Make your city smarter

The 6 best practices for a successful smart city project

Key areas of focus

Traffic management  Public safety  Sustainability

Parking management  Public-Private Partnership  Energy savings
INTRODUCTION

The concept of Smart Cities has been around for a while. The question many cities are grappling with is how to make their city smarter so that they can maximize resources and help their residents.

In essence, the difference between a smart city and a city that doesn't use smart technology solutions is like the difference between someone who uses a smart phone and someone who doesn't. The person who has the smart phone can use an incredible array of technology and apps to accomplish more, save more, make wiser investments of time and money, be more efficient, and enrich their quality of life.

In the same way, a smart city is a municipality that uses communication technologies to increase operational efficiencies, enhance public safety, engage citizens, help manage traffic, build environmentally friendly services, and more.

WHAT IS A SMART CITY?

The integration of technology with a strategic approach to sustainability, cost reduction, citizen well-being, and economic development.

Utilities  
Supply chain  
Vehicles  
Homes  
Metering  
Health  
Security  
Equipment

Interoperability – Data Aggregation – Single Interface

In this white paper, we will look at some of the challenges facing city leaders and residents, and we will outline the 6 best practices for a successful smart city project. We base these recommendations on the experience we’ve had working with numerous cities and municipalities of all sizes, helping them implement their own smart city solutions.
SECTION 1: GROWING CITIES, GROWING CHALLENGES

As the populations of small, medium, and large U.S. cities grow, they face an increasing number of challenges associated with urbanization.

U.S. census studies show urban county populations have increased by 13% while rural county populations continue to decline. Globally, 3.7 billion people currently live in urban cities, and that figure is expected to double by 2050, according to the Center for Strategic and International Studies.

Understanding and addressing current challenges and trends will be an integral part of creating livable and sustainable cities in the future. Some of these challenges and trends include:

**Commuting**

In most cases, city dwellers’ number-one issue is transportation and traffic congestion. Naturally, transportation has become a starting point for many smart city projects.

According to a study by the Texas A&M Transportation Institute (TTI) and INRIX, American drivers waste approximately 6.9 billion hours stuck in traffic — that’s about 42 hours a year per rush-hour commuter, on average.

And that’s before commuters even find parking spaces. According to USA Today, drivers spend an average of 17 hours a year searching for parking spots.¹ With citizens spending so much time behind the wheel, there is significant room for improving transportation inefficiencies with smart solutions.

**Health and wellness**

Excessive drive times for commutes increase tension and stress, which can affect a person’s health. The perception is that after a long day, a resident should be able to go home to relax. Yet, we are finding that home life in the city can cause anxiety rather than relieve it.

Many city residents find it difficult to relax completely while at home. Studies show that those living in the city may have trouble sleeping because of public safety concerns or the loud noises of ‘city living.’ Those factors raised the risk of anxiety and mood disorders by 21% and 39%, respectively.² Smart city solutions can be implemented to make city living easier and improve a person’s health and quality of life.

**Energy consumption**

Urban areas consume massive amounts of energy and remain a large source of greenhouse gases. Cities account for between 60-80% of the world’s energy consumption and generate as much as 70% of all greenhouse gas emissions, so addressing sustainability is a major challenge.³

**Thinking smart**

Most city governments embrace the compelling environmental, financial, and social cases for the development of smart cities.

For example, in many modern cities, public lighting accounts for half of the city’s energy budget.⁴ Smart LED lights could use up to 50% less power than traditional lights, while helping to improve safety with better illumination.

Another example that shows the potential of smart cities technology is installing sensors to existing light poles. This can give cities near real-time information on rush hour delays, air quality, sound detection, parking, and more. Just by targeting lighting, a city can begin to cost-effectively address several city challenges.

With all of the concerns that smart city projects can address, what’s keeping municipal leaders from investing in smart city projects?

SECTION 2: CHALLENGES FOR CITIES THAT WANT TO GET SMART

For city leaders, starting and integrating smart city solutions can be intimidating. Common challenges include:

- Lack of knowledge
- Budget constraints
- Getting buy-in from stakeholders
- Being able to demonstrate success metrics
- Anticipating project complexity

All these factors can cause hesitation in the smart city planning process. And with good reason. If you don’t work with the right smart city solutions provider, a city leader’s reservations can be justified: nearly 70%⁵ of smart cities projects fail at the proof-of-concept stage and only 16%⁶ of cities can self-fund these initiatives. The stakes are high to get it right.

However, the overwhelming promise of the smart city is driving cities of all sizes to explore and initiate smart cities projects.

