepreneurial excitement would catalyze an app ecosystem around the Living Lab, but the underlying software did not work as promised, and the Living Lab died what Sih described as a "natural death."

Bennett next proposed to expand the 54-block area and empower a single firm to manage the project. The aim, he said, was to "provide a fully integrated suite of sensors, networks, and data and analytics platforms that will result in the city becoming the first true Smart City in the world."[20] In addition to the expansion of the connected corridor, Bennett's plan called for more room for "smart parking," the creation of "smart intersections," "smart" and connected outdoor lighting, data-driven public safety, "smart water" advanced metering infrastructure, and an integrated data analytics platform. Bennett issued a request for proposals and received 18 responses from interested companies. (Figure 4)

The proposal quickly ran into opposition. Roche said he "got really nervous and pushed for a change in strategy" after seeing that the plan was short on public feedback and local oversight and had failed to establish how all this technology would improve residents' quality of life. Moreover, there was a more fundamental flaw. "I and a lot of people in City Hall felt that the proposal wasn't going to meet its own goals of making residents' lives better, and it was going to create privacy and maintenance issues," Roche

Figure 4. Street Car Line Smart City Proposal

Figure 2 The initial proposal includes public WiFi, smart lighting and community kiosks. The platform can easily be expanded by adding smart transit, water, infrastructure and parking applications.

https://www.kcmo.gov/programs-initiatives/emerging-technology-initiative-smart-city/emerging-technologies-history

said. "We wanted to fix the foundation before proceeding with a new smart-city phase." Schulte summed up the thinking at the time: "We got all these vague proposals that required us to give up our streetlights for 30 years. The smart-city concept became more of a marketing way to sell products to cities and less about just an approach to how you should do government."

On June 18, 2019, a week after voters elected a new mayor, Quinton Lucas, Kansas City scrapped the ambitious proposal to expand the smart-city streetcar corridor.[21] The new mayor had campaigned as a skeptic of the James administration's commitment to technology. In a blog post he had written several months earlier, Lucas said that Kansas City "has done an excellent job in reviewing and testing projects before implementing them city-wide" but that "technology cannot be pursued simply for exposure. The cost of making mistakes is too high for Kansas Citians to act on these projects with an accelerated process." He added, "There is no room to be reckless or impulsive with technology when it has the potential to affect our livelihoods on a daily basis."[22]

Schulte summarized, "What we did was step back and say, 'We cities probably need to do a better job of identifying the problem we're seeking to solve. Too many people are hawking various projects. It's solutions in search of a problem."

With a far more modest strategy in mind, Schulte and his team at the Office of Performance Management—renamed DataKC—began to look for more-narrowly-defined problems that would benefit from tech-enabled solutions. Using 311 call center data, DataKC zeroed in on the issue of missed trash and recycling pickups, which was the subject of 20% of the 311 call volume and 36% of the city's new 311 cases in 2018 and early 2019. In August 2019, the DataKC team and 311 call center staff launched the Trashbot, which gave citizens calling 311 the option to report missed trash pickups to an automated bot that collected their information rather than to a 311 staff member.

After the success of Trashbot, the team developed additional automated bots to triage requests for snow and ice removal and pothole repair. Roche said he liked the approach of building something small, trying it out, and scaling it up if it worked. "If I had pitched these 311 bots back in the initial smart-city rollout," he said, "it would have been about a bot that can take phone calls for anything, and the project would have been too long."

Bo McCall, an analyst with DataKC who helped develop Trashbot and its successors, described Kansas City's new approach to technology as "more incremental than

transformational. Smart-city projects have evolved from these grand public–private visions to initiatives more directly involved with city operations," he said.

