



PUTTING SMART COMMUNITY STRATEGIES TO WORK

in Small and Midsize Jurisdictions

ICMA | **SIEMENS**

Contents

Foreword 1

Introduction: Smaller Places, Smart Places 1

Smart Community Deployments in Second-Tier Communities 1

Smart Community Profiles

 Bellevue, Washington..... 5

 Lakeland, Florida 7

 Milton Keynes, United Kingdom 9

 Peoria, Illinois 11

 South Portland, Maine 13

Key Considerations 15

About the Author 16

Endnotes 16

Copyright © 2019 International City/County Management Association, 777 North Capitol Street, N.E., Suite 500, Washington, D.C. 20002. All rights reserved, including rights of reproduction and use in any form or by any means, including the making of copies by any photographic process or by any electronic or mechanical device, printed or written or oral, or recording for sound or visual reproduction, or for use in any knowledge or retrieval system or device, unless permission in writing is obtained from the copyright owner.

Cited Internet sources were valid as of October 2018. Because URLs and websites are constantly changing, we cannot vouch for their current validity. To locate other ICMA print and digital publications, please visit icma.org/publications-research.

Putting Smart Community Strategies to Work in Small and Midsize Jurisdictions

Foreword

For almost two centuries, Siemens has been committed to creating perfect places for local governments and the communities they serve by finding innovative solutions to solve their toughest problems. While the smart communities dialogue is often dominated by major investments in New York, London, Paris, and Barcelona, Siemens recognizes the role that small and midsize jurisdictions have in the development and deployment of smart technology solutions.

We understand that the bottom line for public officials is the need to provide a safe, secure, and prosperous community to keep and attract residents and workers. We see smart technology approaches as tools that can help communities reach these goals more efficiently. City or town, large or small, through technology, we help communities modernize buildings, increase public safety, and meet energy goals to create smart and resilient communities of the future.

We are honored to partner with ICMA and continue our commitment to the profession and the communities it serves.

Introduction:

Smaller Places, Smart Places

Local government leaders continue to feel the pressure to do more for their communities with fewer and fewer resources. Paired with sound management and leadership principles, technology has the potential to create efficiencies, drive economic growth, and build the social capital required for communities to thrive.

Communities featured in this publication range from 25,000–260,00 in population size and work with annual operating budgets of roughly \$100–\$600 million. While the way in which smart community projects are managed within the organizational structure of these communities differs, they are all working to deploy new technology in intelligent ways to support organizational objectives.

“Intelligent communities’ . . . seek to make better cities: places large and small, urban and rural, where citizens and employers thrive and prosper in the broadband economy. Intelligent communities adopt technology but do not make it their focus. Instead, they find vision-driven, community-based, smart-technology solutions to their most urgent problems. These issues may differ place to place and include social equity, resource conservation, transportation, economic development, and urban architecture.”

—Intelligent Communities Forumⁱ

As this paper will demonstrate, being technology savvy does not necessarily require major financial investments, or complete workforce reorganization. Successful communities featured in this paper have taken strategic approaches that demonstrate that being “smart” is more than just having the latest technological innovation. Instead, they have taken measured steps to demonstrate how investments, along with public/private partnerships, can support their vision for the future.

Smart Community Deployments in Second-Tier Communities

Recognizing that small and midsize communities have different needs, this report will highlight promising practices from communities that have utilized technology to improve all facets of local government management including facilities, finance, community engagement, economic development, human resources, public safety, and utilities. Local governments interviewed for this report include:

- Bellevue, Washington
- Lakeland, Florida
- Milton Keynes, United Kingdom

- Peoria, Illinois
- South Portland, Maine

Based on data collected in a 2016 survey conducted by ICMA in partnership with the Smart Cities Council, we understand that local governments' motivating factor for engaging in smart community practices is economic development, followed closely by operational and cost savingsⁱⁱ. In studying examples from these and other communities, ICMA has highlighted achievements and lessons learned viewed through a lens of economic and operational improvements that were both replicable and scalable for smaller or slightly larger communities.

Assessing Staff and Community Resources to Support Operational and Human Resources Needs

Leveraging technology to increase operational efficiencies will allow local government leaders to deploy resources more efficiently across their organizations. These technological changes will have impacts on the local government workforce and have the potential to fundamentally change human resources needs. In Lakeland, Florida, utilizing sensors changed the workforce dynamic with staff no longer having to drive from site to site to measure water levels. Having the ability to access real-time data across multiple locations also decreases the time it takes to make decisions, a critical efficiency during extreme weather events.

Each community interviewed began its smart community projects with existing staff but found opportunities for training or repurposing full-time equivalents (FTEs) when natural attrition occurred. Across the teams contributing to its Smart Cities Plan, Bellevue, Washington, made a conscious effort to think through recruitments and the types of staff needed to ensure that every FTE was put to the highest use. Having a plan in place allowed for the city not only to envision the technology it would need, but also the workforce required to accomplish the plan. The evolution of technology has encouraged local governments to move from data creation to data analysis.

