The Future of Safer and Smarter Cities

WASHINGTON | CORE

An agreed-upon definition of a "smart city" is hard to come by, but one can fairly characterize a smart city as one in which big data and intelligent devices are deployed to improve quality of life for its citizens. As a result of the proliferation of sensors and other connected devices, estimates suggest that the number of internet-connected devices worldwide could reach 75 billion by 2025, up from under 40 billion in 2020. From traffic to crime, internet access to health, we should all expect significant changes.

While it may be tempting to think that the COVID-19 pandemic has put smart city developments on hold, this could not be further from the truth. Heat sensors have been widely used to identify clusters of infection, and municipalities will be attuned to the potential for similar devices in building health-related resiliency. Moreover, it might be naive to suggest that uses for network tracking apps, such as the one co-developed by Google and Apple, will simply disappear after the present crisis subsides.

Governments will need big data to analyze and effectively respond to oncoming changes in shopping activity and the ways in which people choose to receive healthcare. Just as urgently, public transit agencies will come under huge strain due to changes in commuter activity, and require innovative, data-driven changes to stay relevant and profitable. The coronavirus will accelerate the rate of change in modern cities and the tightened economy will have little sympathy for those failing to adapt.

Where Do Things Stand?

A number of initiatives have been ongoing for some time. Citizens and visitors alike appreciate public kiosks that provide city maps and free Wi-Fi. Not only are they convenient, but municipal governments can use the screens to communicate public health advisories, promote local businesses, and generate advertisement revenue. Apps are in development to receive data from sensors in parking lots, enabling drivers to pick optimal parking spots based on location and price, which will fluctuate in real time in response to demand. San Francisco has already trialed such technology, with great success.

Commercial and public buildings use video analytics to produce all kinds of useful metrics. Pittsburgh International Airport connects security camera streams to software that predicts security line wait times and broadcasts the results online in real time. Such technology can be useful in healthcare facilities, grocery stores, and any other locations where understanding occupant mobility trends can be crucial.

Environmental sensors, collecting data about particulate matter, gas composition, and humidity, sound, and more, are dotted throughout major cities. These will be used to generate real-time insight about how health is impacted by various aspects of city living, such as traffic and constant exposure to noise and light. In a changing climate, devices providing information on water use and management could be key to reaching sustainable development goals worldwide.

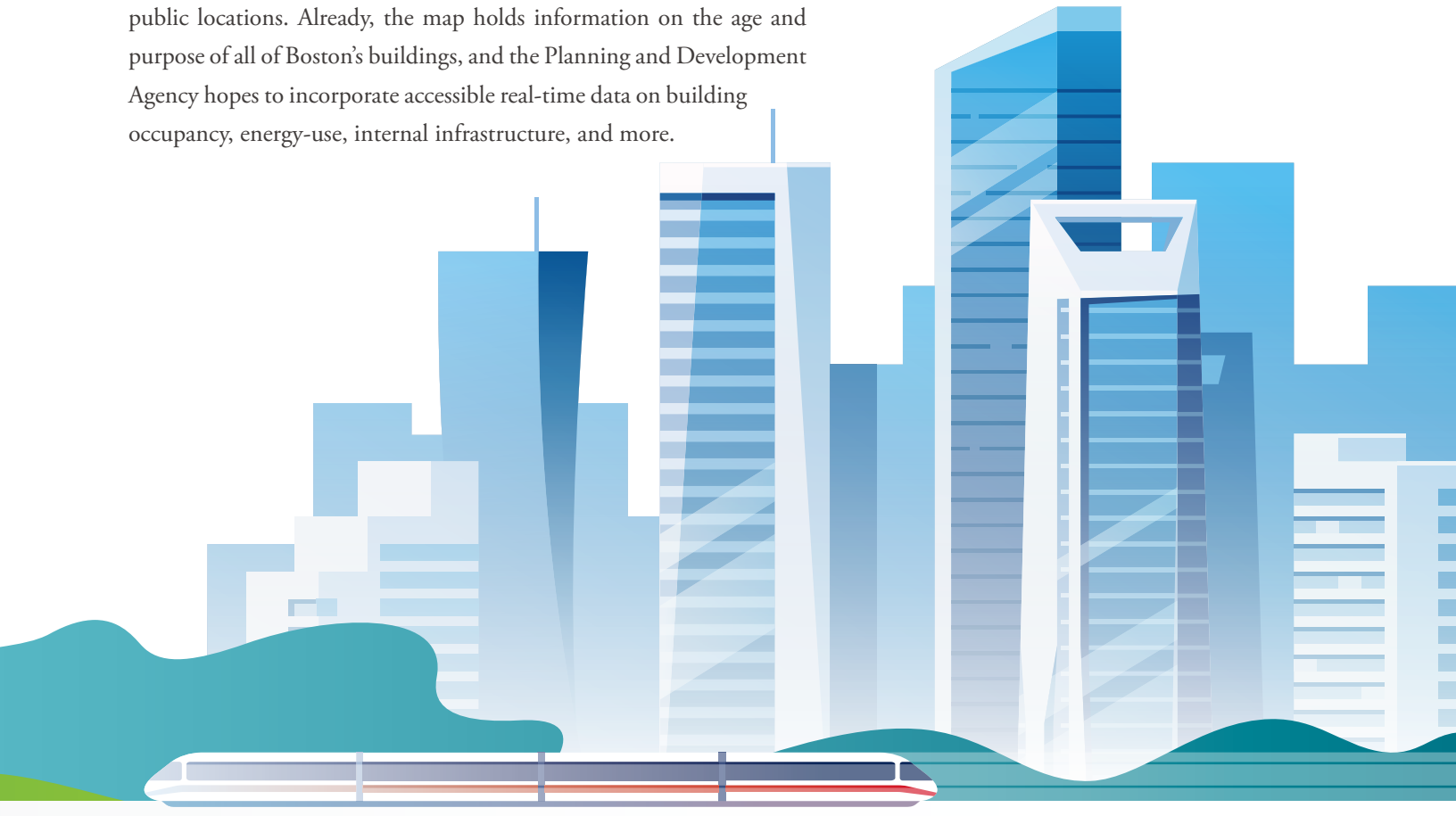
To help citizens navigate changing city landscapes and challenges, a growing number of projects are seeking to promote mobility-on-demand. This new concept aims to better integrate private vehicles and public transportation, as well as ride-share and bike-share applications to create seamless, multimodal and efficient options for urban movement.

