Smart Cities – Modernizing Our Infrastructure as a Platform For Exciting Technology

By Clinton A. Vince and Jennifer Morrissey

In a decade or so, people may look back on the current time as an era of "smart". We have had "smart" devices for several years – phones, TV's, cars, power grids, etc. Now we are moving towards the "Smart Cities." But what does this mean?

The definition of a "Smart City" is elusive. There is tremendous hype in the media, in board rooms, in town halls, even at the dinner table. Conversations about Smart Cities may convey complexity. However, the concept of Smart Cities is relatively simple and elegant. A smart city uses an integrated approach to coordinate all essential services. It modernizes digital and physical infrastructure to make delivery of these services more efficient, useful, innovative, and exciting.

The backbone of a Smart City is "the grid" – another elusive term, at least to the average citizen. The grid is a combination of the electric power grid and advanced telecommunications systems interconnected with and supported by a host of sensors and devices that amass and analyze data real time. Through predictive analytics, machine learning, clean technology and, multidirectional communications, the grid will be used to optimize the efficiency of city operations and services, connect citizens, improve quality of life, and foster sustainability.

While interconnectedness can be achieved almost anywhere, cities (and sizeable communities) are the ideal scale for broad deployment and integration of smart technologies. Over 50 percent of the global population now live in urban areas, and it is projected that by 2050, more than two thirds of the world's population will reside in an urban setting. This growth trajectory means that cities will face increasing challenges in all aspects of their operations. Cities are particularly vulnerable to problems such as social imbalances, traffic congestion, pollution and strain on resources. It is recognized by mayors around the globe that deployment of sustainability strategies and becoming technologically smarter is necessary to improve quality of life in cities. In addition, it is understood that embracing advanced technologies will enable smart growth strategies which in turn leads to investment attraction and positive growth in cities.

For instance, a recent OECD study identifies a strong correlation between cities' environmental performance and prosperity. As the urban populations grow, so does the adverse effect on the environment, which in turn affects many aspects of the daily life. Municipal governments will need to implement strategies for sustainability and, in some regions, adaptation to a changing climate. This requires rapid acceleration towards a cleaner, healthier, and more economically viable city growth through improvements in efficiency, investments in renewable energy technologies, and corresponding regulatory reform. It also requires greening of urban infrastructure, transportation, land-use and development policies. Failure to make this shift will result in increased financial, public health and safety risks.

In addition to sustainability benefits, smart appliances, managed services for telemedicine, crowdsourcing apps, and so forth, can all improve the quality and convenience of daily life. Autonomous vehicles, mass transit made more efficient through data, and automation can connect underserved populations with more jobs and educational opportunities. Applications powered by artificial intelligence and smart streets can offer mobility to people with physical and cognitive disabilities. Smart cities increasingly incorporate computer-enabled networks, sensors, and software into buildings and infrastructure, where citizens and municipalities can control lighting, heating, and air conditioning. Sensor technologies can collect information in real time to manage traffic flow and energy use, and critical information can be deployed to do everything from reducing consumption of natural resources to empowering citizens to communicate more readily with first responders and with one another during an emergency.

The possibilities for a connected future are endless. To get there, however, will require breaking down silos to coordinate across technologies, sectors and disciplines. First, Smart Cities are powered by networks. Devices, people, businesses, and governments must all be able to connect securely, reliably, and quickly in order to share data to improve how people live, work, and manage their daily activities. Even while adopting the most current state of the art telecommunications and network technologies, a meaningful "Smart Cities" strategy must also pave the way for the integration of the next generation of wireless networks and services. This will have to occur not only in the telecommunications companies themselves but in all participating sectors of the economy. Additionally, inherent to any interconnected ecosystem, there are security challenges and altered expectations of privacy. A Smart Cities/Communities approach ensures that the increase in smart technology is accompanied by strategies to enhance cyber and physical security.

Much of the smart movement is consumer- or business-driven, but government leadership at all levels is essential. Building smart communities requires public officials to implement cooperative, interdisciplinary solutions for their constituents' most pressing problems. Policy structures must be created that nurture the evolution of Smart Cities/Communities programs. Among other things, this means creating incentives for businesses of all sizes to invest in the deployment and adoption of advanced technologies while ensuring the trust and safety of consumers.

Building broad community support for a Smart Cities/Communities program is a complex process that requires significant collaboration with community anchor institutions, consumers, and other stakeholders. A smart community can only thrive if its members are interacting with and leveraging the resources that make efficiencies and cost savings possible. As part of developing Smart Cities plans, local governments should also engage universities and NGOs to provide intellectual firepower and foster public trust.

Transportation is a key pillar of any "Smart City", as the efficient movement of people and goods is fundamental to any economy. Reliable transportation infrastructure connects people with goods, services, employment, opportunities, and, each other. When transportation infrastructure is powered by technology, cities will realize countless benefits such as reduced emissions as a result of widespread use of electric car shares, enhanced public safety arising from smart monitoring, reporting and routing of responders, and economic development due to connect underserved communities with employers through efficient, data-driven mass transit.

Energy and water are critical components of "Smart Cities" strategies. "Smart Cities" will incorporate a multi-directional grid and advanced clean energy technology solutions that will include a broad array of distributed energy resource measures. Smart Cities are electrified cities, so the changes must occur without sacrificing reliability. With respect to municipal water systems, there is increasing demand and higher expectations of reliability and quality of service. Smart technologies can be used to monitor and manage delivery systems.

Finally, implementation of these changes requires financing. Because of the varied benefits that will flow from the "Smart Cities", initiatives do not necessarily fit within the scope of traditional municipal infrastructure projects. An integrated, sustainable planning approach is required to look across sectors. Because of the integrated approach, creativity in financing will also be required. Government, industry, philanthropic, and community-based organizations should all have an interest in making Smart Cities work for their residents and may be poised to invest. As for cities, specifically, keep an eye on San Antonio and New Orleans – both with interesting Smart Cities initiatives underway that are focused on modernizing the electric grid as a platform that will assist the integration of other services, including advanced telecommunications and transportation along with a number of public safety measures.

This article was edited by Pardis Khayyer.

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