

Smart Cities and Broadband

Lessons from the Smart Cities Connect Conference / US Ignite Applications Summit

By Rollie Cole / *Sagamore Institute for Public Policy*

Recent broadband improvements, especially the growth of fiber networks, made possible the event I attended in June 2017 – Smart Cities Connect and the co-located US Ignite Applications Summit – and the applications discussed at the event will spur even more broadband growth. US Ignite, a nonprofit, public-private collaboration established by the U.S. government, encourages and supports applications that take advantage of the high speed, low latency and high reliability of fiber-based networks. The organization has helped support several dozen applications throughout its five-year history and expects some 65 new applications to come on line in 2017.

For example, Compute for Cancer helps identify new cancer treatments by crowdsourcing unused compute power on individuals' devices to run massive, complex calculations. The University of Louisiana at Lafayette is developing an immersive, networked, collaborative VR environment for education about energy technologies. And Sensco uses in-pipe turbines with wireless connections for water leak detection. With three such sensors (one each for hot, cold and triangulation), the application can spot and report leaks throughout a building. FTTH greatly facilitates transmitting these signals from the building to the water utility.

The existence of more and better applications increases the demand for FTTH, as it shows the benefits of having an FTTH network. Because these applications do not “emerge” from US Ignite until they are up and running somewhere, they provide concrete demonstrations of value, not just speculation.

With funding from the National Science Foundation, US Ignite promotes FTTH networks as test beds for developing more apps and more services. Some of the cities participating, including Chattanooga, Tennessee; Kansas City, Kansas; and Lafayette, Louisiana, have a dedicated office or a nonprofit whose primary mission is to promote and operate the test bed aspects of the network.

SMART-CITY APPS ENGAGE CITIZENS

The connection between smart cities and FTTH is less obvious because, so far, the apps that get most attention help the government improve its own operations or deal with its suppliers, not with citizens. At last year's Smart Cities Connect, some two dozen vendors promoted citizen engagement apps, which obviously required citizens to have access to some network, although not necessarily FTTH. But most cities (Austin, Texas, is a notable exception) have been reluctant to invest much money or time in pure citizen engagement, so only two such apps were exhibited at this year's conference.

That doesn't mean citizen engagement is a lost cause or that smart-city apps won't engage citizens. What has happened is both more subtle and, I hope, much more profound: Citizen engagement is being built into or added to other city services. To explain my optimism, let me describe my view of the smart-city movement.

I have studied government use of technology since the mid-1970s. Early on, like others in the field, I identified two patterns of government technology adoption, one of which is similar to technology adoption by private entities and

one of which is not. The first pattern, common to both governmental and nongovernmental organizations, is that technology adoption moves in stages. First-stage uses are internal to an organization; in the second stage, the organization distributes information (and later services) to outside users; third-stage uses facilitate interaction between inside and outside users.

The third stage may start with interaction only (like the citizen engagement apps of 2016) and then build interaction into services. The lesson of 2017 is that smart-city apps appear to be moving into this third stage. For example, first-generation automated meters were not even networked. To read a water, a natural gas or an electric meter, a reader had to drive or walk close to one – still a significant improvement over having to stand directly in front of it. Second-generation meters are connected wirelessly or via fiber networks so they can be read and controlled remotely. The third versions – a subject of much discussion at the Smart Cities Connect portion of the joint conference – allow utilities to share readings, and perhaps even some degree of control, with end users.

The number of items one can equip with instruments (to read and to control) is high enough that the increased bandwidth, decreased latency, and higher reliability of fiber-based networks are real advantages. Items such as streetlights number in the thousands, even in small towns.

IS INNOVATION NECESSARY FOR A SMART CITY?

The smart-city movement, however, amounts to more than the adoption of individual apps. Two defining features are worth emphasizing.