ASSESSING RESULTS

The work of Schulte, Bender, and Steenson helped change the institutional culture with regard to data. In 2019, Kansas City was one of only seven cities nationwide to achieve the highest certification in Bloomberg Philanthropies' What Works Cities program. The gold certification recognized the city's use of data and other hard evidence to improve services for residents.[23] The certification also recognized the city's efforts to codify the importance of data through an ordinance passed in February 2019 that mandated the use of data and performance management reporting to "monitor, benchmark, and publicly report on the progress of implementation of the City's strategic priorities."[24]

After the city launched its data-driven performance management program in 2009, policy makers became better able to target service areas in need of improvement—and to win taxpayers' support for the required spending. In response to annual citizen satisfaction measures that scored perennially low—such as maintenance of streets, sidewalks, and infrastructure—the government could use data-driven insights to take action. For example, in April 2017, Kansas City voters approved an $800-million bond offering to improve infrastructure over 20 years. "That was a really powerful case study for us," Steenson said. "If we lay the groundwork with the data year over year, what we need to pursue becomes glaringly clear. So that $800-million bond issuance for infrastructure passed with flying colors throughout the city."

In what he called the "smartest 54 blocks in the country," which ran along the streetcar corridor, Bennett noted that between the launch of the Wi-Fi network and March 2019, more than 2.5 million separate devices such as phones, tablets, or other forms of computer had engaged with the network—nearly five times the population of Kansas City.[25]

Many of the larger, more-expensive projects involving the public–private partnership did not yield the same cost–benefit outcomes as did smaller, less-expensive initiatives born out of the performance management program. Gains along the streetcar corridor were modest. The *New York Times* reported in 2019 that sensor-aided traffic signals saved motorists an average of 37 seconds along their daily commutes.[26] And after the city installed traffic sensors to monitor congestion and road conditions, Schulte said he was not convinced it was worth the cost. "We don't have traffic congestion—even on our worst days," he said. Similarly, crime location predictors did not produce a measurable improvement in the city's downtown entertainment district.[27]

Smaller initiatives like Trashbot also yielded modest service improvements, but at much lower cost. Between Trashbot's launch in August 2019 and February 2020, the automated voice app saved the city $38,000 by reducing 311 call volumes. City residents enjoyed greater convenience based on the ability to call the Trashbot even outside regular 311 call center hours, reduced average call times, and reduced wait times. Average call times with Trashbot totaled 75 seconds, as opposed to 6 minutes with a live agent.

Still, Bennett said, the smart-city initiative along the streetcar corridor had a transformative impact on the city in ways that may be difficult to directly associate with the technology. "Ten years ago, we had fewer than 5,000 people living downtown," he said in an article posted by Amazon Web Services. "We have seen a 520 percent growth in the number of residents in downtown and a 400 percent growth in development investment. I believe our Smart City project has played a prominent role in getting people excited about living here."[28]

During the second half of 2019, Lucas altered staffing and programming to reflect his own strategy. He eliminated the position of chief

innovation officer while keeping the chief data officer and chief information officer posts in place. He also ended KCStat's external performance management meetings. Schulte had planned to retire from the position of city manager when his contract expired in February 2020 but left in December 2019 to become the first county administrator of Jackson County, in which Kansas City is located. He had served as Kansas City's city manager for a decade.

REFLECTIONS

Perhaps the main lessons learned from the Kansas City, Missouri, encounter with technology during the second decade of the twenty-first century were, first, that interest in using information to improve performance has to precede heavy investment in software and hardware in the quest to develop data-driven solutions for municipal problems, and second, that smart cities are defined by smart leaders who use technology effectively to benefit their citizens.

Before investing in new data-driven strategies, programs, and initiatives, City Manager Troy Schulte had to change the organizational culture at City Hall to encourage regular use of data in decision making. He and his team promoted that new culture by partnering across all departments in the organization, engaging the public, and making data more accessible. They soon learned that many Kansas City personnel were ready for a change. Julie Steenson, a deputy performance officer in the city manager's office, said the heaviest users of the new, open-data portal were city employees who could now quickly and easily get information they needed.

Performance management analyst Bo McCall stressed the need to enlist the active involvement of employees in the development of new processes and procedures—especially ones based on technology. For instance, when designing Trashbot—an automated 311 call center system—311 call center agents and managers tested all of the bot prototypes. "You have to make sure the people who are going to be the most heavily affected by the project are also part of the decision-making process," McCall said.