Local governments in small and midsize communities are acutely aware of their resource limitations. These limitations have given rise to unique partnerships and funding arrangements that help communities, or even regions, share in the risk and reward of technology

investments. University partnerships have been effective ways for cities to access scientific expertise that they may not otherwise have on staff. Additionally, universities are often in a position to identify funding and pilot new technology that a city might not have the risk tolerance for on its own.

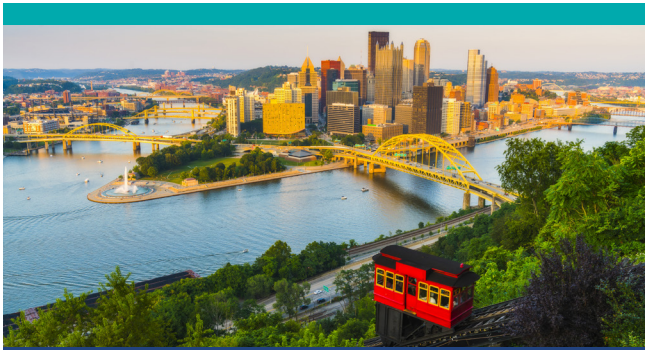


Georgia Tech initiated a Georgia Smart Communities Challenge. With funding from corporate and community partners, the Challenge, designed for communities of all sizes, will provide Gwinnett County, the city of Chamblee, Chatham County, and the city of Albany with \$50,000 in grant funding, access to a research team, connections with industry experts, and networking opportunities to support the deployment and/or integration of technology solutions into local government operations. Projects include IoT sensors to monitor sea level rise, an autonomous shuttle study, data analytics and visualization for housing data, and a connected vehicle technology master plan.ⁱⁱⁱ

Data Collection, Management, and Utilization

Each community profiled was able to start its smart community implementation utilizing existing data sets. However, several recognized challenges with utilizing data across departments. Data quality and security can require an immense amount of staff time. However, the benefits of unified data across an organization are virtually endless. Data consistency across departments allows for the type of enterprise management that will be the cornerstone of smart communities of the future.

While each community was at a different point in the implementation of smart community planning, they all recognize that having quality data—data that has



In **Pittsburgh**, city staff are utilizing a predictive model built by a Carnegie Mellon Ph.D. student to predict fire risk in commercial buildings. The model utilized historical fire data along with other building attributes to identify high-risk factors. The model identified 57 properties, of which 50 had experienced a fire incident. This model will allow city staff to prioritize inspection for the estimated 22,000 commercial properties.^{iv}

been cleaned, classified, and documented—was critical for building partnerships outside of local government and eventually going from reactive to predictive policy making.

Having the IT infrastructure in place for the collection of real-time data delivered throughout the city is a critical consideration as communities prepare for technology investments. Understanding how data will be stored and analyzed is part of understanding the full cycle of a technology product.

Improving Service Delivery

Over the past several years, much of the smart communities conversation has revolved around the Internet of Things (IoT). At the community level, IoT applications have the power to transform the way local governments provide services. Relatively inexpensive sensors can be utilized to support almost every asset of municipal operations including equipment and facilities maintenance, public safety, utilities, environmental, and solid waste management. With real-time data coming in from the field, managers can proactively deploy solutions before resident complaints compound, or disruption in service causes more severe damage to community assets.

While sensors themselves can require minor up-front investments, communities must be prepared to maintain and manage data and provide adequate security measures



In 2015, **Coral Gables** began integrating law enforcement databases with closed-circuit television (CCTV) and plate recognition software to track all vehicles traveling through five different sites throughout the community and compare them to records for stolen vehicle reports, expired registrations, and active warrants. Geofencing contains that review to the city limits, while automatic alerts notify police of the location and travel direction of potentially problematic vehicles. CCTV video is also recorded and archived for potential use as evidence. The resulting data supplements other law enforcement technologies to spot trends in crime data, display that data in neighborhood heat maps, and forecast future infractions.^v

that come with IoT systems. Before rolling out robust systems, communities often pilot lower risk options such as parking or equipment maintenance. While IoT has enterprise potential that can drive predictive analytics that lead to more proactive management, understanding the potential on a project-by-project basis can provide lower risk entry points for small and midsize communities.