Major Projects in Leading Cities

There already exists a robust market for smart city (Internet-of-Things) IoT solutions, with vendors offering platforms that can connect and configure disparate devices, aggregate data, and generate operable insights. Few places are ahead of the City of Las Vegas, where data captured for analysis by various sensors is shared via an open data portal. Among the projects in Vegas, visual sensors on crosswalks generate information on pedestrians and vehicles to optimize traffic signal timing, while other devices automatically alert city officials when trashcans are full to enhance pickup efficiency. The city has captured significant attention and private investment, such that it is now considered the international test-bed for smart city solutions.

Perhaps even more exciting, a 12-acre swathe of Toronto's waterfront is under development by Google's sister company, Sidewalk Labs. In its Waterfront revitalization plan, Sidewalk proposes infrastructure to support electric vehicles and digital navigation systems, sensors to track pedestrians and air quality, novel approaches to waste management and recycling, and even a network of tunnels to facilitate vehicle-free package deliveries. Data on all facets of Waterfront life will be collected and managed via a 'digital layer'. "Did I leave the stove on?" Automatic alerts may answer the question for homeowners (or the fire department). Sensors will track the flow of people and size of crowds, allowing officials to rapidly address overcrowding and congestion, now particularly pertinent to public health. For a clearer vision of the city of the future, keep one eye on Toronto.

An aspect of Sidewalk's plan that has been pioneered elsewhere is a comprehensive 3D map of the city's infrastructure, produced with aerial surveys and LiDAR. New York City's precise 3D maps have been a useful source of municipal revenue, having allowed for the accurate measurement of building footprints and subsequent calculation of tax liabilities. For now, citywide 3D maps are primarily used by architects and city planners to model environmental factors such as flood risk, safety factors such as the presence of hidden underground structures, and aesthetic factors such as views of city skylines. Boston's public 3D map helps enforce strict laws limiting shadows cast over significant public locations. Already, the map holds information on the age and purpose of all of Boston's buildings, and the Planning and Development Agency hopes to incorporate accessible real-time data on building occupancy, energy-use, internal infrastructure, and more.



Reasons for Caution

Unsurprisingly, there are concerns about potential negative consequences of progress towards a tech-reliant and data-driven society. Sidewalk's waterfront development has faced numerous delays due to protests and lawsuits related to citizens' data privacy concerns. Environmentalists bring up the billions of sensors that will eventually generate masses of hard-to-recycle electronic waste. Others express unease at growing vulnerability to cyberattacks. Public fear regularly stalls technological expansion; in 2019, Brussels became the first major city to ban 5G cell deployments over concerns that exposure to electromagnetic radiation increases cancer risk. In 2020, some are buying into theories linking 5G and coronavirus - a result of the existing skepticism.

As those with the capital to live faster and more connected lives move forwards, questions arise about whether certain populations will be left behind. In Boston, a mobile app that tracks smartphone movements in vehicles automatically detects potholes and reports findings to the relevant authorities. This has led to disproportionate attention given to neighborhoods where more people own smartphones, to the detriment of areas with more poor and elderly residents. Where smart technology creates opportunity in some city enclaves, it generates reasons for caution in others.

Contrasting attitudes to these concerns, and the regulations implemented as a result, lead to varying rates of progress. Chinese companies are now trying to lead the way in the development in facial recognition technologies, which the country uses to export smart city "safety & security" solutions around the globe. In China, public skepticism of such technology, driven by human rights and privacy considerations, is less influential, allowing cities to circumvent protests and delays such as those seen in Toronto.

If you don't already live in a smart city, you will soon, as challenges like the coronavirus pandemic will encourage leaders everywhere to step up their modernization efforts. Expect difficulty keeping track of all relevant developments in this space.

Author: Chimdi Obienu, Research Analyst
May, 2020