The good news for city leaders is the latest innovations in smart city models have the flexibility to help solve immediate needs and engage residents in a meaningful way while providing a unique funding model.

SECTION 3: THE 6 BEST PRACTICES FOR IMPLEMENTING SMART CITY SOLUTIONS

Cities that are contemplating or planning investing in smart city solutions can learn from those who have successfully implemented their own. In our work with cities across the nation, we have identified the 6 best practices that we recommend be included in an effective smart city strategy:

1. **Ensure interoperability of systems**
   - The benefits of connected smart devices and big data are maximized when there is interoperability across different technology platforms and city departments. Why? It’s all about the data.
   - Data provides the central pillar of information for urban planners, architects, developers, and transportation providers, as well as for provisioning public services. It is imperative that you have network interoperability with your smart cities solution provider to ensure that data is properly collected, transported and dissected. That’s how you get the most out of a smart city solution.
   - Making sure you have systems that work together can enable powerful change, such as a more efficient use of resources, faster, more informed decision making, greater transparency, and the development of new services and applications.

   For example, by using smart phone and smart meter solutions, consumers themselves can measure, monitor, control, and influence their own energy consumption and make informed decisions about their water usage pattern and adjust accordingly. In addition, the city can reduce operating expenses with remote meter reading capabilities, tamper detection, and leak detection.

   In cities like San Diego and Atlanta, the city’s street lighting has been transformed into a connected digital infrastructure to help make the city smarter and safer. The solution works virtually seamlessly with the city’s network infrastructure. Systems talk to systems, and data moves from sensors across the cloud and over the network.

2. **Incorporate sustainability**
   - With booming urbanization comes the need for city leaders to improve the efficiency of public services that affect the health of citizens and the environment. Energy, water, waste, and carbon emissions are just a few environmental programs that are challenges for most municipalities. Collaborating with a company that has developed and implemented best practices in these areas can be critical to achieving sustainability program goals through smart city technology.

   **Energy**
   - The world’s cities account for 60–80% of energy consumption and 75% of carbon emissions. As a result, cities often prioritize energy efficiency in their smart city planning efforts. Our experience has shown that the results can be significant.
   - Some of the smart city energy management programs that we have implemented at our own company have resulted in over $575 million in annualized savings since 2010, a 45% reduction in energy intensity (a measure of energy inefficiency) since 2013, and a commitment to achieve 60% by 2020.

   **Water**
   - City managers know the ongoing struggle to conserve water. Nearly 2.1 trillion gallons of water are lost each year in the U.S. because of aging and leaky pipes, broken water mains, and faulty meters.
   - In our experience, we’ve found that a smart irrigation solution can greatly reduce water consumption. We implemented a smart irrigation solution at 40 facilities generating a savings of 16.7 million gallons over a 6-month period. Since 2013, AT&T water projects have achieved an overall annualized water savings of 352 million gallons. Our goal is to reduce water intensity 60% by 2020.

---

**Footnotes:**

7 Badger interview
We also helped a large retail chain reduce its water use at facilities by about 650 million gallons and save an estimated $5 million in total water costs.\(^\text{15}\)

**Greenhouse gas**

Cities produce most of our harmful greenhouse gases (GHG), but also have the potential to create the greatest efficiencies.\(^\text{12}\) Across the globe, cities are scaling their efforts to tackle climate change, reduce carbon emissions, and improve air quality for their citizens. It is important to choose solutions that will help propose a low-carbon economy.

**Waste**

According to the National League of Cities, Americans generate more waste than any other country in the world. The EPA suggests that as much as 75% of all waste is recyclable and compostable, even though over half of that material ends up in landfills.\(^\text{13}\)

Additionally, the environmental impact of food waste can be staggering. According to the U.S. EPA, 97% of food waste in this country ends up in landfills — over 80 billion pounds.\(^\text{14}\)

Recycling, food waste, and energy efficiency are key focus areas of many cities wanting to improve their sustainability posture.

A mature smart city sustainability model can cover various environmental challenges cities may face. With the data collected, you can get sustainability reports that include how much waste was diverted from landfills, reductions in greenhouse gas emissions, and the amount of renewable energy your solution generated.

**Smart lighting**

With lighting, as with all the other sustainability areas, the ability to scale is crucial.