Driving Local Economic Development

"The positive impact of smart city technologies on economic development could see cities locking in incremental growth of over 5 percent and driving more than \$20 trillion in additional economic benefits over the coming decade."^{vi}

—ABI RESEARCH: *Role of Smart Cities for Economic Development*

Retaining existing businesses, attracting new ones, and recruiting the next generation of residents is a challenge facing communities of every size. Leveraging smart technology to create future-ready, livable communi-



South Burlington has been the test ground for Propy, an online real estate marketplace that is aimed at addressing the challenges of purchasing property across borders. Utilizing blockchain technology, Propy worked with South Burlington to use the city's platform for real estate conveyance records. The nature of blockchain allows for property records to be kept on a decentralized public record. This helps to ensure transparency through a completely public process, while also being more secure, as each record is encrypted. South Burlington, with a population of roughly 19,000, is now the first city in the world to receive a blockchain-recorded property deed, effectively making it a global leader in the space^{vii}.

ties can seem like an expensive undertaking. Creating partnerships can help communities aggregate demand and increase their purchasing power. Bringing employers, education partners, and neighboring jurisdictions together has the opportunity to go beyond idea generation to co-financing.

Smaller communities have the opportunity to frame themselves as ideal testing grounds for new ideas. Peoria, Illinois, noted that its ability to bring in city leadership on relatively short notice to discuss new initiatives has been attractive to private sector partners that are often accustomed to dealing with larger bureaucracies.

Financing

How to pay for the technology needed for projects is an ongoing and familiar challenge to local government professionals. In addition to finding partnerships and stakeholders to share in some of the investment and risk,

there are also opportunities to structure procurements in ways that ensure vendors provide guaranteed efficiencies and cost savings. Utilizing performance-based contracting, local governments can focus on the impacts and outcomes of procurements instead of the process^{viii}.

Regardless of the procurement structure, agreeing on performance measures and desired outcomes at the onset of the project will help create momentum for the financing of future projects.

Intra-governmental cross team collaboration can also reduce potential costs through joint departmental projects. Major road work or other scheduled infrastructure improvements can provide an opportunity to lay sensors or fiber cable in coordinated manner that can reduce the cost of a stand-alone smart community project. While adding a component to a project can add cost, laying the foundation for technology improvements also have the potential to drive revenues and increase public benefit.



Wasco, a small community of 26,000 residents, was looking for innovative ways to reduce municipal energy costs. Not unlike many municipalities, they found water distribution and wastewater treatment made up over 30 percent of their total energy costs. Wasco was able to procure professional services that identified environmentally remediated land as the potential site for a solar field that could serve the city's energy needs for wastewater treatment and distribution. By structuring the procurement based on performance, Wasco is guaranteed energy savings averaging \$570,000 per year. Over the life of the 15-year term, if savings fall short the contractor provides the difference.

Bellevue, Washington



Situated just east of Seattle across Lake Washington, Bellevue is known for its natural beauty as “a city in a park” and, more recently, its leadership in the technology sector. As part of a regional network of public and private institutions, Bellevue is located on a fiber-optic ring around Lake Washington. This ring, along with other infrastructure improvements and the expansion of public Wi-Fi, supports the municipality’s “Bellevue Smart” plan.

Bellevue Smart is a comprehensive plan that recognizes how technology can advance community objectives around livability, sustainability, and resilience. The plan is one tool for the Bellevue to continue to modernize and become more efficient, all with the end goal of providing the best services possible.

“The Bellevue Smart Plan seeks to improve livability, sustainability, and resiliency in Bellevue.” – Bellevue Chief Information Officer Sabra Schneider

While still in the first phase of the plan, operational successes have been built on strong cross-departmental collaboration and the fundamental idea of a “one city approach.” Smart Bellevue is a collaborative effort with municipal executive sponsors and staff support from across the city including information technology, transportation, utilities, community development, civic services, police, and fire.

COMMUNITY PROFILE

Population: 142,400

Annual Operating Budget: \$597,312,000

Area: 33.5 square miles

Median Household Income: \$113,877

Education: 66 percent of residents have a bachelor’s degree or higher

Understanding that the city could not drive its vision alone, building public and private partnerships has been crucial for engaging the community and garnering additional resources. With city council support, the transportation team has gone as far as dedicating a new full-time employee who is responsible for fostering partnerships throughout the region that drive activities in the smart mobility plan.

Smart Mobility Solutions

Understanding traffic patterns and signaling is a core function of any city-level transportation agency. Bellevue has taken this one step further with its fully deployed, adaptive, traffic management system. Under a traditional structure, most transportation agencies use historic traffic volumes to determine time-of-day patterns for their signals and allow real-time traffic data to make minor adjustments at local intersections based on data from loop detectors at that intersection. Bellevue’s system uses this same real-time traffic data and

looks at the entire corridor to determine the best pattern for the current traffic condition. Put another way, signal timings are adaptive, take into account real-time traffic data, and adjust traffic signals along a corridor accordingly.

Initial results have shown anywhere from a 15-40 percent reduction in travel time in various traffic corridors.

