



# Smart Cities

## ITS Benefits, Costs, and Lessons Learned: 2017 Update Report

### Smart Cities

#### Highlights

- Smart Cities have the potential to integrate transportation, communications, environmental monitoring, utilities, public safety, and other city services by harnessing the power of data and communications technology.
- Deployments and pilot programs are commencing worldwide, with the essential aim of improving the daily lives and routines of residents.



### Introduction

*This factsheet is based on past evaluation data contained in the ITS Knowledge Resources database at: [www.itskrs.its.dot.gov](http://www.itskrs.its.dot.gov). The database is maintained by the U.S. DOT's ITS JPO Evaluation Program to support informed decision making regarding ITS investments by tracking the effectiveness of deployed ITS. The factsheet presents benefits, costs and lessons learned from past evaluations of ITS projects.*

With Intelligent Transportation Systems (ITS) laying the groundwork for innovative transportation solutions, many cities are currently serving as laboratories for new types of transportation services and cleaner transportation options leveraging those solutions. Smart Cities are emerging as a next-generation approach for city management by taking steps forward along the transportation technology continuum. Integrating ITS, connected vehicle technologies, automated vehicles, electric vehicles, and other advanced technologies – along with new mobility concepts that leverage the sharing economy – within the context of a city will provide enhanced travel experiences and make moving people and goods safer, more efficient, and more secure. By enhancing the effective management and operation of the transportation system, smart city solutions can leverage existing infrastructure investments, enhance mobility, sustainability, and livability for citizens and businesses, and greatly increase the attractiveness and competitiveness of cities and regions. The Smart City concept will connect transportation and non-transportation services to improve city services and the quality of life for residents.

The United States Department of Transportation (USDOT) and its Intelligent Transportation Systems Joint Program Office (ITS JPO) is committed to advancing the Smart City concept. Recently, the Department sponsored the Smart Cities Challenge [1], which invited medium-sized cities to submit proposals for up to \$40 million in support (in addition to private resources) to develop an integrated Smart City concept. After receiving 78 proposals from around the country, 7 finalists were selected, with an invitation to develop a more substantial operational concept of their ideas. Columbus, Ohio was ultimately selected as the winner of the Challenge, and will now develop their concept of utilizing transportation networks, human services, electric vehicle infrastructure, and integrated data exchange to ensure improvements in safety, mobility, the environment, and equitability of access.

The USDOT will continue to nurture this exciting advancement in city and transportation planning. In October 2016, the Department announced an additional \$65 million in grants to 4 of the Challenge finalists (Pittsburgh, San Francisco, Denver, and Portland) to aid in the

Globally, cities in many different locales are developing their own Smart City concepts. These efforts vary in scope and complexity, but share the USDOT's vision of improving mobility, connectivity, responsiveness, and concern for the environment and social equity. Notable deployments are currently underway in:

- Barcelona, Spain
- The Songdo International Business District (Seoul, South Korea)
- Singapore
- Vienna, Austria
- Milton Keynes, United Kingdom

## Benefits

The USDOT expects Smart City deployments to realize several important benefits, including:

- **Improved Safety:** by using advanced technologies, including connected vehicle technologies, to reduce the number of collisions, fatalities, and injuries for both vehicle occupants and non-vehicle occupants.
- **Enhanced Mobility:** by providing real-time traveler information and emerging mobility services to improve personal mobility for all citizens including people with lower incomes, people with disabilities, and older adults.
- **Enhanced Ladders of Opportunity:** by providing access to advanced technology and its benefits for underserved areas and residents, increasing connectivity to employment, education and other services, and contributing to revitalization by incentivize reinvestment in underserved communities.
- **Climate Change/Environmental Mitigation:** by implementing advanced technologies and policies that support a more sustainable and cost-effective relationship between transportation and the environment through more efficient fuel use and emissions reductions.

The Smart Cities Council's Readiness Guide [2] provides a similar explanation of expected benefits, as well as advice for practitioners considering or moving towards deployment.