Imagine a smart light pole that could help lower civic costs, increase city efficiencies, drive economic growth, engage citizens, and improve city life in ways never imagined. Many cities are starting with smart solutions for LED street lights. The lights last longer, use much less energy, and with smart controls, can make the streets safer for citizens. By adding sensor technology, cities can transform their lighting infrastructure into an all-knowing data intelligence network. Now imagine these smart lighting units all over the city.

Having a data intelligence network creates the infrastructure and data to enable cities to enlist the greater community to help solve civic issues. Citizens, developers, start-ups, universities, entrepreneurs, and companies with niche expertise can bring ideas to the table, and these smart lights can be used to bring concepts to life.

A few of the potential benefits include:

- Energy and maintenance cost savings
- Increased public safety
- Increased hazard visibility
- Traffic management and smart parking
- Reduction in carbon footprint

The integration of smart lighting in city planning efforts will continue to grow in coming years. Also, the deployment of 5G is expected to enable new IoT use cases.

---


\(^\text{15}\)AT&T 10x Case Study: Lowe’s uses HydroPoint and AT&T to Reduce Water Consumption and Carbon Footprint
3. Implement citywide connectivity and security

Making sure you have the right network connections, capacity, and security is key. Smart cities solutions need to have the right kind of connectivity for the right application. For example, streaming video and public Wi-Fi need highly reliable switched Ethernet or fiber connectivity, while some solutions like smart metering need to transmit less data and can use wireless coverage (like LTE-M, which is cellular coverage built for IoT).

But being able to transmit, collect, and process the data is not the only consideration. You must also protect the data and network. As you consider the security of smart city technologies, you should be looking to implement a multi-layered approach. Your security should defend the end points, connectivity, and your data and applications, through overall end to end threat management. This approach offers you the flexibility to meet the security needs of devices, assets, and applications.

The proliferation of IoT connected devices opens several new attack points in a solution, making cybersecurity a primary consideration for any smart city initiative.

4. Utilize smart cities technology to support public safety services

Unfortunately, natural and man-made disasters can strike a community at any moment. Local governments have a responsibility to maintain the welfare of their citizens through well-rounded public safety initiatives. A city’s fire and police services, emergency communications, and disaster preparedness all play a pivotal role in ensuring citizens can rest easier.

When smart city initiatives intersect with public safety departments, good things can happen. With urban monitoring and city surveillance, cities can use near real-time data and predictive analytics to make their city, events, and transportation safer and more efficient.

For example, Miami-Dade County deployed remote monitoring and upgraded the county’s existing infrastructure to intelligent LED lighting with the desire to reduce crime in certain areas.¹⁶ A study by Crime Lab New York found that increased levels of lighting led to a 7% overall reduction in crimes and a 39% reduction in index crimes that took place at night.¹⁷

Another area where smart cities solutions can potentially make a difference is gun-related violence. According to the National League of Cities, cities are working to make their communities safer, especially when it comes to gun-related violence.¹⁸ In Atlanta, 5 high crime areas were identified where a digital infrastructure platform was installed, which supports gunshot detection and video surveillance.

---

¹⁷https://urbanlabs.uchicago.edu/projects/crime-lights-study
¹⁸https://www.nlc.org/sites/default/files/2018-05/NLC%20State%20of%20the%20Cities%202018%20FINAL%20WEB.pdf
In addition, smart cities can take advantage of FirstNet, the nation’s first high-speed unified network of communication for emergency responders. This wireless broadband network will allow police, firefighters, and emergency medical services personnel the ability to quickly engage each other in cross-agency communication when disaster strikes.

Did you know that first responders across the country currently rely on more than 10,000 separate radio networks which often do not interoperate with one another? By deploying a nationwide broadband public safety network built specifically to meet the communications needs of first responders, the FirstNet network will provide a solution to the decades-long interoperability and communications challenges first responders have experienced.

This example of a first responder radio network emphasizes the first practice on this list: making sure your city technology systems interoperate with each other. It’s vital for your city systems to work cohesively together to help achieve the most efficient outcomes.

5. Tackle traffic issues from multiple angles

According to the U.S. Census Bureau nearly 80% of Americans live in urban communities.¹⁹ As people migrate from rural areas to more urbanized communities, traffic and transportation issues continue to be a challenge for city planners.

Building additional off-street parking is not always a viable solution given time, budget and zoning constraints. Some cities are investigating solutions such as parking prices that fluctuate based on demand to improve space availability. Others are revamping parking permit policies and updating zoning laws to allow for transit-oriented developments. Other cities, like San Diego, have turned to data-driven solutions through IoT technology.