The system has also allowed for different types of signal timings that were not possible with the traditional manual system. Throughout the city, there are now flashing, yellow, left-turn arrows that adjust adaptively based on real-time traffic volume and pedestrian activity. The adaptive system, particularly the flashing yellow lights, have generated tremendous amounts of positive feedback from residents.

Bellevue's emphasis on technology-supported mobility solutions is also contributing to public safety. To support Bellevue's Vision Zero initiative, which aims to end traffic deaths and serious injury collisions on city streets by 2030, the city has begun the process of machine learning to support safer traffic conditions. To date, relying on data after an incident occurs has provided limited information to planners and public safety officials. This type of historical data is missing the many close calls or near misses that traffic cameras can detect. To gather new data about near misses, Bellevue is actively working on algorithms that will train computers to identify a number of safety concerns such as when cars are too close to pedestrians or bicycles, or when turning movements are conflicting with each other. This type of proactive approach to data-driven public policy will help Bellevue prioritize interventions and changes that can enhance public safety.

Challenges

The six-year plan considers budget and staffing limitations. Schneider noted, "The initial planning work was done primarily with existing staff and resources. As Bellevue continues to implement the smart city strategy, many departments are working to enhance staff skills and tools that further advance Bellevue Smart."

The city is also committed to ensuring the security of new data and new sensors. Bellevue Transporta-

tion Director Dave Berg pointed out that liberal public records laws in Washington state require the city to grapple with the idea that, "Although new data can improve operations, it often becomes a public record and available to anyone who requests these records. Bellevue wants to honor the right balance of transparency, privacy, and security." As increased city services rely on sensors, connectivity, and data, Bellevue staff are also deploying additional security measures.

City staff are also working on the challenge of managing, storing, and analyzing real-time data, which supports the future needs of the Bellevue Smart Plan. While this isn't an immediate concern, having a plan in place that includes scalable and secure infrastructure will be crucial in outlying years.

Takeaways

As a midsize city government, Bellevue is relatively unique in that it has gone through the full smart city planning process and begun to see positive results with implementation. This success has been based, first, on a foundation of support from the council, and second, on the "One City" culture that already existed, which allowed for cross-departmental planning that is often difficult to foster in larger organizations. While staff recognized that deliberate collaboration was slower than top-down assignment, the extra effort also has safeguarded that everyone is in lockstep together, working toward the same goals.

Bellevue has also seen that innovation generates energy among residents and industry. By signaling that Bellevue plans to be on the cutting edge of smart transportation and mobility solutions, the city has been able to attract the kinds of businesses and talent that want to innovate in that space as well. By continually identifying and fostering partnerships outside of the city, Bellevue hopes to increase its economic development momentum and become home to more organizations and workforce that can help drive Bellevue Smart forward.

Based on interviews with Bellevue Transportation Director Dave Berg and Chief Information Officer Sabra Schneider

SMART COMMUNITY PROFILE

Lakeland, Florida



Located along the Interstate-4 corridor connecting Tampa and Orlando, Lakeland is home to regional distribution centers for many large corporations, and a vibrant recreational culture. Famous for its 38 named lakes ranging from 1.5 acres to 2,185 acres, the city of Lakeland, Florida, has a robust flood prevention program managed out of its public works department.

The city's stormwater division is responsible for the water levels at 10 lakes in its service area. This is an integral part of the city's flood prevention work. Staff must strike a delicate balance with water levels in the lakes and the higher levels in the storm drainage system during intense rain and storm events to avoid unintentional residential flooding.

While Lakeland doesn't have a full smart community plan in place, it has the foundation for a robust IoT system through its smart grid infrastructure. Lakeland Electric, a public utility, installed smart grid technology, which led to the implementation of smart meters. The grid, which provided the basis for data to be sent by any device, including sensors, is connected in the same way that a new cellphone is connected to a cellular network.

Remote Sensor Technology for Water Level Management

Prior to finding an IoT solution, Lakeland staff had been monitoring water levels by sending team members to

COMMUNITY PROFILE

Population: 108,054

Operating Budget: \$566,141,032

Area: 65.27 square miles

Median Household Income: \$40,918

Education: 25.8 percent of residents have a bachelor's degree or higher

read gauges in the lake, often from the shoreline with binoculars. Interested in updating to a remote sensing system, the public works staff in Lakeland began to investigate different potential solutions. Estimates came back from various vendors that would have cost the city approximately \$500,000.

Through informal relationships the department of information technology learned of public works' need to more efficiently monitor lake levels. Through cross-departmental partnership, the city looked into piggy-backing off of the smart grid to install sensors in the lakes that could remotely monitor water levels. Leveraging this technology cost the city roughly \$17,000 to deploy, a fraction of the initial estimated investment.

Sensors have helped the department deploy human resources more efficiently while allowing them to make more accurate and informed decisions. The sensors provide data points every 15 minutes and allow the team to make more timely decisions since the sensors are able to see all water levels at one time, instead of waiting for staff to report back. The time saved from manually

assessing water levels can now be used for analysis of the impacts of drainage decisions.