One of the most-salient lessons to come out of Kansas City's smart-city initiative was the need to develop a clear and well-defined case for any investment in technology in order to deal with tech companies that offered all kinds of solutions for all kinds of problems but not necessarily for the problems that arise in any particular city: Schulte's "solutions-in-search-of-a-problem" scenario.

Eric Roche, Kansas City's chief data officer, divided technology-based solutions into two categories: complex systems that analyzed multiple data streams to uncover things that cities should do and targeted initiatives that deployed new technology "to clearly solve a problem." Of the two, he much preferred the second, he said. "It really seemed that the tech sector was trying to drive into government what they thought was important instead of working with us, hearing our problems, and trying to help us find solutions in a much more agile and scalable way," Roche said, speaking about Kansas City's experience.

Summing up the feeling among city residents at the time, Schulte added, "It got construed that the city was misplacing its priorities and investing in all this technology instead of putting people to work and just going out and filling potholes."

Moreover, the technology itself was too often a work in progress. Sometimes companies wanted to sell technology that was not ready for the market but still needed field testing. "That's the biggest chasm today that we see that exists in this smart-city marketplace between government and the private sector," said Herb Sih of local consulting and investment firm Think Big Partners. "You've got commercial companies that are selling solutions that aren't always ready for prime time. Sometimes they know it, and sometimes they don't."

Roche and others echoed Sih's frustration. "You had companies—big companies—deploying sensors and promising things they couldn't actually deliver," he said.

The city also learned important lessons about how to structure public–private partnerships and negotiate with representatives of tech companies who spoke in the languages of computers and programming rather than in plain English. After the dust settled on a Cisco Systems contract to build smart-city technology, Roche said: "It wasn't exactly clear what we had procured. Did we buy the sensor, or did we buy the algorithm? Did we buy all versions of the algorithm as they get updated? It was just this kind of gray area."

Schulte's decade-long experience in trying to define a smart-city strategy led to a problem-driven approach instead of the tech-first initiatives that some larger cities had launched. Not every municipality might have weighed the pros and cons the way Kansas City, Missouri, did. Population size, economic structure, and geography might all affect those choices. But whatever the context, Schulte said, "You must have the right tool, the right culture, and the right management."

Exhibit 1. Improvement Area Goals, Objectives, and Indicators from Internal Performance Management Meetings

Area	Goal	Objectives	Outcome Indicators	Output/Efficiency Indicators
Code enforcement	To maximize the efficiency and effectiveness of code enforcement operations in responding to blighting forces in neighborhoods	• Decrease response and abatement time frames • Engage neighborhoods in maintenance of vacant lots • Maximize efficiency in spending and revenue recovery	• Citizen satisfaction with property maintenance and code enforcement program • Percent of violations abated by property owner • Condition of housing stock	• Time to initial inspection • Time to abate • Inspections/inspector • Cost per lot mowed or cleaned • Assessments collected • Percent of land trust lots adopted
Animal control	To improve the consistency, reliability, and efficiency of animal control services	• Improve customer communication • Increase administrative efficiency • Implement systematic and proactive efforts	• Citizen satisfaction with animal control program • Citizen satisfaction with quality of service on animal control requests • Percent of animals licensed	• Time to respond to dispatched service calls • Time to close service requests • Number of customer service complaints
Street maintenance	To ensure the quality and efficiency of street maintenance activities while balancing with citizens' expectations	• Improve customer communication • Quantify street maintenance activities • Improve consistency and reliability of service request responses	• Citizen satisfaction with street maintenance programs • Citizen satisfaction with quality of service on street maintenance requests • Street-condition ratings	• Cost per activity (e.g., pothole, lane mile resurfaced) • Time to close service requests
Water line maintenance	To improve the efficiency of water line maintenance and the effectiveness of communication regarding activities	• Establish reliable time frames for maintenance activities • Improve customer communication • Maximize administrative efficiency	• Citizen satisfaction with water and sewer repair programs • Citizen satisfaction with quality of service on water repair requests	• Time to complete repairs and restorations • Time to respond to citizens' requests for status
Water Services Department (WSD) customer service	To maximize the focus on the customer experience while improving the effectiveness of customer service activities	• Improve timeliness of call handling • Improve consistency of information provided for customers	• Citizen satisfaction with quality of service on customer service requests • Citizen satisfaction with call handling at WSD • Availability and use of self-service options	• Calls handled • Abandonment rate • Efficiency of call takers • Billing errors/exceptions • Customer service escalations

References

[1] Adopted Activity Budget, Fiscal Year 2009-2010; https://www.kcmo.gov/city-hall/departments/finance/budget-archives, 2.