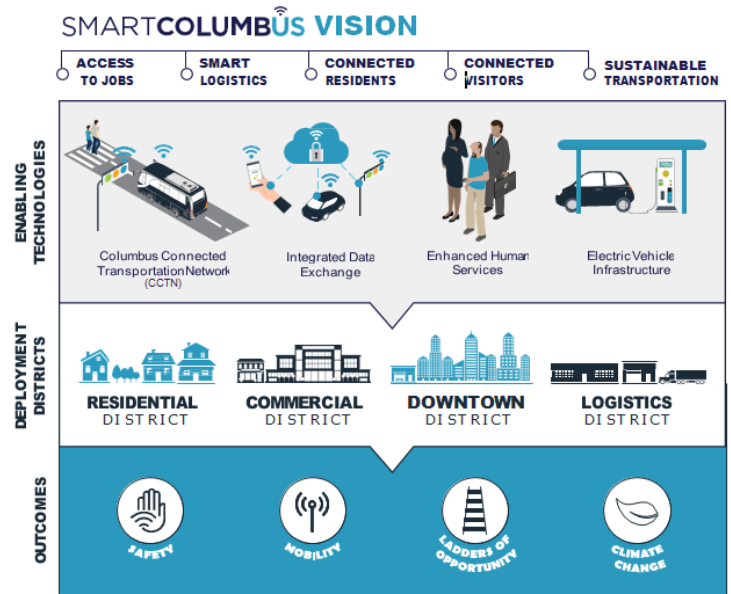
## Costs

As a new planning concept that is still in its formative stages, definitive cost information for Smart City deployments is currently difficult to accurately ascertain. A recent Fortune article [3] has found that the Barcelona, Spain Smart City Deployment, a large-scale citywide initiative, was funded through \$230 million of taxpayer funding. Private and industry partners are expected to contribute funding and expertise for most deployments.

## Lessons Learned

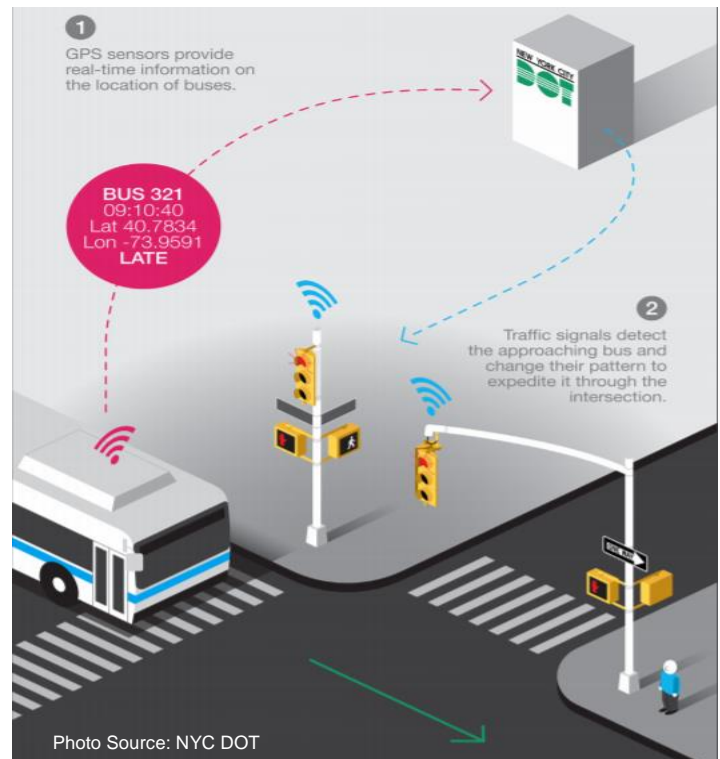
The ITS JPO has identified several trends during the scrutiny and review of the 78 city applications received for the Smart City Challenge [4]. While the development and deployment of the concept has yet to reach a level of maturity where definitive lessons learned can be divined, these insights, along with the development of the Columbus deployment, will prove critical for knowledge development. These insights include:

- Shared data would provide dynamic routing for truck traffic, promote off-peak and overnight deliveries, and enable car share operators to deliver packages (Seattle).