Staff found the sensors and associated app extremely easy to use. There was very little training time required as the app mimicked the measurements that staff was accustomed to seeing in the field. There is minor maintenance associated with the sensors every couple of months to make sure they are clean and remain in place. The sensitivity of sensors also took some troubleshooting, but once they were appropriately calibrated there were no additional problems.

Challenges

Initially, the project was piloted with two sensors that did not meet the needs of staff. Matching the accuracy level and error range that the team was comfortable with was important to finding the right product. The team also learned important lessons regarding the

placement of sensors that required a balance between accessibility for staff with protection from vandalism or curious residents.

Takeaways

Working across departments ultimately saved the city hundreds of thousands of dollars. Finding ways to leverage already existing technology can have huge financial and operational benefits.

May 2018 was the rainiest month recorded since people began collecting data in Florida. Ensuring resilience to floods and severe storms is critical to protecting residents and their livelihoods. Finding cost-effective ways to utilize technology that drives data-driven decision making is becoming a basic requirement for well-managed communities.

Based on an interview with Lakes and Stormwater Manager Laurie Smith

Milton Keynes, United Kingdom



Located in southern England, Milton Keynes is a modern city just over 50 years old. Up the road from Bletchey Park, the birthplace of modern computing, it is only fitting that Milton Keynes works toward becoming a pioneer in the smart communities field. One of the more mature examples of smart community planning and implementation for small and mid-size communities, Milton Keynes has demonstrated that it doesn't take the budget or population of a megacity to begin smart community initiatives.

Milton Keynes has centered its efforts around the utilization of big data to inform intelligent urban design and policy making. With ambitions to grow to 500,000 by 2050, the city has recognized the need for data-driven decision making that supports smart and responsible growth. The MK Data Hub was designed to support the acquisition and management of data from sources throughout the city. The data hub has been the foundation of the city's MK Smart project, a collaborative partnership between the city, The Open University, and private industry to find innovative solutions to support the economic growth of Milton Keynes.

Leveraging Big Data

The MK Smart project was based on the idea that there were ways for stakeholders throughout the city to

COMMUNITY PROFILE

Population: 261,750

Operating Budget: £187,284,000

Area: 119.16 square miles

Average Annual Gross Salary: £31,205

Education: 37.4 percent of residents have Level 4 Qualifications or higher

utilize data for the dual purposes of solving some of the city's most pressing challenges around transportation, energy, and water while generating economic benefit for the city. The vision was that an open innovation environment with quality aggregated data could draw innovators and entrepreneurs interested in testing new solutions.

"Internally, everyone is under so much pressure to meet their core deliverables, they're not in a position to spend time exploring areas that can be risky. External partners have that freedom and time to explore." – Milton Keynes Council Director of Strategy and Futures Geoff Snelson

The partnership structure for the MK Data Hub allowed for the city to be the central repository for real-time and static data that could be used in analytics and software applications. Going beyond a portal or inventory of data, the MK Data Hub is a shared infrastructure that provides developers with APIs and Sandboxes to build their applications.

One pilot application built with data from the MK Data Hub was a city motion map. The app aggregated vehicle and pedestrian movements, and congestion with real-time occupancy data on public transit. This helped residents make real-time transit decisions. This along with other applications related to health, parking, and water and energy usage were initiated.

While the data hub appeals directly to those looking to build applications or use data for research, it may not feel accessible to the average resident. To foster partnerships that would ensure a diverse set of stakeholders engaged with the data, the city used the data hub to inform more user-friendly platforms that could gather ideas and insights from residents, as well as create dashboards and graphs for policymakers.

Challenges

Snelson pointed out that internal partnerships were often more difficult to forge than partnerships outside of the council because of the time pressures that staff have to complete their core work. The MK Smart team had to demonstrate how its objectives aligned with strategic plans. This helped colleagues understand that they were working from the same playbook and had common interests, and more importantly, that MK Smart wasn't just about technology, but about improving well-being and economic outcomes.

Funding has been a continuous challenge. Momentum started organically and incrementally from grant

funding instead of a typical planning process with a clear end-goal. While this can have the disadvantage of creating piecemeal work, Snelson noted, "If we knew where we were going to go from the start, we would have had a more traditional strategy, from which we would have concluded that it was unaffordable." There is still an uncertainty around understanding the value of data. Monetizing data has been a slow crawl rather than a rapid development.

As a continually evolving field there is no definitive equation or clear technology investment that can lead to calculated economic growth. There is still a high level of risk for cities looking to take on new technologies even if they've been tested elsewhere, as there is no one-size-fits-most solution.