One is the value placed on gathering data, analyzing data, and basing decisions and action on data. Data-based management is worth more than it costs, perhaps many times more. For this reason, becoming a smart city often starts with urban instrumentation – installing measuring devices and thus gathering data. Sometimes, as with automated meters, these devices provide



Researchers from Case Western University show a US Ignite application leveraging three-dimensional images to explore human anatomy.

better ways to measure what cities were already measuring; sometimes, as with smart trash cans or smart parking lots, these devices measure things that were not measured before (whether a trash can needs to be emptied or a parking space is open).

Once a city places sensors everywhere, it has pushed its network close to many individual homes. At that point, the economics strongly favor extending the network to provide direct connections to citizens and collect subscriber fees from those citizens.

The second defining feature of smart cities is a focus on technology and innovation. Smart cities are committed to the idea that a better device, or a better process, exists or can be invented, and that the effort to find or invent it will be worth more than it costs. This brings me to the second pattern in government technology adoption, one I see much more frequently in government agencies than elsewhere: the not-invented-here syndrome (NIHS). Government

agencies are more likely than nonprofits or firms to insist that the technology they use be developed for them or at least heavily customized for them. Decades ago, this insistence sometimes applied even to what we now know as word processing and spreadsheets. (Thankfully, even the most NIHS-prone agencies no longer insist on developing their own word processing or spreadsheet software, although they might insist on custom templates and be reluctant to start with templates from another agency.)

Because of NIHS, many cities, and the vendors selling to them, start with the assumption that either new invention or heavy customization is required. The customization may not be in the device itself but in the way it is implemented or combined with other technology. People talk about learning from best practices of other agencies and other cities, but many still assume that any such lessons must be heavily customized.

Some city leaders assume that if a technology is likely to solve some city

Because data-based management is worth many times more than it costs, becoming a smart city often starts with installing measuring devices and gathering data.

problems, it is likely to solve many problems. This inspires them to develop such technology in their cities. Putting on my economic development analyst hat (my other day job), I would agree. However, not every city can be a hotbed of technology innovation, and no one city will be a hotbed for *all* such innovation. But a community that, through luck or diligence, finds a niche that fits its strengths and weaknesses can do well for itself.

If a city makes an effort to become a technology development center, having

a fiber network can help. It can connect the local players and tie them into support services and potential markets all over the globe.

The tension between standardization and customization still remains. Many definitions of a smart city assume the city is an incubator of the technology it uses for civic purposes and of technologies others use for civic and noncivic purposes. Though every city can become smart by focusing on data and technology, I predict many will do so by adopting standard or

only lightly customized processes and technologies developed outside the city. Despite all the hype about innovation, it's perfectly OK *not* to be a technology incubator; the benefits of technology adoption often flow more to those who follow than to those who lead or even develop the technology.

For example, almost 40 years ago, the city of Tacoma, Washington, spent a great deal of its own time and money working with NASA and the Department of Energy's Pacific Northwest Laboratory to develop an automated fire hydrant. It successfully used wireless technology to open and shut hydrants, but other cities expressed interest in these hydrants only if they had been thoroughly field-tested in some other city first. So Tacoma then worked on field testing and on documentation of those field tests as to the reliability of the device and the benefits actually delivered when it worked. Other cities were the beneficiaries of these efforts.

Some 40 years later, cities were still being warned at this conference (and the previous month, at the **BROADBAND COMMUNITIES** Summit) to check whether any proposed solution actually does what it claims to do and what benefits flow when the solution is put into practice. Indeed, much of US Ignite's effort is focused on developing documented field testing to meet this demand from cities with regard to any application they are not innovating.

IMPLICATIONS FOR FTTH

Though Smart Cities Connect showed that a community can become at least partially smart without an FTTH network in place, it also showed that development and implementation of smart-city projects are proceeding much faster in places with FTTH and that many of the most exciting applications, especially if they include citizen engagement, require FTTH to work well. Eventually, every fully smart city will be an FTTH city. ❖

Rollie Cole is a senior fellow at the Sagamore Institute for Policy Research. You can reach him at rolliecole@gmail.com.

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