The Smart Cities Challenge received 78 applications from mid-sized cities, further evaluated 7 finalists, and selected Columbus, Ohio for deployment support

- Partnerships with industry leaders in the automotive and technology fields and academic institutions would help provide access to electric car shares, automated shuttles, and on-demand delivery trucks through integrated mobility applications (Detroit).
- “Radically programmable” city streets with dynamic markings that can change from loading zones, to thoroughfares, to spaces for street hockey, depending on the time of day and season (Boston).
- New connected autonomous shuttles would transport workers to Las Vegas Boulevard, and new solar powered electric vehicle charging stations would help reduce emissions (Las Vegas).
- Dynamically routed on-demand minibuses would provide affordable first mile/last mile transportation options to underserved communities (New Orleans).
- A network of multimodal transportation centers could serve as hubs for mobility, economic development, and community activity (Atlanta).



The Massachusetts Institute of Technology’s (MIT) [Sloan School of Management](#) [5] has identified several further lessons learned gleaned from the relatively mature smart city deployment in Amsterdam, Netherlands, including the importance of private sector data, the paramount role of a chief information officer, taking proper inventory, utilizing pilot projects, and the involvement of private citizens.

## Case Study – One New York

In April 2015, Mayor de Blasio announced the release of “One New York: The Plan for a Strong and Just City,” a comprehensive plan for a sustainable and resilient city for all New Yorkers that addresses the profound social, economic, and environmental challenges ahead [6]. Coordinated by the Mayor’s Office of Information and Technology, the New York City Smart City initiative provides a full-spectrum framework for the evolution of the Smart City concept, with an explicit emphasis placed on equity for all NYC residents. The city has proposed ten unique, complementary areas of focus:

- **Smart Transportation and Mobility:** Responsive Traffic Management and Traffic Signal Prioritization
- **Smart Buildings and Infrastructure:** Smart Indoor Lighting and Wireless Water Meters
- **Smart Energy and Environment:** Smart Waste Management and Water Quality Monitoring
- **Smart Public Health and Safety:** Air Quality Monitoring and Real-time Gunshot Detection
- **Smart Government and Community:** Snow Plow Tracking and 24/7 Service Requests

**New York City’s transportation initiatives have resulted in a 10% reduction in travel times and a 20% reduction in transit bus delays along selected routes**

The transportation elements of New York City’s plan will provide mobility and environment benefits for residents. The Midtown in Motion traffic management system uses real-time traffic flow information gathered from a variety of sources, including microwave sensors, traffic cameras, and EZPass transponders. This information is transmitted wirelessly to the NYCDOT’s TMC (traffic management center), where staff is alerted to congestion issues and alters signal timing to mitigate congestion. This system has resulted in a 10% improvement in travel times, with additional environmental benefits from reduced idling. Due to this initial success, Midtown in Motion has expanded in size and has recently been introduced to the Flushing area of Queens. In addition, the City’s use of the Transit Signal Priority (TSP) system has improved the efficiency and reliability of bus transit services. A bus equipped with TSP can “hold” a green signal as it approaches an intersection, or accelerate the cycle if the signal is currently red.

Equipped buses utilize GPS and location-based traffic software to communicate with the TMC using the City's NYCWin secure wireless network. This technology has resulted in a 20% reduction in bus transit delays along routes in Manhattan, Staten Island, and the Bronx. These and other Smart City efforts have been facilitated by the City's DataBridge data sharing platform, which incorporates data from 50 source systems across approximately 20 City and other organizations.

## References

- [1] United States Department of Transportation. "Smart City Challenge." <https://www.transportation.gov/smartcity>
- [2] Smart Cities Council. "Smart Cities Readiness Guide." <http://readinessguide.smartcitiescouncil.com/readiness-guide/transportation-0>
- [3] Kansas City Business Journal. "How much will KC's Smart City plan cost taxpayers?" <http://www.bizjournals.com/kansascity/blog/2015/02/how-much-will-kcs-smart-city-plan-cost-taxpayers.html>
- [4] United States Department of Transportation. "Smart City Challenge." <https://www.transportation.gov/sites/dot.gov/files/docs/Smart%20City%20Challenge%20Lessons%20Learned.pdf>
- [5] MIT Sloan Management Review. "Six Lessons From Amsterdam's Smart City Initiative." <http://sloanreview.mit.edu/article/six-lessons-from-amsterdams-smart-city-initiative/>
- [6] New York City Mayor's Office of Technology and Innovation. "Building a Smart + Equitable City." <https://www1.nyc.gov/site/forward/innovations/smartnyc.page>

All other data referenced is available through the ITS Knowledge Resources Database, which can be found at <http://www.itsknowledgeresources.its.dot.gov/>.