Takeaways

Providing partners with the high-quality data they need to innovate and create helps cities find and test unconventional solutions while sharing some of the risk. Engaging academic partnerships and allowing the city to be a testing ground for new technology can be mutually beneficial. Smaller communities have the advantage of being more agile, which can be attractive to private sector partners.

Based on an interview with Milton Keynes Council Director of Strategy and Futures Geoff Snelson

Peoria, Illinois



Located in central Illinois, Peoria is the largest city along the Illinois River and home to one of the oldest urban areas in Illinois. Like many small and midsize communities, Peoria is grappling with changing demographic trends and is working to create a community that both retains local talent and attracts people away from larger cities to more affordable communities where they can make a more direct impact. Peoria is part of the Bloomberg Philanthropies Innovation Teams network and has a dedicated Innovation Team looking at how to build partnerships in an effort to co-create solutions to some of the city's most daunting challenges. Unlike other larger cities with more resources within city hall, Peoria has focused its smart community efforts on building partnerships that empower stakeholders outside the city to become active participants and problem solvers. Peoria Chief Innovation Officer Anthony Corso is taking steps to make Peoria a smarter community by meeting people where they are at, understanding their challenges, and including them at the table for idea generation and resource mobilization where the city might need help filling gaps.

This attitude of partnership building has also led Peoria leaders to think about how to market the positive aspects of being a midsize community to public and private sector institutions that could help invest in smart solutions. Through the 1990s, Peoria was a major test

COMMUNITY PROFILE

Population: 112,883

Operating Budget: \$203,582,203

Area: 50.45 square miles

Median Household Income: \$46,547

Education: 33.9 percent of residents have a bachelor's degree or higher

market for consumer products. The city has looked to build on that reputation and demonstrate that technology products aimed at solving big city challenges can be more easily tested in a midsize community that is more manageable and accessible.

Partnering for Smart Growth

Aging and outdated infrastructure in Peoria will require major investments in the near future. While this is a challenge faced by many under-resourced communities, Peoria also sees this as an opportunity to leapfrog from outdated infrastructure to future-ready community solutions. Recognizing that, if reconstructing streetscapes is an immediate need, the city must also consider how it can be redesigned in a way that could include distributed communication and sensors to support data-driven innovations.

Knowing that these problems cannot be solved or financed by the city alone, Peoria has been collaborating with the University of Illinois network for support in identifying economic development opportunities. While

Peoria isn't home to one of the University of Illinois campuses, the mission of the university is to support economic development in cities throughout the state. Peoria has explored matches with researchers across the University of Illinois campuses to explore innovative ideas for research and testing partnerships. The city has also worked with private sector partners of the University of Illinois network to look at public-private partnerships to co-create solutions that can leverage new technologies and methods.

Peoria has positioned itself as a convener and has brought together anchor institutions, major employers, representatives from the community, and other key stakeholders for collective intelligence workshops aimed at exploring ways that technology could improve quality of life in the city. Out of that effort came several smart community priorities including ideas for parking, lighting, and transit projects. The stakeholders interested in smart parking worked together over several months to create working prototypes that helped prompt an investment in new infrastructure to support open API and web-accessible parking decks. These types of community-driven prototypes and pilots provide plans that indicate to potential partners that the city is ready and willing to collaborate.

The city has also recognized that it is in a position to empower other public-sector agencies with the tools they need to identify and foster meaningful partnerships. Peoria's Help Shape West Main campaign has worked to build the capacity of community partners and business associations. Providing collaborating organizations with the tools they need to facilitate idea-genera-

tion meetings, and to prototype and test ideas, has built partnership pipelines outside of city hall.

These relationships have created advocates for the local government in the community that can help to advance solutions that the city alone may not have the resources to address.

Outside of Peoria, the Innovation Team has taken advantage of the Bloomberg Philanthropies Innovation Teams network to learn from other communities. Meaningful community engagement has been a challenge and a key approach for Peoria. Learning from Syracuse and Boston, Peoria has looked at different meeting formats and behavioral insights that cue constructive feedback from residents.

Challenges

Inventorying, cleaning, and parsing data across departments is a major challenge. While the police department is likely leading on the data front in Peoria, its data isn't consumable until it is aggregated and cleaned. Dedicating staff time to this task has been challenging in a resource-constrained environment. To address this, the Innovation Team has been identifying gaps to determine where capturing data would be particularly relevant and create the most impact.

Continuing to drive innovation in a challenging budget environment is a struggle for many small and midsize communities. Peoria has continued to push the needle through partnerships (public and private) that generate ideas and innovations that showcase the city as a ready and willing partner to those that are interested in investing and testing technology solutions that can improve the lives of residents.

Takeaways

With the right leadership, small and midsize communities can be powerful targets of opportunity for economic development and technological growth. Building partnerships creates a multiplying effect on the advocacy a city needs to bring in private sector partners. By leveraging its convening power and building the capacity of other groups, Peoria has created pathways for advancement outside of city hall. Laying the groundwork for these relationships to take hold and flourish is an important catalyst for future smart community interventions.