[2] "Kansas City Profile," Pew Charitable Trusts; https://www.pewtrusts.org/-/media/assets/2013/11/11/kansas_city_profile.pdf?la=es&hash=088659115408094205D8086A4F7FA0592E58C57D, 1.

[3] Tracy Gordon, "State and Local Budgets and the Great Recession," Brookings, December 31, 2012; https://www.brookings.edu/articles/state-and-local-budgets-and-the-great-recession/.

[4] "Unemployment Rate in Kansas City, MO-KS," Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/KANS129UR.

[5] Lynn Horsley, "Why the Retiring City Manager Says Kansas City Is Better Off Than 10 Years Ago," KCUR, October 7, 2019; https://www.kcur.org/post/why-retiring-city-manager-says-kansas-city-better-10-years-ago.

[6] "#170 City Manager Troy Schulte, Kansas City, MO," GovLove podcast, January 5, 2018; https://radiopublic.com/govlove-a-podcast-about-local-go-G7oXza/s1!6e163.

[7] Adopted Activity Budget, Fiscal Year 2010-2011; https://www.kcmo.gov/city-hall/departments/finance/budget-archives, 457.

[8] Eric Salzman, For decades a dividing line, Troost Avenue in Kansas City, Mo., sees new hope, NBC News, October 11, 2018; https://www.nbcnews.com/news/us-news/decades-dividing-line-troost-avenue-kansas-city-mo-sees-new-n918851.

[9] Colin Wood, "What is 311?" GovTech, August 4, 2016; https://www.govtech.com/dc/articles/What-is-311.html.

[10] Laura Adler, "How Citizens See It: Kansas City's Citizen Survey Adds Citizens' Perceptions to the Equation," Harvard Kennedy School Ash Center for Democratic Governance and Innovation, May 12, 2015; https://datasmart.ash.harvard.edu/news/article/how-citizens-see-it-677.

[11] About Sly James, http://kcmayor.org/about-sly-james.

[12] Resolution No. 110406, City Clerk of Kansas City, Mo., May 29, 2011; http://cityclerk.kcmo.org/LiveWeb/Documents/Document.aspx?q=n4OmtEXrKb6WGvsEEjJUSqdIS7bk%2btFd05fV3Q8bowpZjPxhGK19TmHhXL%2blHMQx.

[13] Jason Harper, "What Are the Best Open Data Sets in Kansas City?" KC Digital Drive, April 21, 2015, https://www.kcdigitaldrive.org/article/kcmo-best-open-data/.

[14] Emily Badger, "The Dawn of the Municipal Chief Innovation Officer." CityLab, March 19, 2012; https://www.citylab.com/solutions/2012/03/dawn-municipal-chief-innovation-officer/1516/.

[15] "The Rise of the Innovation Officer: An Interview with Ashley Z. Hand, Chief Innovation Officer of Kansas City, MO," Alliance for Innovation, June 27, 2013; https://www.transformgov.org/articles/rise-innovation-officer-interview-ashley-z-hand-chief-innovation-officer-kansas-city-mo.

[16] "Ordinance No. 140443," Open Data Policy Hub, June 19, 2014; https://opendatapolicyhub.sunlightfoundation.com/collection/kansas-city-mo-2014-06-19/.

[17] KC Digital Roadmap, https://data.kcmo.org/dataset/KC-Digital-Roadmap/dw7j-pk8s.

[18] "Smart City Challenge," US Department of Transportation; https://www.transportation.gov/smartcity.

[19] *Beyond Traffic: The Vision for the Kansas City Smart City Challenge: Part I – Vision Narrative*, City of Kansas City, MO; https://cms8.dot.gov/sites/dot.gov/files/docs/Kansas%20City%20Vision%20Narrative.pdf, 1.

