



Smarter cities are resilient cities

Technology and data can help cities absorb future growth and weather any shocks that come their way.



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Cities are complex systems with millions of moving parts and many concentrated risks. Their complexity and scale makes them vulnerable to disruptions—and when bottlenecks or bigger disasters strike, the ripple effects and economic losses can quickly spiral.

Smart technologies give local agencies new tools for taking preventive measures, responding to emergencies, and planning for longer-term sustainability and growth. A recent McKinsey Global Institute report outlines how dozens of currently available digital solutions for cities can make infrastructure systems more nimble and robust.

Cities seize up when transit, traffic flows, electrical grids, and other fundamental services are hit with bottlenecks and outages. But smart technologies can keep these systems running smoothly. Adding Internet of Things (IoT) sensors to existing infrastructure, for example, can help crews perform predictive maintenance on equipment, fixing problems before they turn into commuter delays, water main breaks, and blackouts.

By reducing the cost of gathering data about usage patterns, smart technologies give agencies and the public alike the real-time information they need to optimize existing systems. Some encourage people to use transit during off-hours, to change routes, to use less energy and water and to do so at different times of day, and to reduce strains on the formal healthcare system by encouraging preventive self-care.

To give just one example, dynamic electricity pricing relies on sophisticated meters to monitor usage precisely and charge consumers higher prices during periods of peak demand. Various pricing schemes and personalized feedback to the consumer can encourage conservation and shift the load to off-peak periods—and smoothing the peak reduces the

need to add capacity and the potential for brownouts during periods of high usage. The combination of digital monitoring and consumer notifications can similarly help cities improve waste management, recycling, and water conservation.

But local agencies are not just tasked with day-to-day operations. On those occasions when a true emergency strikes, the speed and coordination of first responders can be a matter of life and death. While the setup of emergency operations varies from city to city, technology has become essential to all the critical phases, from call centers to the field to the hospital admissions process.

MGI's research finds that cities can improve emergency response times by 20–35 percent by optimizing emergency call dispatching and synchronizing traffic lights for emergency vehicles. Newer emergency call systems have enhanced GPS capabilities to pinpoint the location of callers using mobile phones; they are also designed to be more secure from hackers and more resilient when call volume spikes. Some enable callers to submit video, images, and text to dispatchers so that first responders can have a clear picture of what to expect at the scene of an emergency.

When it comes to natural disasters, providing as much advance warning as possible enables the public to take precautionary measures or evacuate if necessary. Storm-tracking satellites and weather-prediction modeling have made dramatic advances. Some new early-warning systems for earthquakes will cause elevators to stop and open at the nearest floor so people are not trapped, send alerts to hospital operating rooms, and shut down the flow of natural gas in pipelines to reduce the risk of fires. Similar efforts are under way to develop systems that will give residents more warning of impending tornadoes.

In emergencies, people now stay glued to their smartphones. Where cities once relied on the news media to inform communities in peril, they now supplement those efforts by using social media channels. The flow of information runs two ways, with the public providing real-time digital updates that can help authorities assess damage and deploy resources. Cities can crowdsource data gleaned from Twitter, Waze, or specially designed websites and mobile apps to piece together a picture of which evacuation routes are passable, where power is out, and whether specific shelters are full.

Thousands of calls for help can strain a city's resources and first responders to the limit in an emergency, and a lack of information sharing across agencies and neighboring jurisdictions can hamper efforts. Command centers with big data dashboards and data visualization tools can help authorities monitor rapidly evolving situations, allocate help where it is needed, and coordinate multiple agencies. Drones are increasingly being used to survey damage over large areas, while robots are beginning to assist with search-and-rescue efforts.

The ability to manage things in the moment is one aspect of keeping cities resilient. Another is planning ahead to meet long-term challenges. Analyzing data sets at scale and using tools such as geospatial mapping can give city planners better insights and ultimately support smarter decisions about where to expand infrastructure systems to accommodate growth. Unlike traditional capital projects, smart solutions are often much faster and cheaper to introduce, enabling cities to become more responsive and adaptable.

The biggest long-term challenge of all is, of course, climate change. Urban areas consume over two-thirds of the world's energy and generate

roughly 70 percent of its greenhouse gas emissions. A host of smart technologies can help to reduce emissions. These include smart mobility options that discourage the use of private vehicles and cut down on idling traffic and delivery trucks. Intelligent building management systems and smart meters can reduce energy consumption. MGI's research finds that cities deploying a range of smart solutions could, on average, cut greenhouse gas emissions by 10–15 percent. Officials can also use big data, climate models, and predictive analytics to understand their vulnerabilities and plan accordingly—by, for example, mapping flooding risks and changing their zoning codes, or building levees and seawalls.

As cities face the dual challenges of managing everyday stresses and preparing for worst-case scenarios, they need to improve their operational capabilities and future-proof their infrastructure. Smart technologies can help on both fronts, although digitizing the urban environment means that cybersecurity is another critical priority. Forward-looking investment in building robust, flexible infrastructure systems can position cities to absorb future growth and weather the shocks that come their way. ■

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