Based on an interview with Peoria Chief Innovation Officer Anthony Corso



Peoria Area Collective Intelligence Workshop, 2016

South Portland, Maine



COMMUNITY PROFILE

Population: 25,483

Operating Budget: \$101,024,683

Area: 12.93 square miles

Median Household Income: \$56,250

Education: 42.6 percent of residents have a bachelor's degree or higher

A small coastal community in southern Maine, South Portland is home to a working waterfront, computer chip factories, and robust retail activity. Smart community activities in South Portland have largely been driven by the planning, sustainability, and information technology departments.

In 2014, South Portland partnered with Internet service provider GWI to install fiber that would provide Internet service roughly 100 times faster than the majority of the state, to the main corridor of South Portland. With the city serving as the initial customer, schools, municipal offices, as well as residents and businesses, now have access to a high-speed broadband network. This investment aided in laying the foundation for smart community work that the city is continuing to explore.

While South Portland doesn't have a formal plan for smart community projects, it is successfully utilizing technology throughout the organization to make inspections more efficient with the use of tablets capturing real-time data; utilizing GIS to understand energy and power systems and how they can meet their carbon reduction goals; and using apps that have helped to track street repairs being done by multiple agencies.

Smart Lighting

South Portland's newest effort will be the purchase and installation of LED street lights with smart controls. Previously, the city leased traditional, high-pressure sodium lights from Central Maine Power at a substantial cost. By partnering regionally for legislative reform, South Portland was able to acquire the street lights on utility-owned poles.

Street lights are among the most expensive municipal assets, often consuming as much as 25-50 percent of a city's total energy budget^{ix}.

With its newfound ability to convert to more efficient lights, South Portland set out to find a vendor to support the transition. A full investment-grade audit was conducted to inventory lighting throughout the city to understand existing wattage. This allowed for accurate estimates of energy saving potential that would come with a transition to LED lights.

South Portland is estimated to reduce its annual electricity consumption from street lights by 69 percent and save 80 percent on the average annual cost per fixture.^x

Residents were invited to five different sites throughout the city to provide feedback on design and color temperature of the street lights. The city is now on track to install LED lights along with a smart control system. While the smart controls come at an additional cost, the council went with the staff recommendation to incur the expense during the installation, which would be far less expensive than deciding on installation at a later date. Controls allow the city to take a more proactive approach toward maintenance and give staff the flexibility to respond to resident requests for individual or groups of lights. The controls also monitor electricity and will have the ability to dim based on times of day to reduce energy consumption.

Challenges

Understanding electricity consumption throughout the city continues to be a challenge. Currently, there is no systematic way to aggregate utility costs from all the Central Maine Power meters. This has forced the city to work with individual property owners to aggregate data from individual tenants, which is time-consuming and inefficient. More timely and efficient data could support policy and design decisions to reduce consumption and help the city meet more of its carbon reduction targets.

There is far more potential to expand the fiber network and include neighborhoods outside of the main corridor. However, there is debate about how much local government should be subsidizing this effort. Currently, the city doesn't have the resources to do this

but is exploring public/private partnerships and other regional or group agreements that might help to distribute costs.

Takeaways

Technology investments in South Portland are part of a larger approach to local economic development. Highlighting the fiber and LED street light projects builds interest among other potential partners. The fiber project brought the local community college to the table and allowed it to provide more robust online programming and streaming between campuses. Other businesses are looking into doing small fiber extensions to support their operations.

"There is a very real competition between cities across the country to attract talented workers. Some cities are losing and will suffer for it. Others are doing well and will be able to enjoy the benefits of vital economies and active communities. We're trying to be the latter." – South Portland Planning and Development Director Tex Haeuser

Working regionally can be key to overcoming legislative barriers. Three attempts were made in 2003, 2005, and 2011 to pass legislation at the state level that would have allowed municipalities to own their own street lights on utility-owned poles. Working with the neighboring communities of Falmouth, Portland, and Rockland to form the Municipal Street Light Group is part of what made converting to LED lights possible.

Based on interviews with South Portland Planning and Development Director Tex Haeuser and Finance Director Greg L'Heureux

Key Considerations

“The smarter city managers of 2040 will be leading an interconnected community of sensors, automation, data, IoT, and artificially intelligent technologies that will enable them to visualize issues and challenges in ways that today’s managers cannot.”^{xi}

Creating and executing a vision for communities of the future will take courageous leadership. With the right tools, local government managers are poised to be at the forefront of those thriving and interconnected communities of every size. While the communities featured in this paper were on different points on the planning continuum, they each shared common lessons learned, key considerations, and challenges moving forward. Many smart technologies may seem like they belong to a distant future, while others have become practically necessary overnight. Navigating the needs of individual communities will require leaders open to new and innovative solutions from unconventional partners, often-times outside of their organizations or even jurisdictions. As managers begin to grapple with what is possible, there are some key questions worth considering.