[20] "Comprehensive Smart City Partnership with Kansas Missouri," US Ignite; https://www.us-ignite.org/tools/rfps/comprehensive-smart-city-partnership-with-kansas-missouri-2/.

[21] Skip Descant, "Kansas City, Mo., Closes Smart City RFP Without a Selection," June 26, 2019; https://www.govtech.com/smart-cities/Kansas-City-Mo-Closes-Smart-City-RFP-Without-a-Selection.html.

[22] Quinton Lucas, "Becoming a 'Smart City,'" Quinton Lucas for KC Mayor, February 1, 2019; https://quintonlucas.org/blog/2019/1/24/q-on-becoming-a-smart-city.

[23] "What Works Cities Certification," Bloomberg Philanthropies; https://whatworkscities.bloomberg.org/certification/.

[24] "Resolution 190080," City Clerk of Kansas City, Mo., February 7, 2019; http://cityclerk.kcmo.org/liveweb/Documents/Document.aspx?q=jxx9LQom%2fkwnbpWnFwRGA4grWVizGRe7k3swAoARY5P03YQ691mQd01sF0Q8bCz0.

[25] Zack Quaintance, "Kansas City Innovation Chief Bob Bennett Announces Departure," GovTech, March 13, 2019; https://www.govtech.com/people/Kansas-City-Innovation-Chief-Bob-Bennett-Announces-Departure.html.

[26] Timothy Williams, "In High-Tech Cities, No More Potholes, but What About Privacy?" *New York Times*, January 1, 2019; https://www.nytimes.com/2019/01/01/us/kansas-city-smart-technology.html.

[27] Timothy Williams, "In High-Tech Cities, No More Potholes, but What About Privacy?" *New York Times*, January 1, 2019; https://www.nytimes.com/2019/01/01/us/kansas-city-smart-technology.html.

[28] "Kansas City, Missouri, Spurs Growth with Smart City Analytics on AWS," Amazon Web Services, 2017; https://aws.amazon.com/solutions/case-studies/kansas-city/.

Innovations for Successful Societies makes its case studies and other publications available to all at no cost, under the guidelines of the Terms of Use listed below. The ISS Web repository is intended to serve as an idea bank, enabling practitioners and scholars to evaluate the pros and cons of different reform strategies and weigh the effects of context. ISS welcomes readers' feedback, including suggestions of additional topics and questions to be considered, corrections, and how case studies are being used: iss@princeton.edu.

Terms of Use

Before using any materials downloaded from the Innovations for Successful Societies website, users must read and accept the terms on which we make these items available. The terms constitute a legal agreement between any person who seeks to use information available at successfulsocieties.princeton.edu and Princeton University.

In downloading or otherwise employing this information, users indicate that:

a. They understand that the materials downloaded from the website are protected under United States Copyright Law (Title 17, United States Code). This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/4.0/.
b. They will use the material only for educational, scholarly, and other noncommercial purposes.
c. They will not sell, transfer, assign, license, lease, or otherwise convey any portion of this information to any third party. Republication or display on a third party's website requires the express written permission of the Princeton University Innovations for Successful Societies program or the Princeton University Library.
d. They understand that the quotes used in the case study reflect the interviewees' personal points of view. Although all efforts have been made to ensure the accuracy of the information collected, Princeton University does not warrant the accuracy, completeness, timeliness, or other characteristics of any material available online.
e. They acknowledge that the content and/or format of the archive and the site may be revised, updated or otherwise modified from time to time.
f. They accept that access to and use of the archive are at their own risk. They shall not hold Princeton University liable for any loss or damages resulting from the use of information in the archive. Princeton University assumes no liability for any errors or omissions with respect to the functioning of the archive.
g. In all publications, presentations or other communications that incorporate or otherwise rely on information from this archive, they will acknowledge that such information was obtained through the Innovations for Successful Societies website. Our status (and that of any identified contributors) as the authors of material must always be acknowledged and a full credit given as follows:

    Author(s) or Editor(s) if listed, Full title, Year of publication, Innovations for Successful Societies, Princeton University, http://successfulsocieties.princeton.edu/