San Diego’s smart city goals include cutting greenhouse gas emissions in half by 2035, to create better traffic flow, improve public safety, and use existing infrastructure more efficiently. To do this, the city is transforming its street lighting into a connected digital infrastructure by deploying the U.S.’s largest twenty city IoT sensor platform. The near real-time sensor data delivered from across the city will be used to develop applications that tackle traffic issues. (A recent report by Smart Cities World Profiles of San Diego dated November 2018²¹ highlighted the strategies and tools being used to help San Diego meet its goals.)

Another area that we understand San Diego wants to address is parking. The city estimates that up to 30% of traffic is drivers looking for parking spaces. In a trial, sensors were installed on parking meters to track how often they were occupied.²¹ This has already helped achieve higher levels of utilization of available parking spaces.

Taking it a step further with an intelligent node deployment, San Diego is working to leverage data to enhance on-street parking availability. The city also allows people to pay for parking with their cell phones at 2,100 of the city’s 5,700 metered spots. The service includes an option which alerts drivers with a text message when their allotted meter time is close to running out.²¹

Data being collected from the intelligent nodes is also being used to re-time stoplights to keep vehicles and pedestrians moving more efficiently. Results of a trial released in 2017 found that the smart traffic signals reduced travel time by as much as 25% and decreased the number of vehicle stops by up to 53% during rush hour periods.

San Diego has 40 intersections with adaptive traffic signals and uses artificial intelligence to re-program signal timing based on traffic flow. They stay green longer during peak travel times. By 2020, the city plans to use the system on 200 traffic signals.²²

Improved parking and traffic management can help San Diego with congestion, climate goals and to afford its citizens a better quality of life.

6. Include Public-Private Partnerships (PPP(s)) in funding model

Cities have limited budgets to address single point solutions such as parking, traffic, gun violence, or air quality. To raise funds for these endeavors, cities traditionally have had limited choices such as tax increases or the issuance of municipal bonds. Today there is another option — PPP(s).

Several thought leadership organizations like Envision America, the U.S. Conference of Mayors, Smart City Council, and others have highlighted clearly that many, if not most, cities need some form of PPP to roll out smart city solutions.

A recent study by Black & Veatch showed that 60% of the cities surveyed view PPP(s) as the most effective financing model for smart city initiatives.²³
How does the PPP funding model work?
Funding any public project today requires out-of-the-box thinking. Outcome-based models enable cities to explore several financing options without the typical limitations associated with one specific financial provider. PPP agreements can include an end-to-end solution that monetizes data and provides the city with structured financing for key portions of infrastructure projects.

PPP(s) can provide a fully funded model for projects using both revenue-generating solutions and financing. Advertising, energy savings share, and stakeholder data can help minimize the risks associated with the projects as well as help to reduce the total level of funding requirement.

For any remaining portions that cannot be monetized, a creative structured financing/leasing solution could lead to a potential return on investment capital and cash flow coverage for the city.

PPP funding models may potentially include the following benefits to a city:
• $0 upfront
• 20-year execution of installation and maintenance
• Improvement of operating efficiencies
• Revenue generation
• Minimization of technology performance risk
• Economic development
• Digital inclusion

CONCLUSION
AT&T has been a pioneer in smart cities solutions, working for nearly a decade exploring and evaluating the impact of sensor technology. This work has resulted in collaborating, investing, and piloting different technologies with a variety of vendors to identify the best approaches to solve customer problems.

We have accumulated experience acquired in labs, from our strong ecosystem of alliances and relationships, and through real-life smart city deployments. We were also named a Leader in the 2018 Gartner Magic Quadrant for Managed Machine-to-Machine (M2M) Services, Worldwide. This experience and leadership can be of great benefit to any municipality exploring its smart city options.

With an innovative, flexible funding model, we can help every city embark on a smart city journey to address its needs and engage its citizens. Our focus is for our city customers to enhance the overall wellness of their communities and citizens through robust and highly secure smart cities solutions.

Whether your unique set of circumstances have been covered in this paper or not, we welcome the opportunity to discuss your challenges and how your city might benefit from a customized AT&T smart city solution.

Public-Private Partnerships

Municipalities view Public-Private Partnerships as the most effective financing model for smart city initiatives

For more information, please explore our smart cities resources.

© 2019 AT&T Intellectual Property. All rights reserved. AT&T, the Globe logo, and other marks are trademarks and service marks of AT&T Intellectual Property and/or AT&T affiliated companies. All other marks contained herein are the property of their respective owners. The information contained herein is not an offer, commitment, representation or warranty by AT&T and is subject to change. | 14402-043019