Does your community have the conditions to foster smart solutions?

Communities that have the support of elected officials, staff, and community members already have the first building block in place to implement smarter solutions. Having discussions about a vision for the future, along with what residents and stakeholders value, will allow technology to play a supportive versus leading role in creating smart solutions. Incorporating technology solutions into broader planning and performance expectations will help staff and community members see that technology provides a path to providing better services and more livable communities ^{xii}

Can my IT infrastructure handle the data that comes with a smart technology solution?

Having more data undoubtedly drives more informed management decisions, and even provides a level of predictability, through data analytics, that was not available to most communities in the past. However, technology solutions require end-to-end considerations to ensure that resources are in place to handle large amounts of data. Body-worn cameras provide a timely example. Many jurisdictions implemented body-worn camera

programs, but then didn’t have the storage space or technical capacity to deal with collection and analysis of the data.

Security is another key component of this question. Understanding public records legislation in a particular jurisdiction is important to understanding how the data that is collected is classified. Is the data a public record? Does it contain individual sensitive information that needs to be secured? Are there federal Homeland Security implications? These are all questions that will need to inform the security of data as well as the physical IT assets within a jurisdiction.

How will my human resources needs shift as a result of smart technology implementation?

As more functions become automated, it will be important to understand how employees that previously handled monitoring or maintenance functions might be impacted. In the case of Lakeland, Florida, staff who previously did manual reading of water levels were easily retrained to use the application associated with the sensors. On the other hand, as Bellevue has experienced natural attrition, it has used that as an opportunity to reconsider the type of FTE required to meet the future needs of the community.

Who are the critical partners and what is the status of those relationships?

In every example, partnerships both within and outside of the municipality were critical to the success of smart community projects. Cross-departmental collaboration was fundamental in every case, and while that was informal in some communities and formalized through working groups or innovation teams in others, leadership must support a culture for those relationships to occur.

Community partners are the connection between smart technology solutions and economic growth. The vast majority of small and midsize communities will not be able to take on the technology and infrastructure investments they need to be successful in the future by themselves. Bringing neighboring jurisdictions, academic institutions, private sector businesses, and community groups to the table to co-create solutions can lead to co-financing, laying the groundwork to attract the next generation of residents excited by the community’s potential.

About the Author

Jessica Johnston is a Program Director at ICMA on the Global Programs Team. Jessica oversees a portfolio of local government technical assistance projects and contributes regularly to ICMA's research and content. She holds a B.A. in Peace and Conflict Studies from Chapman University and an M.S. in Public Policy and Management from Carnegie Mellon.

Endnotes

- i https://www.intelligentcommunity.org/from_smart_cities_to_intelligent_communities
- ii <https://icma.org/documents/icma-survey-research-2016-smart-cities-survey-snapshot>
- iii <http://www.smartcities.ipat.gatech.edu/georgia-smart>
- iv <https://www.cmu.edu/metro21/news-and-events/metro21-events/2018/fire-prediction-press-conference.html>
- v <https://icma.org/documents/smart-solutions-technology-serving-communities-e-book>
- vi https://www.chordant.io/white_papers/abi-research-role-of-smart-cities-for-economic-development
- vii <http://www.govtech.com/biz/Vermont-City-Real-Estate-Startup-Try-Out-Blockchain-for-Recording-Property-Transactions.html>
- viii https://icma.org/sites/default/files/308803_E-43026.pdf
- ix <https://aceee.org/partnerships-reduce-energy-use-public-outdoor>
- x <http://www.southportland.org/departments/planning-and-development/street-lights/>
- xi To be released ICMA and IBM Leading Cities of the Future Report
- xii <https://icma.org/documents/smart-solutions-technology-serving-communities-e-book>

ICMA, the International City/County Management Association, advances professional local government through leadership, management, innovation, and ethics. ICMA provides member support, publications, data, and information; peer and results-oriented assistance; and training and professional development to more than 12,000 city, town, and county experts and other individuals and organizations throughout the world. The management decisions made by ICMA's members affect millions of individuals living in thousands of communities, from small villages and towns to large metropolitan areas.

Siemens helps create perfect places to live and work by leveraging innovation that saves money and reduces energy, creating smarter and sustainable communities. We implement energy conservation solutions for all building types and campuses by partnering with local, diverse supplier bases. Along with our foundation, we regularly contribute to social sustainability by using these infrastructure upgrades to promote living labs and STEM education, thereby stimulating local economic development and job creation. Our extensive expertise in guaranteed performance-based solutions, combined with our scalable, proven portfolio, allows Siemens to efficiently and effectively meet the needs of all cities.